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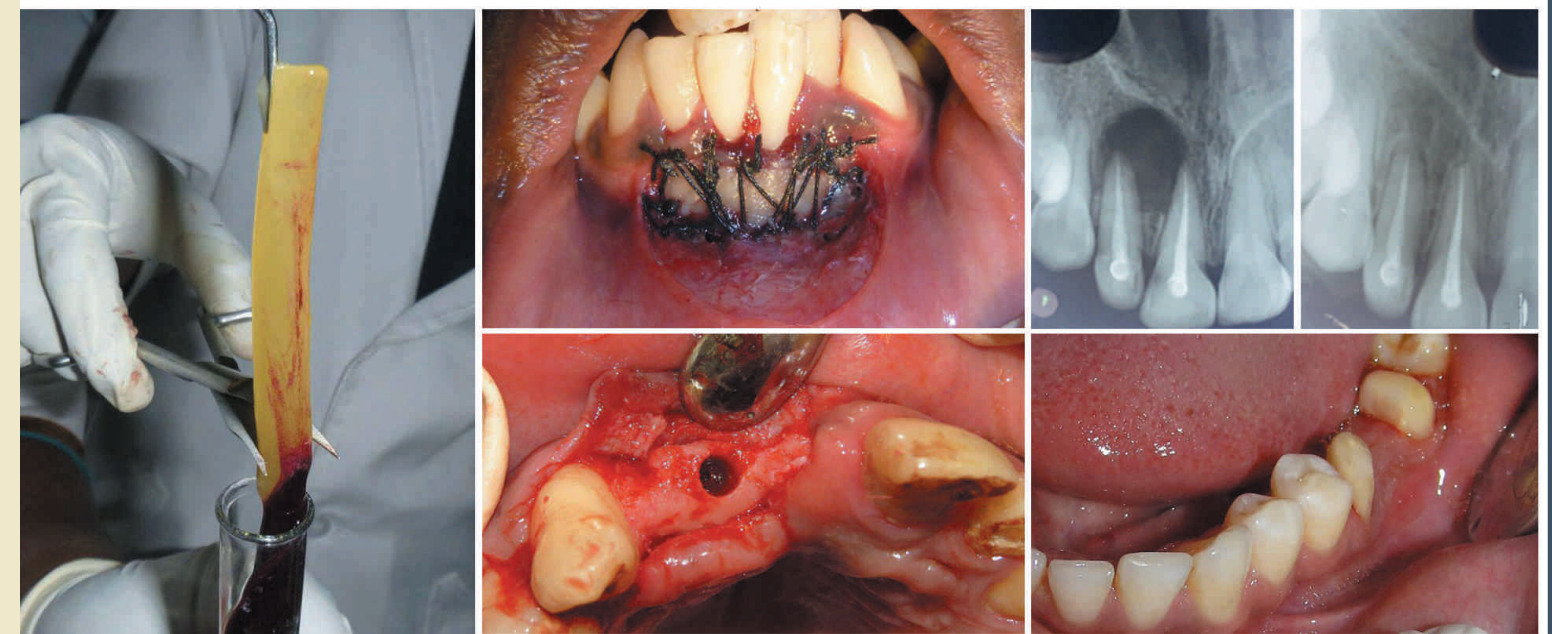
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 OF COCHIN
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Born in an informal meeting of 11 Periodontists of IDA Cochin branch on 3rd August 2004 COPS has today grown to one of the best regional professional societies in the field of dentistry in the state of Kerala. Over this period, COPS has served as a platform for more than 60 Professional Enrichment Programs including several state level conferences. COPS played an integral role in hosting the national conference of Indian Society of Periodontology in the year 2013. Having majority of its members as active academicians serving across the state, it was a dream of the society to have a scientific journal of its own, which is realized through Jcops, the official publication of Cochin Periodontists Society.

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JOURNAL OF COCHIN PERIODONTISTS SOCIETY (Jcops)

The Journal of Cochin Periodontists Society (Jcops) is the official publication of Cochin Periodontists Society. It is an initiative of the academic members of the COPS who works as undergraduate and postgraduate guides and teachers at various institutions across the state of Kerala. The journal has an equal affinity for articles with exclusive and interdisciplinary nature in the subject of Periodontology.

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Jcops will be circulated free of cost among all its life and associated members and every speciality departments of dental colleges across the state and major dental colleges across the country. This professional society journal is framed within the objective of supporting clinical practice, education and research in the field of dentistry.

Editor in Chief: **Dr. Biniraj K.R.**

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I feel extremely privileged to edit the first issue of Journal of Cochin Periodontists Society, the national publication of Cochin Periodontists Society aimed at contributing a group of high quality literature to the vast field of researches and practices in the field of dentistry. Living in an era where information has bypassed formal education, teachers being substituted by internet resources and training being confused with curriculum it is quite natural that an average reader tends to substitute text book based learning by a parallel stream of literature alike journals. In this context, I would like to dedicate the first editorial to a matter that every author of article of this kind of journal need to be aware of. Warm wishes to all readers of Jcops

We understand the true responsibility of a journal is to limit its objective only to provide first hand information and guide the reader to search for its true source of knowledge from where this tributary originated from - its references. If an article of journal is to be made worth reading, its content should be exclusively formatted and should not resemble the way such a topic is dealt in text books as a chapter.

Text books are always considered the true source of authentic knowledge, but it takes years together for a novel approach to be featured in a text book. Scientific journals are published more frequently and are circulated among its members and cover up different aspects of a speciality ranging from case reports to research conclusions and reviews which individually, could not be a part of any text book. In short, journals help in rapid dissemination of research and clinical conclusions and innovations, giving due credit to original authors and clinicians who publish it.

But presentation of an article in journal need to be more precise and focused than a text book and a presenter should be aware of the kind of reader the journal aims at. This can be compared with a cookery show where a master chef present the final step how a special dish is cooked. Every ingredient for this preparation is kept ready on the table and the presenter avoids the details on how each of these ingredients is made

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A text book would serve any type of a reader, be a beginner or a reviewer a heartfelt of knowledge, but a journal serve a handful of knowledge.

In short, journals are meant for seekers of information not formal education, text books contain seasoned materials meant for teachers to guide students. This cannot be substituted by parallel resources and, training of a beginner should be based upon text book materials, whereas an article in journal should be subjected to constant updating. Requesting the authors to utilize the platform of journal literature to publish and share their knowledge and skill to make it reach the one who seek for it. Let the target of articles of a speciality journals like Jcops be the ones, who has already attained the basic knowledge in the subject you would like to discuss with them.

Wish you all the very best!

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Prevalence of ABO blood groups among North Indian population with chronic periodontitis: A pilot study.

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ABSTRACT:

Periodontal disease is one of the major dental disease that affect human populations worldwide. Although it is primarily caused by bacterial plaque, its incidence and severity is modified by an individual's inflammatory response, systemic health, and various local factors that predispose to plaque accumulation. Only few investigations have been made to explore the relationships between ABO blood groups and the incidence of oral diseases, especially periodontitis. The present study is designed to evaluate the correlation between chronic periodontitis and ABO blood groups among North Indian population.

Key words: ABO Blood groups, Chronic Periodontitis, North Indian Population

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Introduction

In 1901, Landsteiner identified ABO blood groups as the first recognized human blood group system. The clinical significance of ABO blood type extends beyond transfusion medicine and solid organ/hematopoietic transplantation. To date, numerous reports have suggested important associations between ABO blood groups and various diseases, for example, gastric cancer,^[1] periodontal diseases,^[2] and cardio-metabolic diseases.^[3,4]

It is well known that periodontal disease can vary with respect to bacterial etiology, host response, and clinical disease progression. Although differences exist among the various types of periodontal diseases, all share the common characteristic of complex host-bacterial interactions. Disease

onset and progression reflect the balance between homeostasis and destruction of the periodontal tissues.^[5]

Although bacteria are the main cause of inflammatory periodontal disease, there is increasing evidence that host factors such as diabetes, smoking and genetic predisposition, contribute to the clinical appearance, distribution of lesions and severity of destruction in each individual. It has been estimated that less than 20% of the variability in periodontal disease severity can be explained by the quantity of specific bacteria found in disease-associated plaques. Instead, a key role for genetic effects has been suggested^[6]

The most important blood-typing system, the ABO blood type system comprises of four blood types: O, A, B and AB. Blood group O erythrocytes have no true antigen, but blood serum of

O-type individuals carries antibodies to both A and B antigens. Type A and B erythrocytes carry the A and B antigens, respectively, and make antibodies to the others. Type AB erythrocytes do not manufacture antibodies to other blood types because they have both A and B antigens^[7,8] Limited efforts have been made to investigate the relationship between ABO blood group and periodontal disease.

The aim of this pilot study was to investigate the prevalence of ABO blood groups among North Indian Population with chronic periodontitis.

Study Design

A cross-sectional study was designed with the following sample design.

Sample Design

A total of 100 systemically healthy patients with chronic periodontitis were randomly selected from private dental practices among North Indian population in the age group of 25 years to 75 years of both the sexes.

Population Description

20 individuals each from five states of North India who were diagnosed as chronic periodontitis patients and who were ready to give consent for the participation in the study were included. Individuals from Punjab, Haryana, Uttar Pradesh, Rajasthan and New Delhi were included in the study.

Inclusion criteria: All the participants were systemically healthy without any systemic disease and who were diagnosed as chronic periodontitis patients were included in this study.

Exclusion Criteria: Patients having systemic debilitating disease that may alter periodontal health and patients who underwent periodontal treatment and systemic antibiotic therapy in last three months was excluded from this study. Pregnant females and lactating mothers were also excluded.

Periodontal Examination

Full mouth examinations (excluding third molars) were conducted for all patients. Four sites were examined for each tooth (mesiobuccal, distobuccal, buccal, lingual).

Probing Pocket Depth (PPD) was recorded using a marked periodontal probe (William's Probe, Hu-Friedy, Chicago, IL, USA). Patients who exhibited more than 30% sites with probing pocket depth more than 3mm were diagnosed as chronic periodontitis patients.

Blood Analysis

Venous blood was collected from each subject, and analyzed for determination of ABO blood group and Rh factor after obtaining informed consent from all subjects. Blood samples were collected by a sterile finger prick with a disposable needle. The blood grouping and Rh factor investigation was carried out by slide method.

Blood Groups	N	%
A+ve	20	20%
A-ve	8	8%
B+ve	34	34%
B-ve	0	0%
O+ve	24	24%
O-ve	0	0%
AB+ve	12	12%
AB-ve	2	2%

Table 1: Distribution of ABO groups and Rh factor in study population

Results in table 1 showed that out of the 100 subjects, 90% were Rh positive and 10 % were Rh negative. Among 100 participants 56% were male and 44 % were females. 34% patients had B positive blood group which was the highest among study population. 24 % patients had O positive blood group which was followed by 20% of A positive blood group patients. 12% patients had AB positive blood group followed by 8% with A negative and 2% AB negative blood groups.

Results showed that there were no patients with B negative and O negative blood groups.

DISCUSSION

Chronic periodontitis is a multi factorial disease that differs in etiology, natural history, disease progression and response to therapy, but has a common underlying chain of events, that are influenced by disease modifiers.^[9] The presence of microorganism is a crucial factor in inflammatory disease, but the progression of disease depends on host related risk factors. A wide range of background factors such as age, sex, education, place of residence, oral hygiene habits, socio-economic status, genetic characteristics and smoking habits have been identified as risk factors for the occurrence and progression of periodontal disease.^[10] In addition, recent studies suggest that chronic periodontitis is associated with systemic health problems including cardiovascular diseases, pre-term low birth weight, diabetes mellitus etc. The purpose of present study was to correlate ABO blood group and chronic periodontitis in North Indian Population. Results of present study revealed that out of 100 chronic periodontitis patients from a sample of North Indian Population, 90% were Rh positive and 10 % were Rh negative. In India above 90% of population are Rh positive. Among 100 participants, 56% were male and 44 % were females. 34% patients had B positive blood group which was the highest among study population. These results are in accordance with the study of Ghamdi.^[11] 24 % patients had O positive blood group which was followed by 20% of A positive

blood group patients. These results were in accordance with Vivek et al.^[12] and Pai et al.^[13] 12% patients had AB positive blood group followed by 8% with A negative and 2% AB negative blood groups. Results showed that there were no patients with B negative and O negative blood groups. According to the American National Red Cross there is very less prevalence of B negative and O negative blood groups worldwide.

In the present study and various other studies^[14,11,15] that reported on ABO blood group and periodontal disease, a difference is found in the percentage and frequency distribution of A, B, AB, and O blood groups with different degree of periodontal parameters like probing pocket depth and clinical attachment loss. In India most of the other studies related to the association between ABO blood groups and prevalence and severity of periodontal diseases were done among south Indian populations with small sample size. Present study is the first study which was conducted among North Indian population. It will be too early to conclude the definite association between chronic periodontitis and ABO blood groups, until figures with bigger population size are made available.

REFERENCES

1. El Hajj II, Hashash JG, Baz EMK, Abdul-Baki H, Sharara AI. ABO blood group and gastric cancer: rekindling an old fire. *South Med J* 2007; 100(7):726–7.
2. Demir T, Tezel A, Orbak R, Eltas A, Kara C, Kavrut F. The effect of ABO blood types on periodontal status. *Eur J Dent* 2007; 1(3):139–143.
3. Qureshi MA, R. Bhatti R. Frequency of ABO blood groups among the diabetes mellitus type 2 patients. *J Coll of Physicians Surg Pak* 2003; 13(8), 453-5.
4. Reilly MP, Mingyao Li, Jing He, Ferguson JF, Stylianou IM, Mehta NN et al. Identification of ADAMTS7 as a novel locus for coronary atherosclerosis and association of ABO with myocardial infarction in the presence of coronary atherosclerosis: two genome-wide association studies. *Lancet* 2011; 377(9763):383–92.
5. Listgarten MA. A perspective on periodontal diagnosis. *J Clin Periodontol* 1986; 13(3): 175-181.
6. Offenbacher S. Periodontal diseases: pathogenesis. *Ann Periodontol* 1996; 1(1): 821- 78.
7. Skripal IG. ABO system of blood groups in people and their resistance to certain infectious diseases (prognosis). *Mikrobiol Z* 1996; 58(2): 102-8.
8. Hakomori S. Antigen structure and genetic basis of histo-blood groups A, B and O: their changes associated with human cancer. *Biochim Biophys Acta* 1999; 1473(1): 247-66.
9. Ekstein J, Shapira L & Van Dyke TE. The pathogenesis of periodontal disease: a paradigm shift. *Refuat Hapeh Vehashinayim (Israel)* 2010; 27(3): 35-9.
10. Michalowicz BS. Genetic and heritable risk factors in periodontal disease. *J Periodontol*, 1994; 65(5 Suppl):479-88.
11. Ghamdi AS. Association between ABO blood groups and severity of chronic periodontitis. *Journal of King Abdulaziz Medical Sciences* 2009; 16(3): 31-41.
12. Vivek S, Jain J, Simon SP, Battur H, Supreetha S, Haridas R. Association of ABO Blood Group and Rh factor with Periodontal Disease in a Population of Virajpet, Karnataka: A Cross-Sectional Study. *J Int Oral Health* 2013; 5(4):30-4.
13. Pai G, Dayakar M, Shaila M & Dayakar A. Correlation between “ABO” blood group phenotypes and periodontal disease: prevalence in south Kanara district, Karnataka state, India. *J Ind Soc Periodontol* 2012; 16(4): 519-23.
14. Demir T, Tezel A, Orbak R, Eltas A, Kara C & Kavrut F. The effect of ABO blood types on Periodontal Status. *Eur Dent J* 2007; 1(3): 139-43.
15. Koregol AC, Raghavendra M, Nainegali S, Kalburgi N & Varma S . ABO blood groups and Rhesus factor: An exploring link to periodontal diseases. *Ind J Dent Res* 2010; 21(3): 364-8.

ORIGINAL RESEARCH

Assessment of the effect of subgingival irrigation with chlorine-dioxide on oral malodour in chronic periodontitis: An interventional study

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ABSTRACT:

Background: Recent studies have shown that one time use of chlorine-dioxide containing mouthwash significantly reduces mouth odour intensity for at least 4 hours. But there are few studies demonstrating the long-term benefit of chlorine-dioxide in reducing VSC levels, when used as an adjunct to SRP in chronic periodontitis patients. This study aimed to assess the effectiveness of subgingival irrigation with chlorine-dioxide as an adjunct to SRP on oral malodour in chronic periodontitis patients.

Materials and methods: 24 healthy volunteers were randomly assigned to two groups. Group 1: Full mouth SRP along with subgingival irrigation of 0.1 % of chlorine-dioxide mouthwash. Group 2: Full mouth SRP and subgingival irrigation with distilled water. The parameters assessed were plaque index (Silness&Loe), Bleeding index (O’Leary), Tongue coating index (Shimizu et al), Pocket depth and Volatile sulfur compounds levels (VSC levels). All the parameters were assessed at baseline, 1 month and at 3 months. VCS levels were assessed 1 day after the procedure also.

Results: There was statistically significant improvement for all periodontal parameters (except tongue coating index) and VSC levels in both groups. But there was no statistically significant difference between test and control group.

Conclusion: The present study shows that the effectiveness of 0.1% chlorine dioxide as a single time irrigant is similar to placebo. Although chlorine dioxide has not shown any additional benefit, its efficacy when applied more frequently and or at higher concentrations needs to be assessed in future studies.

Key words: Chlorine–dioxide, volatile sulfur compounds, chronic periodontitis

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Conflict of Interest: None declared

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INTRODUCTION

Oral malodour also referred to as halitosis or bad breath is experienced by 20% - 50% of general population. Although non-oral sites are also etiologic factors, an estimated 80% to 90% of all

bad breath odours originate from mouth.^[1,2] The primary substances responsible for oral malodour are volatile sulfur compounds including hydrogen sulfide, methyl mercaptan, dimethyl sulphide and compounds like butyric

acid, propionic acid, putriscene, cadaverine etc.^[2]

These compounds are produced by the proteolytic degradation by predominantly anaerobic gram negative microorganisms on various sulfur containing substrates like food debris, saliva, blood, epithelial cells.^[1,2] Studies shows that VSC levels in the mouth correlate positively with the extent of periodontal breakdown and that amounts of VSC in breath increase with number, depth and bleeding tendency of periodontal pocket.¹ The bacteria on tongue also showed strong correlation with malodour.^[3]

Because these malodourous gases are produced by certain oral microorganisms, the major treatment strategies involve mechanical and chemical reduction of oral microbial load.^[4] Mechanical interventions like tongue cleaning, tooth brushing, interdental cleaning, professional periodontal therapy etc. have shown reduction in oral malodour. Chemical agents reduce oral malodour by antimicrobial properties and by chemically neutralizing odourous compounds including volatile sulfur-containing compounds.^[5] One study also showed significant reduction in microbial load when mechanical therapy was combined with chemical agents.^[6]

Anaerobic gram negative organisms being primarily responsible for VSC production, chemical agents with oxygenating properties may be effective in reducing VSC levels. Recent study has shown that one time use of chlorine-dioxide containing mouthwash significantly reduces mouth odour intensity for at least 4 hours.^[7] So the present study aims to explore the effect of subgingival irrigation with chlorine-dioxide combined with scaling and root planing on volatile sulfur compound levels in chronic periodontitis.

MATERIALS AND METHODS

This was a randomized, single-blind, placebo-controlled clinical trial involving a total of 24 patients who reported to the Department of Periodontics, V. S. Dental College and Hospital, Bengaluru, Karnataka, India. The patients who fulfilled the inclusion criteria were selected for the study after ethical clearance had been obtained from the institutional review board. Participation of subjects for the study was voluntary and written informed consent was obtained from those who agreed to participate. The duration of the study was 3 months (November 2013 - January 2014).

Inclusion criteria

- Chronic periodontitis (at least 1 tooth with \geq 5mm periodontal pocket depth)
- Volatile sulfur compounds level of more than 70 parts per billion (ppb)

Exclusion criteria

- Patients with systemic diseases

- Smokers
- Pregnant women and lactating mothers
- Patients who have undergone any periodontal treatment six months before the study
- Those who have taken local or systemic antibiotics 3 months before the study.

Each patient was randomly assigned to group 1 or group 2 by flip of a coin. Group 1: Patients received full mouth SRP along with subgingival irrigation of 0.1 % of chlorine-dioxide mouthwash (Freshclor, contains 0.1% stabilized chlorine-dioxide), and Group 2: Patients received full mouth SRP and subgingival irrigation with distilled water. All the procedures were done by single examiner.

Study parameters

The parameters assessed were Plaque index (Silness&Loe), Bleeding index (O'Leary), Tongue coating index (Shimizu et al),^[8] Pocket depth and Volatile sulfur compounds. Pocket depth was measured for six sites per tooth for all teeth, including the third molars. Probing depth was measured with UNC -15 probe and the measurements were adjusted to nearest millimeters. VSC assessment was done with a Halimeter.

Procedure

In group 1 all patients received SRP and subgingival irrigation with 0.1% chlorine-dioxide (Fig A) around all teeth by means of blunt tipped syringe. In group 2 subjects received full mouth SRP and irrigation with distilled water around all teeth. Oral hygiene instructions involving proper brushing technique and interproximal cleaning were given to all patients after the procedure.

After 1 day the levels of VSCs were assessed with Halimeter (Fig B) for each patient in both groups. At 1 month and 3 months visit all clinical parameters and volatile sulfur compound levels were assessed in all patients of both groups.

Volatile sulfur compound analysis

VSC levels were assessed with a portable sulfide monitor, Halimeter (Interscan). A straw connected to a plastic tube was attached to the air inlet of the monitor. Each patient was then instructed to place their mouth over the straw so that it extended 4 cm into the oral cavity (Fig C). Volunteers were instructed to refrain from talking for more than 5 minutes prior to measurement and to breathe through their nose during the VSC determination. A sample of mouth air then passed through the sensor, which registered the level of sulfides in it. The maximal level attained was determined in parts per billion (ppb) sulfide equivalents by direct readings taken from the digital display of the monitor. Subjects were instructed to refrain from eating, drinking, brushing, mouth rinsing and using chewing gum for 2

hours prior to assessment.

Statistical analysis

Descriptive and inferential statistical analysis was carried out in the present study. Results on continuous measurement are presented as Mean \pm SD and results on categorical measurements are presented as number or percentage. Significance is assessed at 5% level of significance.

Student t-test (two-tailed independent) was used to find the significance of the study parameters on continuous scale between two groups (intergroup analysis) on metric parameters. Student t-test (two-tailed, dependent) was used to find the significance of the study parameters on continuous scale within each group. Fischer exact test was used to find the significance of study parameters on categorical scale between two or more groups. Statistical software namely SAS 9.2, SPSS 15.0, stata 10.1 was used for analysis of data and Microsoft word and excel have been used to generate tables for comparisons.

Mean scores per subject were calculated for every study parameter at baseline and at the 1 and 3 months evaluations. Changes between baseline and the post-treatment visits were compared using the paired t test. Values of P <0.05 were accepted as statistically significant.

RESULTS

A total of 24 subjects, 12 in Group 1 and 12 in Group 2 completed the study. The mean age of group-1 was 29.50 \pm 7.99 and the mean age of group 2 was 37.92 \pm 11.19 (Table 1).

At baseline, no statistically significant differences were observed in the mean values of PI, BI, TCI, PD and VSC levels (Table 2). However, all parameters showed statistically significant improvements after periodontal treatment (p < 0.05) in both groups. The mean values of PI (Table 2), BI (Table 2), TCI (Table 3), PD (Table 4) and VSC levels (Table 5) at baseline and after 1 month and 3 months were not significantly different between test and placebo groups. But there was statistically significant improvement at 1 month and 3 months when compared to baseline in both groups.

Tables
Table 1- Demographic data.

	Group 1	Group 2	P Value
Age	29.50 \pm 7.99	37.92 \pm 11.19	0.400
Gender	75% (M) 25% (F)	58.3% (M) 48.1% (F)	0.667

Table 2- Plaque index and Bleeding index

PI	Baseline	1 Month	3 Month	P-Value
Group 1	1.65 \pm 0.33	1.05 \pm 0.47	1.21 \pm 0.46	? 0.001
Group 2	1.62 \pm 0.27	1.09 \pm 0.36	1.17 \pm 0.31	<0.001
P-Value	0.831	0.821	0.806	
BI	Baseline	1 Month	3 Month	P-Value
Group 1	89.00 \pm 11.30	36.75 \pm 13.55	33.17 \pm 8.91	? 0.001
Group 2	78.00 \pm 28.35	41.83 \pm 15.28	37.42 \pm 13.33	? 0.001
P-Value	0.225	0.365	0.363	

Table 3 - Tongue coating index

TCI	Baseline	1 Month	3 Month	% of change
Group 1				
1	7(58.3%)	7 (58.3%)	7 (58.3%)	0.0 %
2	5 (41.7%)	5 (41.7%)	5 (41.7%)	0.0 %
Group 2				
1	6 (50%)	6 (50%)	6(50%)	0.0 %
2	6 (50%)	6 (50%)	6(50%)	0.0 %
P-Value	1.000	1.000	1.000	

Table 4 - Probing depth

PD	Baseline	1 Month	3 Month	P-Value
Group 1	3.27 \pm 0.48	2.69 \pm 0.22	2.53 \pm 0.21	? 0.001
Group 2	3.08 \pm 0.63	2.53 \pm 0.33	2.40 \pm 0.32	? 0.001
P-Value	0.415	0.182	0.262	

Table 5 - VSC levels

VSC	Baseline	After 1 day	1 Month	3 Month	P-Value
Group 1	218.17 \pm 95.79	131.67 \pm 61.57	112.83 \pm 52.83	93.58 \pm 46.52	? 0.001
Group 2	175.67 \pm 39.40	121.33 \pm 21.30	85.17 \pm 23.71	64.42 \pm 16.15	? 0.001
P-Value	0.169	0.600	0.112	0.052	

DISCUSSION

This study investigated the effect of 0.1% chlorine dioxide irrigation along with SRP on clinical parameters and VSC scores in subjects with chronic periodontitis. Previous studies (Yates 1997, Frascella 1998) have suggested that chlorine dioxide (ClO₂) and the chlorite anion (ClO₂⁻) directly oxidize VSCs to non-malodorous products. Experimentally, chlorine dioxide and chlorite anion have been shown to result in oxidative consumption of amino acids like cysteine and methionine, which are precursors of VSCs.^[9] Thus, clinical use of this mouthrinse can be expected to reduce oral malodour by reducing concentrations of VSCs. Moreover, the chlorite anion is powerfully bactericidal to microorganisms.^[10] But there are few controlled clinical trials that report the clinical efficacy of chlorine dioxide in the treatment of oral halitosis. Frascella et al. (1998) demonstrated the efficacy of a chlorine dioxide containing mouthrinse in reducing oral malodour after a one-time use in patients with “unpleasant” breath.^[11] Shinada et al. reported that the ClO₂ mouthwash was effective in reducing morning oral malodour for 4 hours when used by healthy subjects.^[7] These studies were of short-term duration, i.e. the effects were measured after a number of hours. Moreover, no clinical study has investigated its efficacy as an irrigant along with scaling and root planing.

In the present study a portable sulfide monitor, Halimeter (Interscan) was used for determining oral malodorous gases. A highly significant correlation between measurements obtained from Halimeter and organoleptic ratings have been demonstrated by Rosenberg et al., 1991.^[12] Moreover, this VSC monitor has many advantages over complex gas chromatographic methods, including substantially lower cost, rapid sample throughput, facile portability, no requirements for the experimental employment of specialist technical staff, and the appropriateness of the manner in which samples are collected.^[13]

In the present study there was statistically significant improvement in PI, BI, PD and VSC levels at all follow-up periods when compared to baseline in both groups. But there was no statistically significant difference between the groups.

This shows that scaling and root planing in conjunction with proper plaque control results in alteration of the subgingival environment that is sufficient in most instances to improve periodontal health. The results are in accordance with previous study which shows that periodontal treatment with oral hygiene can significantly improve the level of VSCs and other periodontal parameters in chronic periodontitis patients.^[14] The use of chlorine dioxide did not significantly improve the outcome probably because it was used as a one time irrigant and the concentration employed in the present study was low. Also the observation period of our study extended to 3 months unlike earlier studies where observations were done at the end of 4 hours and the assessment was for morning breath odours.^[7] Contrary to these findings there are some isolated reports in the literature of improved periodontal parameters in gingivitis and periodontitis patients using stabilized chlorine dioxide for the control of halitosis. It was found that ClO₂ mouthwash used over a 7-day period appeared effective in reducing plaque, tongue coating accumulation and the counts of *Fusobacterium nucleatum* in saliva.^[15] In another study ClO₂ rinse have shown equivalent plaque inhibitory action compared to chlorhexidine.^[16]

In the present study, no differences were observed in the mean tongue-coating index before and after treatment in both groups. This indicates that the mere presence of a tongue coating does not necessarily lead to oral halitosis and that reduction of the VSC production can be achieved in the presence of a tongue coating. On the basis of these observations, one can hypothesize that the composition of the tongue coating rather than the thickness or extension of the tongue coating is the determining factor in oral halitosis.

Even though theoretically chlorine dioxide is suggested to have a beneficial effect on oral malodour due to its oxidizing properties, results of the present study indicate that chlorine dioxide as a single time irrigant has no additional benefit when compared to placebo. It is probable that higher concentration and more frequent application may provide the desirable benefits which need to be assessed in future studies.

CONCLUSION

The present study shows that the effectiveness of 0.1% chlorine dioxide as a single time irrigant is similar to placebo. Although chlorine dioxide has not shown any additional benefit, its efficacy when applied more frequently and or at higher concentrations needs to be assessed in future studies.

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REFERENCES

- Morita M, Wang HL. Association between oral malodor and adult periodontitis: A review. *J Clin Periodontol.* 2001;28:813–819.
- Vandekerckhove B, Van den Velde S, De Smit M, Dadamio J, Teughels W, Van Tornout M, et al. Clinical reliability of non-organoleptic oral malodour measurements. *J Clin Periodontol.* 2009;36:964–969.
- Annemiek MWT, Van den Broek, Louw Feenstra, Cees de Baat. A review of the current literature on aetiology and measurement methods of halitosis. *J Dentistry.* 2007;35:627–635.
- Curd ML, Bollen, Beikler T. Review Halitosis: the multidisciplinary approach. *Int. J Oral Science.* 2012;4:55–63.
- Francis JH, Rod McNabb. Oral malodour – A review. *Archives of Oral Biology* 2008;53(Suppl 1):S1–S7.
- Quirynen M, Zhao H, Soers C, Dekeyser C, Pauwels M, Coucke W, et al. The Impact of Periodontal Therapy and the Adjunctive Effect of Antiseptics on Breath Odor-Related Outcome Variables: A Double-Blind Randomized Study. *J Periodontol.* 2005;76:705–712.
- Shinada K, Ueno M, Konishi C, Takehara S, Yokoyama S, Yoko. A randomized double blind crossover placebo-controlled clinical trial to assess the effects of a mouthwash containing chlorine dioxide on oral malodor. *Trials* 2008;9:71:1-8.
- Shimizu T, Ueda T, Sakurai K. New method for evaluation of tongue-coating status. *J Oral Rehabil.* 2007;34:442–447.
- Peruzzo DC, Jandiroba PF, Nogueira Filho GR. Use of 0.1% chlorine dioxide to inhibit the formation of morning volatile sulphur compounds (VSC). *Braz oral res.* 2007 Mar;21(1):70-74.
- F. Al-bayatly, T. Taiyeb-ali, M. A. Abdulla and F. Hashim. Antibacterial effect of chlorine dioxide and hyaluronate on dental biofilm. *Afric J Microbio Res.* 2010 Jul;4(14):1525-1531.

- Frascella J, Gilbert R, Fernandez P. Odor reduction potential of a chlorine dioxide mouthrinse. *J Clin Dent.* 1998;9(2):39-42.
- Rosenberg M, Kulkarni GV, Bosy A, McCulloch CA. Reproducibility and sensitivity of oral malodor measurements with a portable sulphide monitor. *J Dent Res.* 1991;70(11):1436–40.
- American Dental Association Report. Oral malodour. *JADA* 2003 Feb;134:209-214.
- Pham TAV, Ueno M, Zaitso T, Takehara S, Shinada K, Lam PH, et al. Clinical trial of oral malodor treatment in patients with periodontal diseases. *J Period Res.* 2011;46(6):722–729.
- Shinada K, Ueno M, Konishi C, Takehara S, Yokoyama S, Zaitso T, et al. Effects of a mouthwash with chlorine dioxide on oral malodor and salivary bacteria: a randomized placebo-controlled 7-day trial. *Trials.* 2010 Feb;12:11-14.
- Soares LG, Guaitolini RL, Weyne SC, Falabella ME, Tinoco EM, Gomes da Silva M. The effect of a mouthrinse containing chlorine dioxide in the clinical reduction of volatile sulfur compounds. *Pharmacotherapeutics.* 2013 Jul;46-49.



Fig:A: Freshchlor mouthwash (Group pharma)

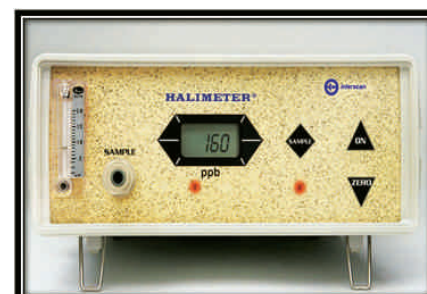


Fig:B: Halimeter (Interscan)



Fig:C: CVSC assessment

Comparative evaluation of removal of gutta-percha by different retreatment rotary files using cone beam computed tomography: An in vitro study

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ABSTRACT:

Aim: Complete removal of the gutta-percha from the canal using three rotary systems after obturation using Epiphany sealer.

Methodology: 60 freshly extracted intact, single rooted, permanent maxillary anterior teeth were collected and decoronated at the cemento-enamel junction with a diamond disc to facilitate straight line access for instrumentation and obturation. Working length was determined by placing a size 15 k file in to the canal until it appeared at the apical foramen. The specimens were randomly divided into three experimental groups; with 22 specimens each for removal of gutta-percha by using one of the following techniques.

- Group A: Protaper universal retreatment files
- Group B: D-RaCe retreatment files
- Group C: Mtwo retreatment files

Time to reach working length (T1) and time needed for the complete gutta-percha removal (T2) were recorded. Specimens were scanned post-operatively using CBCT equipment within a full rotation. Data was analyzed using ANOVA and Post Hoc Tukey Test.

Results: The CBCT evaluation found significant difference between ProTaper, Mtwo, and D-RaCe in the removal of filling material. In this study ProTaper was the most effective system especially when compared with Mtwo and D-RaCe.

Conclusion: The findings from this study suggested that: 1. Non-surgical re-treatment is a valid treatment option for failed endodontic teeth rather than extraction. 2. Rotary instruments required less time for root filling material removal than manual instrumentation. 3. All instruments left filling material inside the root canal. 4. The analysis of coronal, middle, and apical thirds did not detect significant differences in the residual material between instruments. 5. CBCT proved to be reliable, non-invasive method of evaluating this study

Key words: Gutta-percha, rotary, obturation, epiphany

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Source of Support: Nil

INTRODUCTION

The main goal of non-surgical endodontic retreatment is to remove the existing root filling material throughout the canal length to regain access to the apical foramen, to allow disinfection of the root canal space and creation of favorable conditions for periradicular healing.^[1]

Causes of endodontic failure being improper cleaning and filling of root canal system, procedural errors or the lack of sufficient hermetic sealing enables the survival of a bacteria inside dentinal tubules, apical ramifications, accessory and secondary canals.^[2]

Gutta-percha is the most popular root filling material, and in cases of endodontic failure, various methods have been introduced to remove it from root canal system which includes rotary files, ultrasonic instruments, hand files combined with heat or chemicals, and paper point with chemicals.^[3]

Endodontic failure might occur in case of bacteria persisting in root canal system as a consequence of insufficient cleaning, inadequate obturation or when there is a coronal leakage.^[4] Main goal of retreatment is to regain access to the apical foramen by complete removal of the root canal filling material. Therefore as much as possible, the obturating material must be removed to reduce the number of microorganisms within the canal.^[5]

If nonsurgical treatment is not possible, surgical procedure may be performed to save the tooth. Various hand and rotary instruments have been used for gutta-percha removal including endodontic hand files, engine driven rotary files, ultrasonic tips and files, solvents and heat carrying instruments. The most commonly found root canal filling material is gutta-percha which is used widely, in conjunction with various sealers. Removing gutta-percha from inadequately prepared and obturated root canal systems is a major part of most root canal retreatments, and can be time consuming and challenging. Therefore much effort has been made to find a clinically practical method for removal of this material from the root canal. This ability to effectively remove root canal filling materials enabling a new attempt at canal cleaning is of great clinical importance.^[6]

Chemical solvents are used to solubilize gutta-percha. Orange oil, eucalyptol, xylol, chloroform, halothane and rectified turpentine have all been used as adjuncts to remove endodontic filling materials.^[7] Earlier eucalyptol and chloroform (solubilizes gutta-percha easily, inexpensive and easy to obtain) were used as gutta-percha solvents to facilitate canal obturation procedures.

The instruments specifically designed for retreatment includes Protaper Universal Retreatment system, which is effective in

removing root filling material.

The efficacies of re-treatment procedures can be assessed by the amount of residual gutta-percha and sealer on the root canal wall and epiphany sealer from root canal walls.

Materials and methods

Sixty freshly extracted human permanent maxillary anterior teeth were collected. This study was conducted at a private dental college in the Department of Conservative Dentistry and Endodontics. CBCT imaging was done at a diagnostic center, Kochi.

Initial root canal treatment

Each tooth was decoronated at the cemento-enamel junction with a diamond disc to facilitate straight line access for instrumentation and obturation. Working length was determined by placing a size 15 k file in to the canal until it appears at the apical foramen; the length is measured and the working length is at 0.5mm short of this distance. A circumferential staging platform is established near the canal orifice ensuring a uniform working length of 15mm in each tooth. The samples were divided into three groups of 20 teeth each. Cleaning and shaping was done by step back technique. The coronal third was flared with sizes 1-3 Gates Glidden drills. Canal preparation was carried out with sequential use of K files up to 35 at working length. Upon withdrawal of each instrument, canals were irrigated alternatively with 5.25% sodium hypochlorite and 17% Ethylene Diamine Tetra Acetic acid (EDTA).

Root canal obturation

The root canal of each tooth was dried with paper points. A size 30 master cone and root canal sealant were placed in the canal. Lateral condensation was accomplished using finger spreaders and gutta-percha accessory points with sealer until the canal was completely filled. The obturation was judged to be complete when a spreader did not penetrate more than 3mm into the gutta-percha mass and sealed with temporary filling material (CAVIT, 3M-ESPE, Seefeld, Germany). All teeth were to be stored at room temperature for 30 days to allow complete setting of the sealer.

Retreatment technique

All the specimens were randomly divided into three experimental groups; with 20 specimens each for removal of gutta-percha by using one of the following techniques.

Group A: Protaper universal retreatment files

Group B: D-RaCe retreatment files

Group C: Mtwo retreatment files

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Group A: ProTaper Universal retreatment files

ProTaper universal retreatment files were operated with a speed and torque controlled electric motor and the gutta-percha was removed using light apical pressure. The root canals were instrumented in crown down sequence. As recommended, ProTaper D1 was used to remove filling material from coronal portion of the root canal, whereas the middle and apical third of the canals were instrumented using ProTaper D2 and D3 files respectively.

Group B: Mtwo retreatment files

Mtwo retreatment files were used according to the manufacturer's instructions. Removal of root filling materials was done with the use of sizes 1-3 Gates Glidden drills in the coronal portion. The canals were instrumented in a simultaneous technique to the working length using Mtwo R2 (size 25, 0.05 taper) in a brushing action with lateral pressing at a speed of 300 rpm and torque of 1.2 N cm. Progression of the rotary files was done by applying slight apical pressure and frequently removing the files to inspect the blade and clean the debris.

Group C: D-RaCe retreatment files

Race rotary instrument sizes DR1 facilitate penetration in to the filling material at the cervical third of the canal and for DR 2 at the middle and apical third of the canal was used with a brushing action in a crown down manner, until D-RaCe retreatment instruments were used according to the manufacturer's instructions.

Specimen evaluation:

Remaining filling material on canal walls were evaluated through CBCT.

According to guidelines described by Hulsmann and Stotz.

Score 0- No debris or only isolated small particles is present.

Score 1- Minimal debris particles are present in small clumps.

Score 2- Clumps of debris particles covered less than 50% of the canal wall.

Score 3- Clumps of debris particles covered more than 50% of the canal wall.

Score 4- Clumps of debris particles completely covered the canal wall.

The main purpose of this study was to determine the best removal technique based on removal time and material left in root canal.

Result and statistical analysis-

The mean and standard deviation among the groups was calculated by ANOVA (One Way Analysis Of Variance) and

MASTER RESULTS

Area of remaining Filling material			
Sample	ProTaper	Mtwo	D-RaCe
1	3.85	4.05	4.12
2	3.95	4.15	4.19
3	3.34	4.2	4.09
4	3.32	4.35	3.61
5	3.23	4.65	3.71
6	3.82	4.7	3.81
7	3.41	4.23	3.73
8	3.51	4.15	3.72
9	3.61	4.17	3.33
10	3.71	4.21	3.25
11	3.81	4.31	3.15
12	3.91	4.35	3.16
13	3.21	4.44	3.17
14	3.25	4.46	3.41
15	3.65	4.18	3.65
16	3.13	4.19	4.15
17	3.19	4.25	4.13
18	3.1	4.3	4.18
19	3.15	4.45	3.91
20	3.32	3.46	3.81
21	3.4	3.61	3.71
22	3.45	3.6	3.46

TOTAL TIME TAKEN IN MIN:SEC

SAMPLE	OTAP	Mtwo	D - RaCe
1	2.59	3.1	2.58
2	1:05	3.05	2.59
3	2.32	3.13	2.58
4	1:44	3.5	2.44
5	1:59	3.59	2.55
6	1:26	3.54	2.48
7	2.18	3.14	2.49
8	2.2	4.11	3.05

9	2.14	4.21	3.13
10	2.05	3.11	2.13
11	1.15	3.38	2.22
12	2.2	3.41	2.15
13	1.3	3.31	2.04
14	1:35	3.21	2.08
15	1:02	3.19	2.09
16	1:11	3.18	2.13
17	2.13	3.19	2.18
18	2.18	3.21	3.21
19	2.3	3.21	3.25
20	3.44	3.29	3.35
21	3.43	1.49	3.45
22	3.55	1.51	3.5
TOTAL TIME TAKEN	43.4	70.06	57.58

multiple comparisons among the various groups were carried out by using Post Hoc Tukey Test.

Individual comparison among the mean scores of 3 different groups by Mann Whitney U Test, showed statistically significant difference with respect to mean area of remaining filling material, and time in seconds between ProTaper universal retreatment system, Mtwo and D-RaCe (p<0.05)

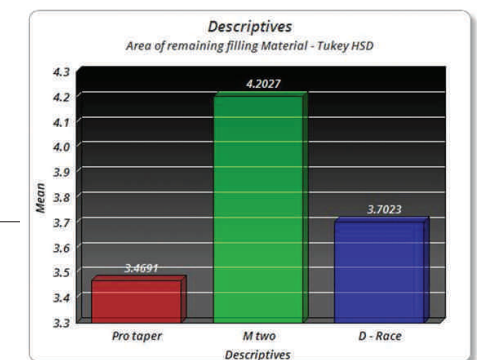
DISCUSSION

The utilization of rotary instruments as a coadjuvant in the retreatment of root canals results in a better cleaning of the apical third^[9]. Successful root canal treatment is dependent on effective debridement and shaping of the root canal system. Post treatment disease is associated with the persistence of microorganisms in the root canal system after cleaning and shaping. The study was conducted on straight root canals because majority of experimental studies comparing the efficacy of different retreatment techniques have been performed using straight root canals to simplify standardization of specimens.^[10]

The teeth were decoronated to obtain standardized working length to minimize variations amongst the specimens and to apply an identical protocol for root canal preparation, root

Area of remaining filling material

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.182	2	3.091	31.343	.000
Within Groups	6.213	63	.099		
Total	12.396	65			



Multiple Comparisons

Area of remaining filling material

Tukey HSD

(I) Groups	(J) Groups	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Pro taper	M two	-.73364*	.09469	.000	-.9609	-.5064
	D - Race	-.23318*	.09469	.043	-.4605	-.0059
M two	Pro taper	.73364*	.09469	.000	.5064	.9609
	D - Race	.50045*	.09469	.000	.2732	.7277
D - Race	Pro taper	.23318*	.09469	.043	.0059	.4605
	M two	-.50045*	.09469	.000	-.7277	-.2732

*. The mean difference is significant at the 0.05 level.

canal access, thus providing a more reliable comparison of the proposed retreatment techniques.^[11]

However, in particular when used in severely curved canals, traditional stainless steel instruments often fail to achieve the tapered root canal shapes needed for adequate cleaning and filling.^[12]

The main goal of non-surgical root canal retreatment is to re-establish healthy periapical tissues following the ineffective root canal treatment or reinfection.^[13] If nonsurgical treatment is not possible, a surgical procedure may have to be performed to save the tooth. However, the option of retreating the tooth through the root canal system is possible in almost all cases.^[14] In such cases, complete removal of the previous root filling material is required to facilitate proper cleaning, disinfection and refilling of the root canal.^[15]

Although numerous materials have been described for obturation of root canals, GP in combination with a sealer is the most frequently used material.

Removal of the obturation material can be effected with endodontic hand files, ultrasonic instruments, laser, heat carrying or engine driven rotary files with or without aid of solvents.^[16]

Advantages of rotary files include maintenance of canal shape and shorter working time, whereas disadvantages include higher incidence of file fracture and more remaining filling material after retreatment.^[17]

Sealers used in conjunction with gutta-percha may remain inaccessible to mechanical removal when they are in anatomical ramifications. In such cases, solvents are essential. There are also dangers of using purely mechanical means to remove gutta-percha, such as root perforation, canal straightening or altering the original canal shape.^[18]

Various methods have been used in endodontic research to evaluate the efficacy of root filling removal including radiography and digitized images. Other techniques include splitting the teeth longitudinally and visualizing them using a stereomicroscope or by using images obtained with a camera and using image analyzer software.

In the present study, CBCT imaging displayed remnants of gutta-percha and sealer after retreatment, which was expressed as percentage of the filling material left in root canals.

Recently Computed Tomography (CT) scan has been used because it enables a three dimensional evaluation of the root canal system with a significantly lower effective radiation dose compared to CT. More recently the use of CBCT in endodontic research has enabled 3D appraisal of treatments performed within the root canal system. This non-invasive method allows detailed visualization of the morphological features and does

not require the destruction of the teeth.^[19]

Prior to introduction of ProTaper Universal Retreatment files (PTUR), ProTaper rotary finishing files had been used for gutta-percha removal. This technique yielded a high fracture incidence of 22.7%. RaCe rotary instrument sizes DR1 (size 30) which has an active tip to facilitate its initial penetration in to the filling material at the cervical third DR 2 at the middle and apical third of the canal and to be used with a brushing action reaching the working length. D-RaCe retreatment instruments were used according to the manufacturer's instructions.^[20]

Two retreatment files in a similar way to be used according to the manufacturer's instructions. Two Retreatment Files consist of two instruments with active cutting tip: R1 and R2. These instruments are characterized by two cutting edges, which are claimed to cut dentine effectively.

The CBCT evaluation found significant difference between ProTaper R-Mtwo R, D-RaCe in the removal of filling material.

In this study ProTaper retreatment files was the most effective system, especially when compared with Mtwo and D-RaCe. This when compared with Mtwo and D-RaCe. D-RaCe was more significant. Earlier it was found that Protaper was more effective when compared with other studies (Schirrmeister)

The present study reported similar amount of residual gutta-percha or sealer on root canal wall after ProTaper, Mtwo and D-RaCe files instrumentation.

REFERENCES

1. Nica L, Grigorie M, Rusu D, Anghel MM, Didilescu A, Stratul SI. Computer – assisted photo micrographic evaluation of root canal morphology after removal of the filling AEZ' I material during retreatment. Rom J Morphol Embryol. 2011; 52:443-8
2. Siouthia Jaya, Acharya Shashi Rashmi and Gupta Sunil Kumar. Efficacy of Protaper retreatment system in root canals obturated with gutta-percha using two different sealers and Gutttaflow. Int J Dent 2011; 1-5.
3. Bahareh Dadresanfar, Payman Mehrvarzfar, Mohammad Ali Saghiri, Sedigh Ghafari, Zohreh Khalilak, and Mehdi Vatanpour. Efficacy of Two Rotary Systems in Removing gutta-percha and Sealer from the Root Canal Walls. Iran Endod J. 2011. Valentina Giuliani, Roberto Cocchetti, MD Gabriella Pagavino Spring; 6: 69–73.
4. MD, DMD Efficacy of ProTaper Universal Retreatment Files in Removing Filling Materials during Root Canal Retreatment, 2008 Nov; 34:1381-1384.
5. Siouthia Jaya, Acharya Shashi Rashmi and Gupta Sunil Kumar. Efficacy of ProTaper retreatment system in root

canals obturated with gutta-percha using two different sealers and Gutttaflow. Int J Dent. 2011; 1-5.

6. Imura. N, Zuolo. M.L, Ferreira M.O.F & Novo. N.F. Effectiveness of the canal finder and hand instrumentation in removal of Gutta-percha root fillings during root canal retreatment. Int Endod Journal. 1996; 29:382-386.
7. Miriam F. Zaccaro Scelza; Jeffrey M. Coil; Ana Carolina de Carvalho Maciel; Lilian Rachel L. Oliveira; Pantaleoscelza. Comparative sem evaluation of three solvents used in endodontic retreatment: an *ex vivo* study; . Appl. Oral Sci. Bauru. 2008 Jan./Feb.; 16
8. Khaldoun Al-Naal, Mohammad Rekab. Effect of Passive Ultrasonic Irrigation on the Removal of Root Canal Filling During Retreatment Procedures. IAJD - International Arab Journal of Dentistry 2013 Jan; 4:66-73.
9. Caroline Rodrigues Alves Valois, Marisol Navarro, Adriana de Azevedo Ramos et al. Effectiveness of the ProFile.04 Taper Series 29 Files in Removal of gutta-percha Root Fillings During Curved Root Canal Retreatment. Braz Dent J 2001; 12: 95-99.
10. Rodig et al. Efficacy of D-RaCe and ProTaper universal retreatment NiTi instruments and hand files in removing gutta-percha from curved root canals- A Micro-Computed Tomography study. Int Endod Journal 2012; 45:580-589.
11. K. Marfisi, M. Mercade, G. Plotino et al. Efficacy of three different rotary files to remove gutta-percha and Resilon from root canals. *Int Endod J.* 2010 Nov; 43:1022-8.
12. A. Guelzow, O. Stamm, P. Martus & A. M. Kielbassa. Comparative study of six rotary nickel-titanium systems and hand instrumentation for root canal preparation. International Endodontic Journal, 2005; 38: 743–752
13. Schirrmeister J.F, Meyer K.M, Hermanns P, Altenburger & Wrbas K.-T. Effectiveness of hand and rotary instrumentation for removing a new synthetic polymer-based root canal obturation material during retreatment. Int Endod Journal 2006; 39:150-156.
14. Horvath S.D, Altenburger M.J, Naumann M, Wolkewitz M & Schirrmeister J.F. Cleanliness of dentinal tubules following gutta-percha removal with and without solvents: A Scanning Electron Microscopic study. Int Endod Journal 2009; 42:1032-1038.
15. Mollo et al. Efficacy of two Ni-Ti systems and hand files for removing gutta-percha from root canals. Int Endod Journal 2012; 45:1-6.
16. Shrikanth v. bhat, Nithinsuvarna k, Harish kumar shetty, k. Ravi varma. Comparison of efficiency of gutta-percha removal in retreatment using ProTaper retreatment files, RaCe instruments with and without 'H' files - An *ex vivo* evaluation. Endodontology 2010; 22:33-43.
17. Hammad Mohammad, Qualtrough Alison And Nick

Silikas. Three-Dimensional evaluation of effectiveness of hand and rotary instrumentation for retreatment of canals filled with different materials. J Endod 2008; 34:1370-1373

18. Johann Julia Elis, Martos Josue, Silveira Luiz Fernando Machado, Pino Francisco Augusto Burkert Del. Use of organic solvents in Endodontics: A Review. Clin. Pesq. Odontol. 2006; 2:393-399.

19. Mafisi et al. Efficacy of three different rotary files to remove gutta-percha and Resilon from root canals. Int Endod Journal 2010; 43:1022-1028.

Diode Laser-assisted Lingual Frenectomy: A Case Report

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ABSTRACT:

A short or thick and fibrotic lingual frenum results in ankyloglossia or tongue-tie. Restricted tongue movement in ankyloglossia may at times result in speech problem with difficulty in pronunciation of some sounds, impaired mechanical cleaning of the oral cavity by free tongue movement, gingival recession or malocclusion. Thus, the surgeries for ankyloglossia can be considered at any age depending upon patient's history of speech, mechanical and social difficulty and can be performed by scalpel, electrocautery or lasers nowadays. The paper presents report of case of lingual frenectomy where diode laser was used for lingual frenectomy. Diode laser has shown to be one of the excellent options for performing these surgeries with better bleeding control, excellent precision, less discomfort and short healing time.

Key words: Ankyloglossia, Diode laser, Frenectomy

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INTRODUCTION

At birth the tongue is usually short with the frenulum extending to the tip. During the early weeks of life, the tongue grows longer and thinner, the frenulum stretches and its tongue attachment often recedes to a lower position. Lingual frenum is a fold of mucous membrane that attaches tongue to the floor of mouth. When the lingual frenum is short or when it encloses muscle fibers with it, it results in thick and fibrotic frenum which is known as ankyloglossia or tongue-tie.

The term ankyloglossia comes from the Greek word meaning ankylos, i.e. 'crooked' and glossa, i.e. 'tongue' and

first used in the medical literature in 1960s when Wallace defined tongue-tie as a condition in which the tip of the tongue cannot be protruded beyond the lower incisor teeth because of a short frenulum linguae, often containing scar tissue.^[1] Ankyloglossia has also been associated with problems with breast feeding among neonates, malocclusion and gingival recession.

Clinically acceptable, normal range of free tongue is greater than 16mm.

Later, Kotlow^[2] classified ankyloglossia depending on the range of free tongue as follows:

Class I: Mild with 12 to 16 mm of free tongue

Class II: Moderate with 8 to 11 mm of free tongue

Class III: Severe with 3 to 7 mm of free tongue

Class IV: Complete with < 3 mm of free tongue

Various surgical techniques like frenotomy, frenectomy and frenuloplasty over time have been used for treating ankyloglossia. These procedures were conventionally carried out by scalpel only, until electrocautery and later lasers were introduced.

Use of electrocautery was considered better than the use of scalpel for these surgical techniques in terms of hemostasis but the primary mode of tissue interaction with electrosurgical instruments is by heat ablation that produced a zone of necrosis. As frenectomy with diode lasers is known to have several advantages over scalpel and electrosurgical procedures this technique is more preferred nowadays. The present paper involves a case report where a diode laser AlGaAs (810 nm) has been used for lingual frenectomy.

CASE REPORT

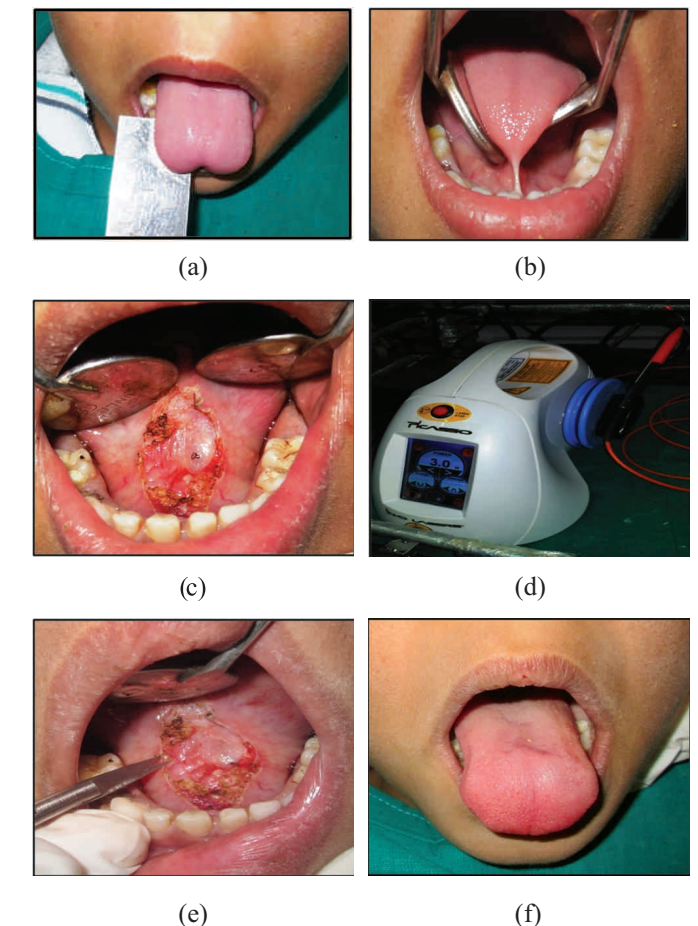
A 7-year-old male patient reported to the department of periodontology at Institute of dental studies and technologies with a complaint of difficulty in complete protrusion of tongue and slight impairment of speech. The patient eye, nose and throat (ENT) and physical examination were normal. On intraoral examination, it was diagnosed with class II ankyloglossia using Kotlow assessment with fibrotic and thick frenum. Patient had restricted protrusion of tongue with slight midline invagination of tongue on protrusion (Figure 1). There was neither any gingival recession in relation to mandibular incisors lingually nor any malocclusion present. After thorough examination, lingual frenectomy with diode laser was planned for the patient.

SURGICAL PROCEDURE-

Lingual frenectomy by soft-tissue laser was carried out for patient after the informed consent was taken. After application of topical anaesthesia, few drops of lignocaine was injected in the frenum. After stripping the fibre-optic wire tip, the tip was initiated by firing it in continuous mode. Diode laser with delivered optical power range of 2.5 to 3.5 W maximum was used with an average power of 1.37 W in a pulsed mode. The tongue was retracted backward and the diode laser was applied in a contact mode with focused beam for excision of the frenal tissue. The tip of laser was moved from the frenal apex to the frenal base of frenum in brushing method excising it slowly and continuously mopping with wet gauze to prevent any excessive thermal damage to the excised tissue. A diamond-shaped wound appeared after excision and protrusive

tongue movement was checked postoperatively. There was minimal bleeding and suturing was not required. Patient was given analgesics and recalled after 1 week. Healing was uneventful and the protrusion of tongue improved. Patient when examined after one and three months, reported increase in tongue mobility following surgery. The speech articulation was improved following speech therapy.

Figure 1: (a & b)- Pre operative view, (c)-Intra operative view, (d)- Diode laser, (e)-removal of fibers with castrovejjo scissor, (f)- Post operative view



DISCUSSION

Restricted tongue movement in ankyloglossia may cause speech difficulty for pronunciation of dentolingual-labial sounds. Consonants, like t, d, n and, l, are difficult to pronounce and frontal and lateral lispings may be seen. Tongue-tie has also been associated with problems like malocclusion and gingival recession.^[3] Besides this, tongue also helps in cleaning the oral cavity by its free movement in sweeping of insides of cheeks, fronts and backs of teeth and licking right around both lips. The surgeries for ankyloglossia can be considered at any age

depending upon patient's history of speech, mechanical and social difficulty.^[4]

Diode lasers have wavelengths ranging from 655 to 980 nm. Laser light is monochromatic, coherent and collimated, therefore, it delivers a precise burst of energy to the targeted area. Diode lasers can be used in continuous waves or gated pulse modes in contact or out of contact with the tissue (Figure 2b). Pulsed mode provides time for the tissues to cool down and prevents the collateral tissue damage incident to excessive heat production.^[5] Laser energy incises tissue more efficiently than the scalpel, generates complete vaporization and coagulates blood vessel. The hemostatic effect is created when laser energy interacts with the soft tissue is due to the sealing of capillaries by protein denaturation and stimulation of clotting factor VIII production.^[6] The excellent hemostasis, and absence of postoperative swelling was attributed to increased platelet activation by lasers^[7] and sealing of lymphatic vessels.^[8] As a result of improved hemostasis, the surgical field remains clean improving visualization of surgical site which can be left without sutures. Examined histologically, laser wounds have been found to contain significantly lower number of myofibroblasts.^[9] This results in less wound contraction and scarring, ultimately improved healing. In addition, sterilization of wound^[10] by laser reduces the need for postoperative care and antibiotics.

CONCLUSION

The use of diode laser in oral surgical procedures is beneficial for both the clinician and the patient. Laser-assisted lingual frenectomy is easy to perform with excellent precision, less discomfort, short healing time, better postoperative pain perception and can be left without sutures because of excellent hemostasis.

REFERENCES-

- Wallace AF. Tongue-tie. *Lancet* 1963;2:377-8.
- Kotlow L. Ankyloglossia (tongue-tie): a diagnostic and treatment quandary. *Quintessence International* 1999;30: 259-62.
- Ewart NP. A lingual mucogingival problem associated with ankyloglossia: a case report. *NZ Dent J* 1990;86:16-7.
- Messner AH, Lalakea ML. Ankyloglossia: controversies in management. *Int J Pediatr Otorhinolaryngol* 2000;54:123-31.
- Kotlow L. Laser in pediatric dentistry. *Dent Clin North Am* 2004;48:889-922.
- Pirnat S. Versality of an 810 nm diode laser in dentistry: an overview. *J Laser Health Acad* 2007;4:1-9.
- Mordon S, Begu S, Buys B, et al. Study of platelets in vivo after endothelial stimulation with laser irradiation using

fluorescence in trivitalvideomicroscopy PEGylated liposome staining. *Microvasc* 2002;64:316-325.

- Pick RM, Pecaro BC, Silberman CJ. The laser gingivectomy: the use of CO2 laser for the removal of phenytoin hyperplasia. *J Periodontol* 1985;56:492-6.
- Zeinoun T, Nammour S, Dourov N, et al. Myofibroblasts in healing laser excision wounds. *Lasers Surg Med* 2001;28:74-9.
- Moritz A, Schoop U, Goharkhay K, Schauer P, Dourbudak O, Wernisch J, Sperr W. Treatment of periodontal pockets with a diode laser. *Lasers Surg Med* 1998;22(5):302-311.

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CASE REPORT

Periodontal regeneration in esthetic zone using 'Whale's tail technique'

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ABSTRACT:

Procuring periodontal regeneration has always been a great challenge and several approaches have been used throughout the years. Despite conclusive evidence that some regeneration may occur following regenerative procedures, complete regeneration may be an unrealistic goal for many situations due in part to the complexity of the biological events, factors, and cells underlying successful periodontal regeneration.. A new surgical technique (the "whale's tail" technique) was designed by Bianchi and Bassetti in 2009 for the management of wide intrabony defects in the esthetic zone. This case report is intended to describe a clinical case where the "Whale's tail" technique was employed to obtain periodontal regeneration.

Key words: Periodontal regeneration, Aesthetics, Diastema, Guided Tissue Regeneration

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INTRODUCTION

Periodontics has always grappled with the objective of regeneration of the tooth supporting structures, which have been lost as a consequence of periodontal disease progression. Procuring periodontal regeneration has always been a great challenge and several approaches have been used throughout years. The efforts involve the use of different bone grafts with or without barrier membranes, root surface demineralization, enamel matrix derivatives etc.^[1] Although periodontal regeneration, i.e., the formation of new bone and new cementum with supportive periodontal ligament, is a possible objective of several periodontal therapeutic modalities, outcomes of such

modalities are not always predictable. The complex nature of biological events, factors and cells underlying successful periodontal regeneration renders complete regeneration an unrealistic goal for many situations.^[2]

Currently there are ample evidence to support the fact that the new attachment is possible using the GTR principle^[3-5] and it is effectual than conventional treatment modalities.^[6,7] Primary closure of the interdental space is necessary to ensure obvious results in periodontal regeneration. The flap design is crucial in obtaining successful regeneration .It should be in such a way that maximum amount of gingival tissue is preserved to acquire complete coverage of the regenerative material placed in the

osseous defect.^[8-11] One of the limitations associated with GTR is the membrane exposure, and one method to overcome this is by modifying the flap design. Various techniques have been described in literature to recuperate the lost tissue and to conserve soft tissues.^[8-10,13-14]

A new surgical technique (the "whale's tail" technique) was designed by Bianchi and Basseti in 2009 for the management of wide intrabony defects in the esthetic zone, by the elevation of a large flap from the buccal to the palatal side, to permit the access and visualization of the intrabony defect and to accomplish periodontal regeneration while preserving the interdental tissue over grafting material.^[11] Authors reported a significant improvement on clinical parameters and soft tissue healing with primary closure.^[11] This review is to describe a clinical case where the "Whale's tail" technique was employed to obtain periodontal regeneration.

CASE REPORT

A 37-years old female patient reported to the Dept. of Periodontics with a chief complaint of spacing between upper front teeth (Fig 1). The patient reported that she first noticed the spacing 2 years ago and it was getting progressively worse. Her general health condition was good, was not under any medications and had no known allergies. On examination, aberrant maxillary labial frenum in relation to the maxillary central incisors was present. There was clinical and radiographic evidence of an intrabony defect associated with the maxillary left incisor and had a mesiobuccal and mesiopalatal probing pocket depth of 7 mm and 6 mm respectively (Fig 2). Before the surgical procedure, full-mouth plaque score, full-mouth bleeding score, periodontal probing depth (PPD), clinical attachment level (CAL), and gingival recessions were recorded. In addition, the subject was evaluated regarding occlusal factors such bruxism and hyper mobility. Full mouth scaling, root planing and polishing (SRP) were performed and a plaque control instruction was given 4 weeks before surgery

SURGERY

Maxillary labial frenectomy was done using No: 15 BP blade under local anaesthesia. Buccally, two vertical full-thickness incisions were traced from the distal mucogingival line of 21 to the distal margin of the right maxillary central incisor. A horizontal incision connected the apical margins of the first two incisions. The coronal margins of the vertical incision were extended intrasulcularly in the buccal, interproximal, and palatal aspects (Fig 3).

These incisions enabled the elevation of a full thickness flap from buccal to palatal regions and visualization of the intrabony defect (Fig 4). Granulation tissues were carefully

removed both from the osseous defects and from the tissue surfaces. Necrotic cementum from the root surface was removed with a unification of manual and ultrasonic instruments (Fig 5). Root surfaces were conditioned with tetracycline for 2 minutes.

Defects were filled with sybograft and PRF (1:1) (Fig 6). Following grafting, a bioresorbable sterile collagen membrane (Periocol[®]-GTR), was adapted and positioned to cover the defect 4 mm beyond the bone defect margins (Fig 7). The flap was positioned back from the palatal to the buccal side, and its margins were sutured without tension, far from the defect in such a way that the biomaterials were perfectly shielded by the flap (Fig 8). Suture removal was done after 10 days. Subsequently the patient was advised to rinse with 0.12% chlorhexidine gluconate twice daily until the second postoperative week. In addition, antibiotics were also prescribed.

Patient was recalled after 1 week for suture removal, followed by evaluation on 1st, 3rd, 7th, 12th month. No subgingival instrumentation was performed until 3 months. After 3 months the mesiobuccal and mesiopalatal probing depths were reduced to 3mm with a radiographic evidence of bone fill after 7 months. (Fig 9)

DISCUSSION

The exigency for esthetics has increased rapidly. The absolute objective in restorative dentistry is to attain "white" and "pink" esthetics in esthetically important zones. "White esthetics" is the natural dentition or the restoration of dental hard tissues with appropriate materials and "Pink esthetics" refers to the surrounding soft-tissues, including dental papilla and gingiva.

The papillary integrity should be conserved during all dental procedures in order to curtail its disappearance so as to preserve esthetics specially during and after periodontal surgery.^[12] Surgical approach is recommended by Takei *et al*, called as papilla preservation technique, which maintains the complete papillae overlying the lesion so as to preserve the interdental soft tissues for maximum soft tissue coverage following surgical management of proximal osseous defects.^[8] This technique was often utilized in the surgical treatment of anterior teeth for preserving esthetics. Thereafter, Cortellini *et al* suggested a modification of the flap design which enabled to be performed in combination with regenerative procedures.^[9] Thus modified papillae preservation was instigated with the sole purpose of increasing the space for regeneration, and to attain the primary closure of the flap in interdental area.

Bianchi and Basseti in 2009 pioneered a surgical technique which has been presented in this paper.^[11] This novel approach

permits regeneration of wide intrabony defects in the maxillary anterior teeth with appreciable interdental diastemas. The advantage of "Whale's tail" flap is that the design itself will allow the elevation of a large flap from buccal to palatal, thereby conserving large amount of soft tissue and attaining a significant primary flap closure.^[11] The design also enables to preserve the vascularity of the flap. The technique allows the preservation of interproximal tissue by recreating functional attachment in addition to satisfying the esthetic demands.^[11] It can be performed in narrow and/or posterior interdental spaces. The technique also minimizes the percentage of flap dehiscence especially when membranes are used. An added benefit is the restriction of membrane collapse.^[13] The placement of incisions away from the interdental area and the location of sutures far from the regenerated defects, will intercept the bacterial colonization which are often responsible

for recession and other complications associated with the regenerative therapy.

The major limitation of the aforementioned technique is that it requires the presence of a diastema which facilitates the displacement of flap towards the palatal side.^[12] The elevation of flap should be delicate and the surgeon must be cautious to preserve the papilla, which will maintain the vascularization of the flap. Bianchi and Basseti reported a gain in CAL (4.57 ± 0.65 mm) and a reduction in PPD (5.14 ± 0.95 mm) with the "Wale's tail" flap.^[11] In our case there was a complete reduction of pocket depth and no further attachment loss till 1 year.

CONCLUSION: In light of the understanding from these findings, we may recommend predictable outcomes with "Whale tale" technique in conjunction with osseous grafts and guided tissue regeneration.



Fig.1 Preoperative view of the maxillary anterior dentition. this patient originally presented with a periodontal defect on the mesial aspect of the maxillary left central incisor. a probing depth of 7mm and clinical attachment level of 8 mm were measured.



Fig:2 Preoperative radiograph of the defect reveals extensive vertical bone



Fig :3 Buccal horizontal incisions are traced to connect the two vertical incisions. a full-thickness "whale's tail" flap is then elevated.



Fig:4 -"whale's tail" flap elevated

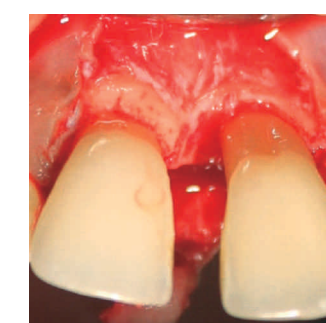


Fig 5 - Intraoperative view of defect after surgical debridement



Fig:6 - Defect filled with sybograft and prf(1:1)

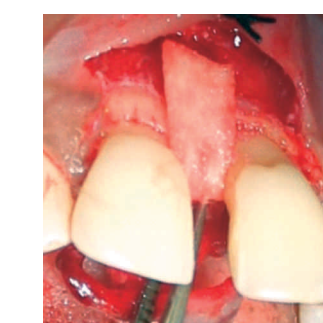


Fig 7: Bioresorbable collagen membrane adapted over the defect

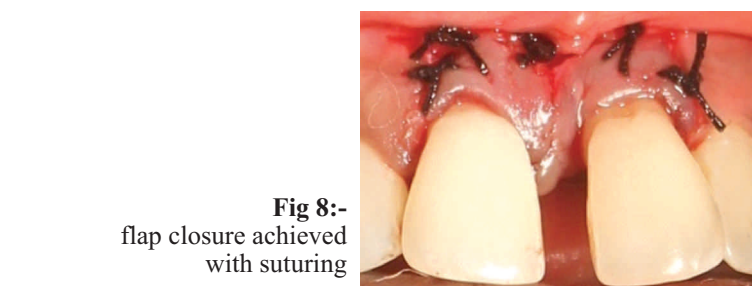


Fig 8:- flap closure achieved with suturing

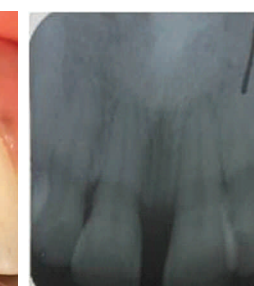


Fig 9 : 7 month post operative radiograph reveals complete filling in the defect

REFERENCES

1. Camelo M, Nevins ML, Schenk RK, Simion M, Rasperini G, Lynch SE, et al. Clinical, radiographic, and histologic evaluation of human periodontal defects treated with Bio-Oss and Bio-Gide. *Int J Periodontics Restorative Dent.* 1998;18:321–31.
2. M.Chiapasco M, Zaniboni M. Augmentation procedures for the rehabilitation of deficient edentulous ridges with oral implants. *Clin. Oral research* 2002;3:83-95
3. Nyman S, Lindhe J, Karring T, Rylander H. New attachment following surgical treatment of human periodontal disease. *J Clin Periodontol* 1982;9:290–296.
4. Gottlow J, Nyman S, Lindhe J, Karring T, Wennström J. New attachment formation in the human periodontium by guided tissue regeneration. Case reports. *J Clin Periodontol* 1986;13:604–616.
5. Karring T, Nyman S, Gottlow J, Laurell L. Development of the biological concept of guided tissue regeneration—Animal and human studies. *Periodontol* 2000 1993;1:26–35
6. Neddleman I, Tucker R, Giedrys-Leeper E, Worthington H. A systematic review of guided tissue regeneration for periodontal infrabony defects. *J Periodontal Res* 2002;37:380–388.
7. Cortellini P, Pini Prato G, Tonetti MS. Periodontal regeneration of human infrabony defects. I. Clinical measures. *J Periodontol* 1993;64:254–260.
8. Takei HH, Han TJ, Carranza FA Jr, Kenney EB, Lekovic V. Flap technique for periodontal bone implants. Papilla preservation technique. *J Periodontol* 1985;56:204–10.
9. Cortellini P, Prato GP, Tonetti MS. The modified papilla preservation technique. A new surgical approach for interproximal regenerative procedures. *J Periodontol* 1995;66:261–6.
10. Murphy KG. Interproximal tissue maintenance in GTR procedures: Description of a surgical technique and 1 year reentry results. *Int J Periodontics Restorative Dent* 1996;16:463–77.
11. Bianchi AE, Bassetti A. Flap design for guided tissue regeneration surgery in the esthetic zone: The “Whale’s tail” technique. *Int J Periodontics Restorative Dent* 2009;29:153
12. Checchi L, Montevicchi M, Checchi V, Bonetti GA. A modified papilla preservation technique, 22 years later. *Quintessence Int.* 2009;40:303-11.
13. Cairo F, Carnevale G, Billi M, Prato GP. Fiber retention and papilla preservation technique in the treatment of infrabony defects: a microsurgical approach. *Int J Periodontics Restorative Dent.* 2008; 28: 257-63.

CASE REPORT

Labial-cervical-vertical groove management with glass ionomer cement and composite resin: A Case Report

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ABSTRACT:

A Labial cervical vertical groove may occur in central maxillary incisors and act as a funnel for accumulating plaque and calculus. Since it is inaccessible to routine oral hygiene efforts of the patient and to treatment manipulations of the dentist, this anomaly predisposes the tooth to localized periodontal disease. Conservative or surgical treatment of such teeth should restore periodontal health by creating an environment more favorable for plaque control.

Key words: Labial-cervical-vertical groove, glass ionomer cement, gingivectomy

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INTRODUCTION

Tooth deformities are found in varying morphology and prevalence, which may occur due to nutritional, environmental, genetic and ethnic causes. Labial cervical vertical groove (LCVG) also referred to as facial radicular notch or labiogingival notch^[1,2] is a dental anomaly found at the cervical region of upper permanent incisors. It starts on the cervical enamel and extends to the radicular surface. LCVG is a developmental anomaly which occurs due to infolding of the enamel organ and Hertwig’s epithelial root sheath creating a groove on the labial surface of permanent maxillary incisors.^[3] Etiology for this malformation may be trauma, disease, and nutritional issues (eg, rickets), or can be genetic or idiopathic.

The depth of this notch can vary from a short shallow depression to a deep

groove extending apically. Shallow defects are usually not associated with any change in gingival contour and are identifiable only by probing; where as deeper defects can result in irregular contour of the marginal gingiva.^[4] Besides the aesthetic concern, these defects can predispose the tooth to periodontal problems due to improper gingival marginal contour, accumulation of plaque and, consequently, gingival pocket with bone loss, as well as failure of endodontic and periodontal treatments.^[5]

Though frequently encountered in practice, this type of dental deformity has been scarcely investigated and reported in the dental literature. Hence, the purpose of this case report is to alert the clinician about this deformity so that cautious oral hygiene can be implemented. Misdiagnosis of this anomaly for cervical caries or cervical

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root resorption may lead to unnecessary invasive treatment.^[6] Hence it is important for clinicians to consider this entity in the differential diagnosis of enamel defects.

CASE REPORT

A 21 year old systemically healthy male patient reported to the Department of Periodontology, with a chief complaint of bleeding gums with respect to the upper front tooth. Intraoral examination showed fair oral hygiene with apparently normal gingiva except for the labial aspect of the maxillary left central incisor, which showed marginal inflammation that bled on probing. Probing revealed a 4-mm periodontal pocket associated with the midbuccal surface of 21(Fig.1). Normal sulcus depths were noted on the mesial and distal aspects of the tooth. On careful examination, a concavity was detected on the labial cervical aspect of 21 extending subgingivally. The edematous gingiva seemed well adapted to the concavity. Exploration indicated that the concavity crossed the CEJ extending to the root in the form of a groove. The tooth responded normally to pulp vitality tests.

The patient was informed of the condition and the need for surgical exploration of the area to evaluate the extend of the groove, to which the patient agreed. Since the gingiva presented an irregular contour, it was decided to perform an external bevel gingivectomy.



Fig. 1. Pre - Operative



Fig. 2. 4mm Probing pocket depth irt 21



Fig. 3. After gingivectomy



Fig. 4. After placement of restoration

After assuring surgical asepsis, local anesthesia (2% lignocaine with 1:80000 adrenalin) was administered. An external bevel gingivectomy was done using electrosurgery to expose the defect and to ensure a proper gingival contour (Fig.3). All local irritants which were present in vertical grooves were scaled and the root was carefully planed. Since the groove was deeper than expected, it was decided to obliterate the groove on the root surface with glass ionomer cement (GIC) filling. The coronal portion of the defect was restored with light cured composite resin to improve the esthetics (Fig.4). The patient received post-operative instructions and was prescribed appropriate analgesics (paracetamol 500 mg qid) and 2% chlorhexidine gluconate gel for topical application.

The patient was reviewed after one week. Satisfactory gingival healing was observed and the restoration was intact.

DISCUSSION

Periodontitis, a multifactorial infectious disease, affects primarily a subset of subjects and subset of sites. Recent microbiological data have ascertained that for disease progression to occur, a susceptible host and site are needed, besides the presence of pathogenic microbes. Case control studies undoubtedly suggest a strong association between anatomic aberrations (LCVG) and periodontal attachment loss.

The maxillary incisor region is a site of developmental hazard. Anatomic variations like root grooves can commonly be found here, that can form stagnant sites or ecological niches favoring the retention and growth of micro-organisms. By providing surface areas sheltered from cleaning efforts as well as host defense mechanisms, grooves may also facilitate plaque accumulation.

The prevalence of LCVG on maxillary central incisors is said to range from 4.5% in a study by Mass et al.^[1] to 6.5% in the study by Brin and Ben-Bassa.^[4] In a study conducted by Shpack et al.^[7], out of 1250 patients examined, 66 exhibited LCVG (5.3%) in one of the upper incisors.

LCVG initially develops on the enamel in the cervical region and further extends to the radicular surface. Based on its depth and extent, these grooves can be classified into mild, moderate, and complex. The defect may vary from a simple, shallow developmental groove, to a partial or complete lack of closure of calcified tissues, allowing a direct soft tissue communication between the periodontium and the pulp. Initially after root formation, these grooves are deep and become shallower as age advances. The presence of LCVG may exacerbate some clinical aberrations, such as esthetic deficiency of the gingival marginal contour, accumulation of plaque and, consequently, gingival pocket with bone loss, as well as failure in endodontic and periodontal treatments.^[1] Kozlovsky et al.^[8] reported a

direct relationship between a periodontal lesion with vertical bone loss and labial groove on a maxillary central incisor in a 25-year-old female. A close association between an intrabony defect and LCVG on #21 has also been observed.^[10]

It is strongly recommended that whenever LCVG is detected, the dentist should inform the patient on this deformity so that proper oral hygiene should be maintained. Careful management of LCVG is of utmost importance as this embryological deformity may predispose to the development of an endodontic-periodontic lesion.

CONCLUSION

This case reports describes the successful treatment of maxillary central incisors associated with facial radicular grooves. These defects may provide a seat for local factors to accumulate. Deep radicular grooves may predispose to pulp necrosis and establishment of combined endodontic periodontal lesions. Earliest careful examination is of paramount importance in the treatment of radicular grooves.

REFERENCE

1. Mass E, Aharoni K, Vardimon A. Labial-cervical-vertical groove in maxillary permanent incisors—Prevalence, severity, and affected soft tissue. *Quintessence Int* 2005;36:281-6
2. Srinivas TS, Pradeep NT. Bilateral facial radicular groove in maxillary incisor. *J Interdiscip Dent* 2012; 2: 41-3.
3. Lee KW, Lee EC, Poon KY. Palato-gingival grooves in maxillary incisors. A possible predisposing factor to localised periodontal disease. *Br Dent J* 1968; 124:14-18.
4. Brin I, Ben-Bassat Y. Appearance of a labial notch in maxillary incisors: A population survey. *Am J Phys Anthropol* 1989; 80: 25-9.
5. Simon JH, Glick DH, Frank AL. Predictable endodontic and periodontic failures as a result of radicular anomalies. *Oral Surg Oral Med Oral Pathol* 1971; 31:823-826.
6. Ben-Bassat Y, Brin I. The labiogingival notch: An anatomical variation of clinical importance. *J Am Dent Assoc* 2001; 132: 919-21.
7. Shpack N, Dayan T, Mass E, Vardimon AD. Labial cervical vertical groove (LCVG) distribution and morphometric characteristics. *Arch Oral Biol* 2007; 52: 1032-6.
8. Kozlovsky A, Tal H, Yechezkiely N, Mozes O. Facial radicular groove in a maxillary central incisor. A case report. *J Periodontol* 1988; 59: 615-617.
9. Goon WW, Carpenter WM, Brace NM, Ahlfeld RJ. Complex facial radicular groove in a maxillary lateral incisor. *J Endod* 1991; 17: 244-248.
10. Shah MP, Gujjari SK, Shah KM. Labial cervical-vertical groove: A silent killer-Treatment of an intrabony defect due to it with platelet rich fibrin. *J Indian Soc Periodontol* 2014; 18: 98-101.

Subgingival tooth fracture: An esthetic treatment approach

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ABSTRACT:

This article describes a technique for the esthetic rehabilitation of a complicated crown root fracture. Here the sub gingival fractured root is extruded about 4mm by a combined orthodontic and periodontal treatment procedure, followed by a fiber post placement and ceramic crown which has given an excellent functional and esthetic result.

Key words: Cervical root fractures, crown-root fractures, forced eruption

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INTRODUCTION

Sub gingival fracture of anterior tooth causes not only an esthetic and functional breakdown but also a psychological breakdown. Treatment of sub gingival fracture of anterior tooth often requires a multidisciplinary approach.^[1]

Attempts to expose the fracture line by alveolar re- contouring and periodontal procedures may compromise the functional root length and esthetics.^[2] Placing the margin of the restoration in the biological width frequently leads to chronic gingivitis, loss of the clinical attachment, pocket and gingival recession. Controlled orthodontic extrusion is considered as the easiest tooth movement to expose the fracture line, which has excellent result, good prognosis and low risk of relapse. The method is also called forced eruption, orthodontic eruption, vertical extrusion

or assisted eruption. First reported by Heithersay and Ingber, controlled orthodontic extrusion is considered the easiest orthodontic tooth movement that can produce excellent results with a good prognosis and a low risk of relapse. Although highly advantageous, the technique is rarely used; the possible reasons may include the fear of first time approach, a false belief that the procedure is inherently complex, and little knowledge in this field and some emphasis on specialist orthodontic aspects involved.^[3]

CASE REPORT

A 33 yrs old male patient reported to a private clinic with fractured teeth following an assault. Preliminary treatment and soft tissue injuries had been treated at a hospital nearby and was referred for further dental treatment. On clinical examination maxillary right and

left central incisors (11 & 21) had Ellis type 3 fractures. (Fig.1). Intraoral periapical (IOPA) radiograph showed multiple fracture of the crown portion of 11 extending sub gingivally. Root tip fracture of the same tooth was also noted. Re attachment of the fragments was ruled out because of the extensive nature of the fracture. Endodontic treatment of both tooth #11 & 21 was performed. On tooth #11 the obturation was extended till the root apex including the fractured tip. Gingivectomy was performed on tooth # 11 along with orthodontic extrusion with the intention of maintaining the biological width. Orthodontic forced eruption was performed by cementing a stainless steel wire hook in the canal of the tooth # 11. A 26 gauge stainless steel wire was splinted connecting teeth #12 & 21 with composite. Chain Elastic was used to extrude tooth # 11 with weekly change of elastics for three weeks (fig.3 & 4). On completion of eruption to the desired level of approx 4 mm (fig. 5) circumferential supra crestal fibrotomy was done on tooth#11 and stabilized for a period of 2 months to prevent relapse. Later Fiber post of tooth # 11 and metal free ceramic e-max crowns were given on both 11 & 21 (fig. 6 & 7). Immediate esthetics was satisfactory and 1 year review has been followed up with satisfactory results.

Discussion:

Reattachment of the fractured fragment is considered the best treatment option in a fractured tooth. In this case re attachment was ruled out because there were multiple fragments in the fractured area. Gingivectomy for crown lengthening alone would not give sufficient fracture margin exposure therefore Orthodontic extrusion along with gingivectomy were performed. Forced orthodontic eruption is considered to be the best treatment option for exposing the fractured margins without compromising on the biological width. Care was taken not to compromise on the crown-root ratio of at least 1:1 for a good long-term prognosis.^[4] In the present case, we also limited our forced eruption within the maximum limit of 4 mm to avoid relapse and to maintain proper crown-root ratio for a favorable prosthetic restoration.^[5] Relapse of the extruded tooth is one of the main problems that is commonly seen in such cases. In this case report circumferential supra crestal fibrotomy procedure was followed to prevent the relapse of the extruded tooth and also a 2 months retentive period was given by stabilizing the tooth before the crowns were given. Simon et al. indicated that the orthodontic extrusion should become a routine procedure in dentistry. They also stressed that the orthodontically extruded tooth must be stabilized for 8-12 weeks prior to fabrication of a permanent post and core.^[6]

REFERENCES

1. Olsburgh S, Jacoby T, Krejci I. Crown fracture in the permanent dentition: Pulpal and restorative considerations. *Dent Traumatol* 2002;18:103-15
2. Andreasen FM, Andreasen JO. Crown root fractures. Textbook and color atlas of traumatic injuries to the teeth 4th edition Blackwell Munksgaard 314-334
3. Emerich-Poplatek K, Sawicki L, Bodal M, Adamowicz-Klepalska B. Forced eruption after crown/root fracture with a simple and aesthetic method using the fractured crown. *Dent Traumatol* 2005; 21:165-169
4. Simon JH. Root extrusion. Rationale and techniques. *Dent Clin North Am* 1984;28:909-21.
5. Yoeli Z, Samet N, Miller V. Conservative approach to post-traumatic treatment of maxillary anterior teeth: A clinical report. *J Prosthet Dent* 1997;78:123-6
6. Simon JHS, Kelly WH, Gordan DG, Erickson GW. Extrusion of endodontically treated teeth. *JADA* 1978;97:17-23



Fig. 1

Fig. 4

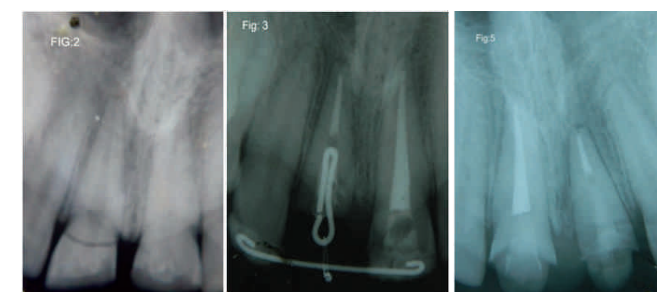


Fig. 2

Fig. 3

Fig. 5



Fig. 6

Fig. 7

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Preservation of grossly mutilated teeth- showcasing multiple approaches of management

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ABSTRACT:

Considering the concept of 'preservation of that which remains', a grossly mutilated tooth, with adequate support of the periodontium can be rehabilitated functionally. It could serve as a viable alternative to extraction and other prosthetic replacements. Management of such requires interdisciplinary approach with thorough clinical and radiographic examination and treatment plan based on the gingival peripheries of the destruction and without invasion of biological width. This article presents a clinical documentation of patients with various clinical situations of grossly mutilated teeth and the different modalities of their functional rehabilitation and preservation.

Key words: Surgical extrusion, biological width, three dimensional ferrule, apical repositioning flap, orthodontic extrusion

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"The preservation of that which remains is of utmost importance and not the meticulous replacement of that which has been lost" Muller de van (1952).

Restoration of a tooth permanently, when confronted with extensive tooth mutilation or disease that exceeds the restorative capacity of any conventional rehabilitative modality is a challenge. The fittest survives, and the weakest succumbs to extraction. Thus considering the concept of 'preservation of that which remains', a grossly mutilated tooth can be spared off extraction forceps, if a final restoration can be built up in the most acceptable fashion; sacrificing the least amount of dental tissues, time and expense, using the most indicated materials and

technique, and creating the least irritation to supporting tissues.^[1] Prosthetic rehabilitation of the victimized tooth, entering the biological width with caution, is inevitable for pristine periodontal health.^[2]

Trespass of the biological width can prove detrimental. Therefore, when restoring teeth with subgingival caries or fractures below the gingival margin, determine if the tooth is salvageable, whether the crown needs to be lengthened, and which crown-lengthening procedure is appropriate. Clinical crown lengthening is performed to achieve a three dimensional ferrule, finish lines on sound tooth structure, maintenance of the biologic width, access for impression techniques

and esthetics.^[3] This article presents a clinical documentation of patients with various clinical situations of grossly mutilated teeth and the different modalities of their functional rehabilitation and preservation.

Case 01

A 34 year old female patient presented with grossly decayed 35 with loss of coronal tooth structure up to gingival level. A pocket depth of 2mm and bone sounding of 3mm was noticed. Intra oral periapical radiograph revealed adequate root length and no interproximal bone loss. Patient had missing 34 but loss of space for prosthetic rehabilitation of the edentulous space. 36 had chronic irreversible pulpitis. Patient desired to preserve 35. The treatment plan was to manage the involved teeth endodontically and increase the clinical crown length. After endodontic treatment, surgical crown lengthening was planned by apically repositioned flap (APF) with ostectomy to maintain the biologic width.

The treatment plan was discussed with the patient and a written informed consent was obtained. Under adequate anesthesia, mucoperiosteal flap was reflected with vertical releasing incisions distal to 33 extending to mesial of 36. Ostectomy was done to remove 3 mm of bone with round bur no.702 on slow speed micromotor under constant saline irrigation. The flap was then repositioned apically and secured with direct interrupted 3-0 black silk sutures and periodontal dressing was given. Patient was prescribed antibiotics for 5 days and analgesics for 3 days. Patient was advised to take soft diet and avoid brushing of the surgical area for a week and use 0.2% Chlorhexidine mouth rinse for 2 weeks. After three months, healing was satisfactory with a gain of 3 mm clinical crown. 35 was then reinforced with glass fiber post and composite core and rehabilitated with porcelain - fused - to - metal crown (Fig.1)

Case 02

A 42 year old male patient reported with grossly mutilated 12 at the gingival level. Bone sounding of 3mm was measured. Pre operative intraoral periapical radiograph showed incomplete obturation in relation to 12 and proximal caries on 21. The crown: root ratio and occlusal clearance was adequate. Treatment plan was endodontic revision followed by orthodontic extrusion and prosthetic rehabilitation. The treatment plan was discussed with the patient and a written informed consent was obtained.

After completion of Re-RCT, orthodontic extrusion was carried out using J hook. A 'J' hook was prepared with 19 gauge wire and partially inserted in canal and bonded with zinc phosphate cement. Activation was done using elastic module between the 'J' hook and a loop and clinical crown was obtained to give a three dimensional ferrule. Circumferential

supra crestal fibrotomy was performed during the period of extrusion. The tooth was then reinforced with glass fibre post and composite core. Later tooth preparation for crown and gingivectomy was carried out and long term acrylic temporary crown was given. Four weeks later, the tooth was prosthetically rehabilitated with porcelain-fused-to-metal crown (Fig.2).

Case 03

A 26 year old male patient reported with Ellis III fracture of 11 and 21, fracture of 11 extending subgingivally in palatal region. A pocket depth of 3mm with no mobility was noticed. Radiographic examination revealed an oblique crown fracture extending palatally, at the cervical region of 11 with completely developed root, with no periapical lesion. The treatment planned was endodontic therapy of 21, surgical extrusion of 11 followed by endodontic treatment and prosthetic rehabilitation. The treatment plan was discussed with the patient and a written informed consent was obtained.

Adequate anesthesia was achieved and intersulcular incision was made and full thickness mucoperiosteal flap was reflected. The tooth was carefully luxated so as to avoid damage of the marginal bone and PDL cells. Carefully the root was rotated (90 – 180°) and repositioned 3mm coronal to the gingival margin and secured with direct interrupted 3-0 black silk sutures and semi rigid functional splinting was done from 13 to 23 on the same visit. Antibiotic therapy was administered to the patient.

After 2 weeks, the periodontal healing was evaluated. 11, 21 were endodontically treated and splinting was removed. The teeth were reinforced with glass fiber post and composite core and prosthetically rehabilitated with all ceramic crowns.

Discussion

Management of grossly mutilated tooth with adequate periodontal support and their preservation in the arch functionally is a viable alternative to extraction and other prosthetic replacements. Management of such requires interdisciplinary approach with thorough clinical and radiographic examination and treatment plan based on the gingival peripheries of the destruction and finish lines of the envisaged final restoration should be decided upon.

Infringement of the biologic width for additional retention of restoration could result in crestal bone loss, gingival recession with localized bone loss, localized gingival hyperplasia with minimal bone loss, or a combination of them.^[4] The final restoration should be in harmonious relationship with the periodontium.

The most common procedure for clinical crown lengthening is an APF with osseous surgery. This technique exposes dental structure to accommodate a new connective tissue attachment and junctional epithelium.^[5,6] A minimum distance of 3–4 mm

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from the restorative margin to the alveolar crest is required for a three dimensional ferrule.^[7] Before planning an APF with osseous surgery, prognosis of the tooth should be determined, evaluating the bone loss (in %), probing depth, furcation involvements, mobility, crown-to-root ratio, root form, pulpal involvement, and strategic value of the concerned tooth.^[8] Performing osseous reduction to expose adequate sound tooth structure could compromise periodontal support of the tooth, jeopardize the adjacent teeth, and result in furcation involvement and a poor crown-to-root ratio. Once a good or fair prognosis is determined, an APF with osseous surgery can be performed before or after post and core or core build-up and initial crown preparation.

In case 01, there was loss of coronal tooth structure at the level of gingiva, bone sounding of 3mm, no periapical pathology and adequate root length with no inter proximal bone loss. The area of interest was not esthetically strategic. The treatment was planned to increase the length of the clinical crown which demanded osseous resection. Apically repositioned flap with osteotomy was done to maintain the biologic width.

While APF with or without osseous resection is generally recommended for clinical crown lengthening, orthodontic forced eruption is considered in cases where traditional surgical crown lengthening will lead to unaesthetic outcomes.^[9,10] It is a method of altering the relationship between a non-restorable tooth and its attachment apparatus, elevating sound tooth structure from within the alveolar socket thereby placing finish lines in clinical crown.^[11,12] In a tooth that has undergone forced eruption, the crown-to-root ratio may remain unchanged or even be improved compared to a tooth that has undergone an APF with osseous reduction.^[9]

In case 02, forced orthodontic extrusion with fibrotomy and gingivectomy was performed, considering esthetics. Forced eruption helps to maintain crown-root ratio, re-establishment of biological width and maintains normal anatomical contour of periodontium.^[13] It is a more conservative approach than surgical extrusion. The severing of the circumferential supracrestal fibers reduces the tension on the tooth thereby shortening the retention period after tooth movement.^[14] The gingiva follows the vertical movement of the root during extrusion maintaining the normal architecture and contour. This enables an esthetically superior rehabilitation after crown lengthening procedure.^[11]

Though orthodontic extrusion provides esthetic outcomes, its time consuming, which makes surgical extrusion as an alternate in some clinical situations.^[15] Luxation of the tooth and its rotation may sever the PDL fibers, but since the root does not leave the alveolar socket, it maintains the viability of PDL cells.^[16] Stabilization and functional semi-rigid splinting prevents further displacement.^[17] It reduces the chances of

ankylosis and prevents root resorption.^[18,19] The physiologic micro movement stimulates revascularization and provides accelerated periodontal reattachment and reorganization.

In case 03, tooth 11 had oblique fracture extending subgingivally in palatal aspect. Therefore the tooth was gently luxated, extruded from socket and carefully rotated (90–180°) and repositioned 3mm coronal to the gingival margin. The splinting duration was 2 weeks as per American Association of Endodontists (AAE) and International Association for Dental Trauma recommendations.^[20] The treated tooth was functioning normally in 3 months review. The mobility and probing depths were within normal limits. In 6 months review, radiograph revealed reestablishment of lamina dura around the extruded roots.

In all the cases, the patients were reviewed clinically and radiographically at 3 months, 6 months and 1 year to assess the periodontal health.

Conclusion

Restoration of a grossly mutilated tooth functionally, without affecting the biological width, would serve as the most conservative and viable method of preserving the harmonious relationship of tooth and the periodontium. Various clinical crown lengthening procedures minimize the encroachment of biological width by restorations for additional retention and esthetics. Although a number of techniques have been proposed for clinical crown lengthening procedures, all have some limitation in terms of function and esthetics. Based on clinical and radiographic evaluation, the method of increasing the clinical crown height should be planned thereby enabling the placement of finish lines on sound tooth structure.

REFERENCES

1. Marzouk MA, Simonton AL, Gross RD. Operative Dentistry: Modern Theory and Practice. Ishiyaku EuroAmerica; 1985. 500 p.
2. Oh S-L. Biologic width and crown lengthening: case reports and review. Gen Dent. 2010 Oct;58(5):e200-205.
3. Becker W, Ochsenbein C, Becker BE. Crown lengthening: the periodontal-restorative connection. Compend Contin Educ Dent Jamesburg NJ 1995. 1998 Mar;19(3):239-240, 242, 244-246 passim; quiz 256.
4. de Waal H, Castellucci G. The importance of restorative margin placement to the biologic width and periodontal health. Part II. Int J Periodontics Restorative Dent. 1994 Feb;14(1):70-83.
5. Pontoriero R, Carnevale G. Surgical crown lengthening: a 12-month clinical wound healing study. J Periodontol. 2001 Jul;72(7):841-8.
6. Deas DE, Moritz AJ, McDonnell HT, Powell CA, Mealey BL. Osseous surgery for crown lengthening: a 6-month clinical study. J Periodontol. 2004 Sep;75(9):1288-94.

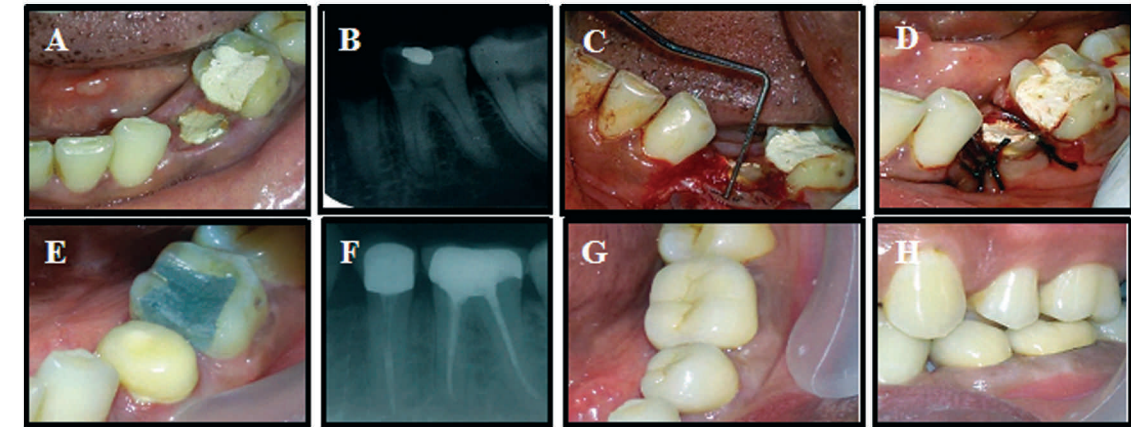


Figure 01A- Pre op photograph showing 35 with reduced clinical crown height. B- IOPA of the same region with adequate bone height. C- Osteotomy done to remove 3 mm of bone. D- Flap apically repositioned and sutured. E- Post op photograph showing 35 with 3 mm gain in clinical crown. F- Post op radiograph showing 35 with post and core and crown. G, H- Post op photograph showing rehabilitation with porcelain- fused- to- metal crown.

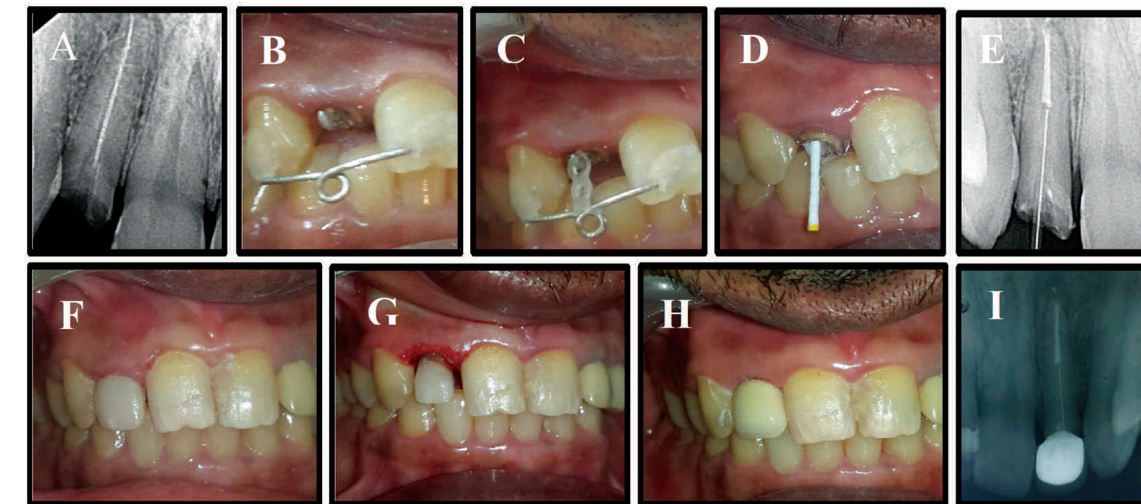


Figure 02A- Pre op radiograph showing incomplete obturation. B- 'J' hook attached to root canal. C- Elastic module connecting 'J' hook and loop. D- 3mm gain in clinical crown. E- Radiograph showing glass fibre post luted into canal. F- Photograph showing composite core. G -Tooth preparation for crown and gingivectomy. H- Post op photograph showing rehabilitation with porcelain- fused- to- metal crown. I- Post op radiograph showing 12 rehabilitated with post, core and crown

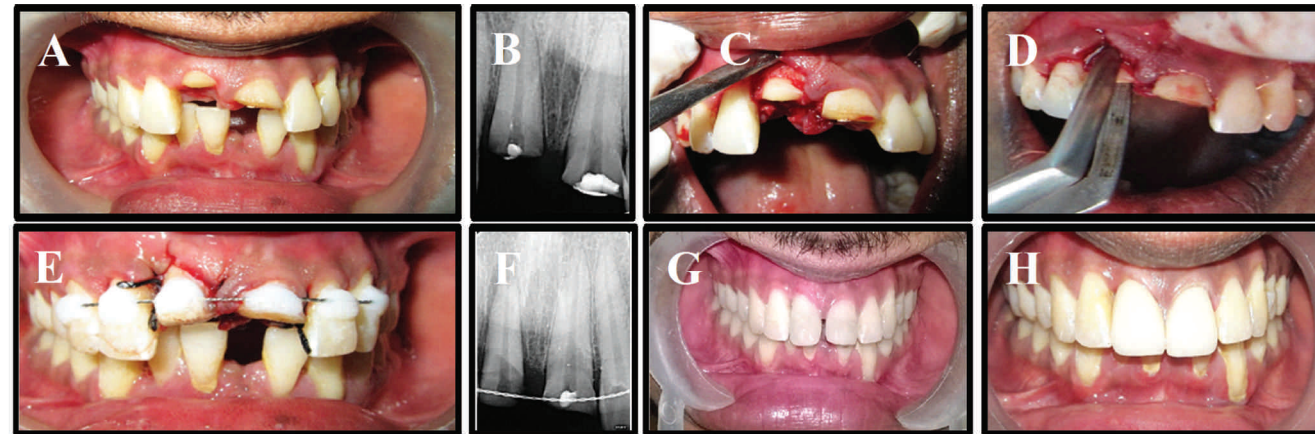


Figure 03A- Pre op photograph showing I1 with reduced clinical crown. B Pre-op radiograph showing adequate root length. C- Full thickness mucoperiosteal flap elevated. D- Extrusion, rotation, repositioning achieving 3mm gain of clinical crown. E- Post op photograph showing I1 after semi rigid functional splinting. F- Post op radiograph showing I1 with 3mm crown length. G- Photograph of I1, 21 reinforced with fiber post and composite core. H- Post op photograph showing rehabilitation with all ceramic crown

7. Wagenberg BD, Eskow RN, Langer B. Exposing adequate tooth structure for restorative dentistry. *Int J Periodontics Restorative Dent.* 1989;9(5):322-31.
8. McGuire MK. Prognosis vs outcome: predicting tooth survival. *Compend Contin Educ Dent Jamesburg NJ* 1995. 2000 Mar;21(3):217-220, 222, 224 passim; quiz 230.
9. Ingber JS. Forced eruption: part II. A method of treating nonrestorable teeth—Periodontal and restorative considerations. *J Periodontol.* 1976 Apr;47(4):203-16.
10. Addy LD, Durning P, Thomas MBM, McLaughlin WS. Orthodontic extrusion: an interdisciplinary approach to patient management. *Dent Update.* 2009 May;36(4):212-4, 217-8.
11. Bach N, Baylard J-F, Voyer R. Orthodontic extrusion: periodontal considerations and applications. *J Can Dent Assoc.* 2004 Dec;70(11):775-80.
12. Brown GJ, Welbury RR. Root extrusion, a practical solution in complicated crown-root incisor fractures. *Br Dent J.* 2000 Nov 11;189(9):477-8.
13. Smidt A, Lachish-Tandlich M, Venezia E. Orthodontic extrusion of an extensively broken down anterior tooth: a clinical report. *Quintessence Int Berl Ger* 1985. 2005 Feb;36(2):89-95.
14. Ahrens DG, Shapira Y, Kuflinec MM. An approach to rotational relapse. *Am J Orthod.* 1981 Jul;80(1):83-91.
15. Lee J-H, Yoon S-M. Surgical extrusion of multiple teeth with crown-root fractures: a case report with 18-months follow up. *Dent Traumatol.* 2015 Apr 1;31(2):150-5.
16. Goswami M, Chaitra T, Chaudhary S, Manuja N, Sinha A. Strategies for periodontal ligament cell viability: An overview. *J Conserv Dent JCD.* 2011;14(3):215-20.
17. Kim C-S, Choi S-H, Chai J-K, Kim C-K, Cho K-S. Surgical extrusion technique for clinical crown lengthening: report of three cases. *Int J Periodontics Restorative Dent.* 2004 Oct;24(5):412-21.
18. Caliřkan MK. Surgical extrusion of a cervically root-fractured tooth after apexification treatment. *J Endod.* 1999 Jul;25(7):509-13.
19. Elkhadem A, Mickan S, Richards D. Adverse events of surgical extrusion in treatment for crown-root and cervical root fractures: a systematic review of case series/reports. *Dent Traumatol Off Publ Int Assoc Dent Traumatol.* 2014 Feb;30(1):1-14.
20. American Association of Endodontists. Recommended guidelines of the American Association of Endodontists for the treatment of traumatic dental injuries. 2004;

CASE REPORT

Minimally Invasive Technique for Multiple Recession Coverage using VISTA: A Case Series

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ABSTRACT:

Gingival recession is one of the common clinical manifestations of periodontal diseases. It is clinically manifested by an apical displacement of the gingival tissues which results in root surface exposure leading to hypersensitivity, root caries and esthetic problems. Wide arrays of therapeutic options are available for the management of gingival recession. The management of multiple recession defects represents one of the challenges of periodontal treatment. Newer techniques and materials have been developed. This case series presents a minimally invasive novel technique, using Vestibular Incision Subperiosteal Tunnel Access (VISTA) for multiple recession coverage using Platelet Rich Fibrin and Collagen membrane (PerioCol GTR membrane). Three cases of Miller's Class I and II multiple recession defects were managed using VISTA. A total of 12 teeth managed, excellent results have been attained in all teeth except one tooth (91.7% coverage was obtained).

Key words: Gingival recession, vestibular Incision, subperiosteal tunnel access (VISTA), coronally anchored suture, platelet rich fibrin

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INTRODUCTION

Gingival recession is defined as the displacement of marginal tissue apical to cemento-enamel junction.^[1] There are various anatomic, pathologic, physiological and iatrogenic factors causing recession. They include tooth malposition, frenal pull, faulty tooth brushing, periodontitis, presence of heavy calculus, subgingival restorations, orthodontic therapy etc.

Gingival recession can be localized or generalized. It can result in clinical

problems like hypersensitivity, root caries, root abrasions, esthetic problems like long clinical crown etc.

PREVALENCE

The US National survey revealed that 88 % of people, 65 years of age and older and 50% of people 18-64 years of age have one or more sites with recession. The prevalence of gingival recession increases with age.^[2] It is more common in males than in females and is more prevalent and severe on buccal than interproximal surface of teeth. Different

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classifications have been proposed for gingival recession and Miller's classification is most commonly used.

A wide array of treatment options are available for the management of gingival recession which are broadly classified into non surgical and surgical management. Non surgical management includes restorations, crowns, veneers etc.

Many surgical options are available for treatment of isolated gingival recession with predictable outcomes. Different options include pedicle flap procedures (coronally advanced flap,^[3] laterally positioned flap,^[4] double papilla flap), graft procedures (Free gingival graft,^[5] Subepithelial connective tissue graft^[6]), non resorbable and resorbable membranes^[7] and Acellular dermal matrix (ALLODERM).^[8] However for multiple recession defects, the treatment options are few with predictable outcome which include coronally advanced flaps, subepithelial connective tissue grafts and tunnel technique. The subepithelial connective tissue graft is considered to be the gold standard. However the above mentioned techniques for the management of multiple recession defects except coronally advanced flap, resulted in two surgical sites which is a major disadvantage. This case series present a minimally invasive

novel technique for multiple recession coverage using Vestibular Incision Subperiosteal Tunnel Access (VISTA).

CLINICAL CASE MANAGEMENT

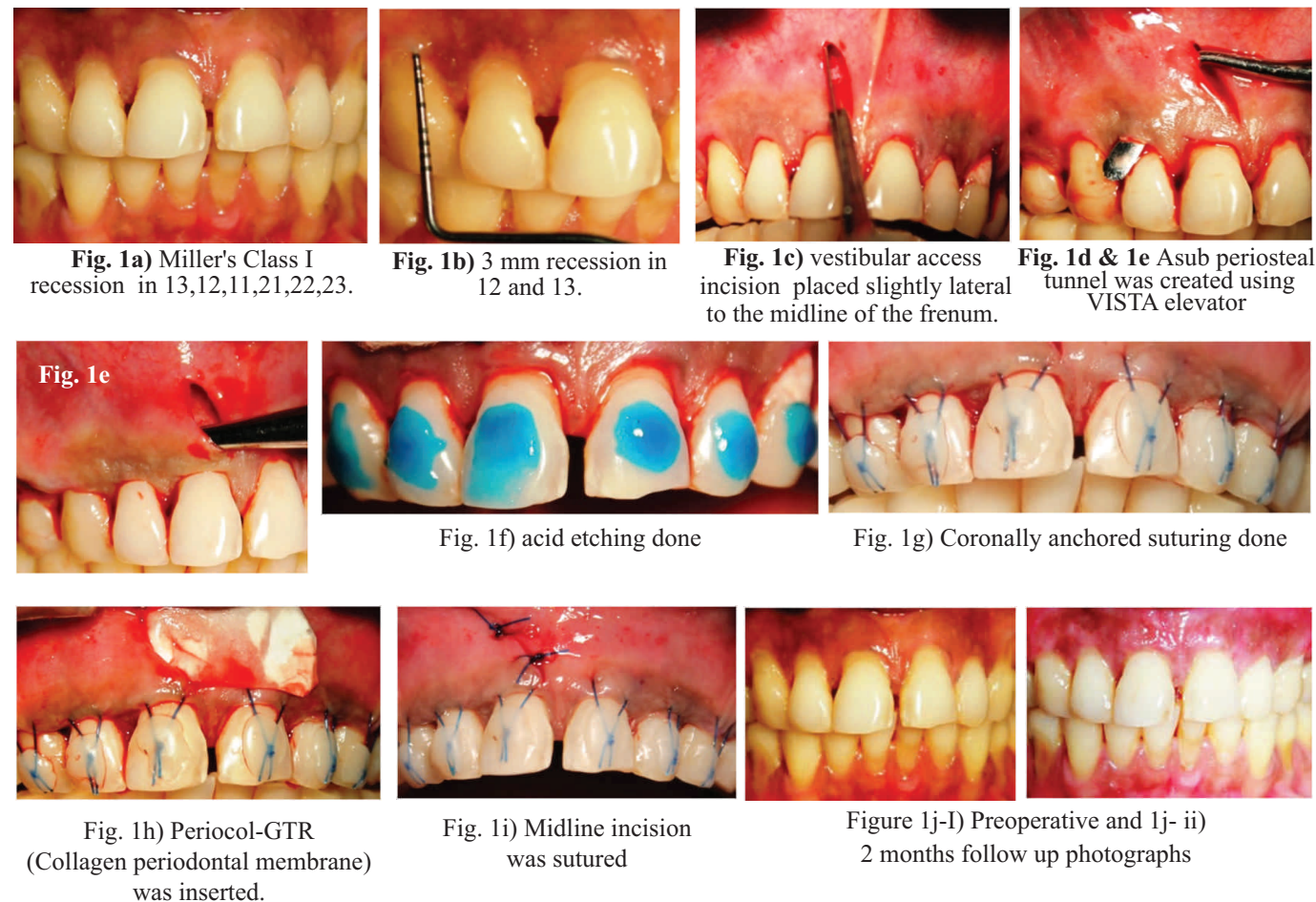
CASE 1

A 45 years old female patient reported to the Department of Periodontics, PMS College Of Dental Science and Research, Trivandrum, Kerala with a complaint of hypersensitivity in relation to upper front teeth. She had noncontributory medical history. Intraoral examination revealed Miller's Class I recession in 13, 12, 11, 21, 22, 23 (Fig.1a). Recession of 2 mm in relation to 11, 21 and 22, 3 mm in relation to 12, 13 (fig. 1b) and 4 mm in relation to 23.

PRE SURGICAL PREPARATIONS

Preoperative clinical parameters like recession height, probing pocket depth, clinical attachment loss (using Williams graduated periodontal probe) were measured. Detailed medical and dental histories were taken. Thorough scaling and root planing was done and oral hygiene instructions were given. Routine blood investigations and radiographs were taken. After 3 weeks following Phase I therapy, root coverage procedure

CASE 1



was planned. The surgical procedure (VISTA) was explained and informed consent was obtained from the patient.

SURGICAL MANAGEMENT

After adequate local anesthesia (2% Lignocaine, 1:80000), a vestibular access incision was placed slightly lateral to the midline of the frenum (fig. 1c).

A VISTA elevator was introduced and inserted through the incision between the bone and the periosteum thereby creating a subperiosteal tunnel (fig.1d and 1e). The tunnel preparation was extended into the papilla and apically beyond the mucogingival junction to mobilize the gingival margin for coronal repositioning.

Acid etching was done on the facial aspect using 37% phosphoric acid (fig.1f). Coronally anchored suturing was done using 4.0 prolene material and secured with composite resin on the facial aspect (Fig.1g). Periocol-GTR (Collagen periodontal membrane) of adequate size was inserted into the tunnel (Fig.1h). Midline incision was sutured (Fig.1i).

Patient was put on antibiotics and analgesics. Suture removal

was done after 10 days. After 2 months postoperative 100% root coverage can be appreciated in all teeth except # 12, where 1 mm recession was present. (fig.1j-I and 1j-II).

CASE 2

A 32 years old male patient came to the department with a complaint of elongation of upper front teeth. Patient was systemically healthy. Intraoral examination revealed Miller's Class I gingival recession in 11 & 21 (fig.2a). Surgical procedure was same as the above case except for material placed into the tunnel. Here Platelet Rich Fibrin [PRF] membrane was placed instead of collagen membrane (Fig.b, c, d, e, f, g and h). 100% root coverage is maintained after 1 month and 6 months follow up (fig.2j).

Figure 2a) Millers Class I gingival recession in 11 and 21. 2b) Incision placed at the midline of frenum using no.15 BP blade. 2c) Tunnel preparation was done using VISTA elevator.

Figure 2d) Coronally anchored suturing was done on facial aspect using 4.0 Prolene. 2e) Platelet rich fibrin (PRF) was procured.

CASE 2

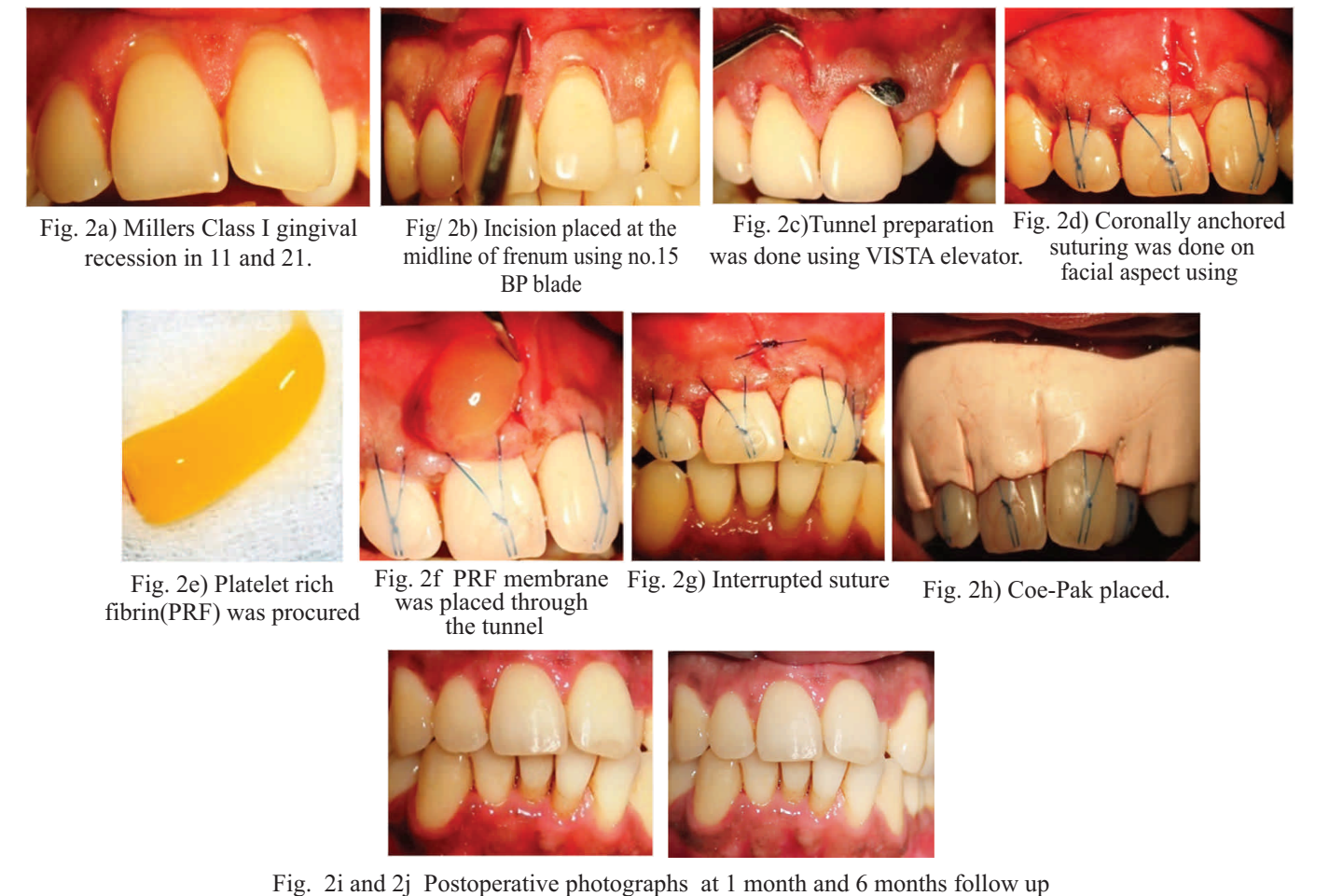


Figure 2f) PRF membrane was placed through the tunnel. 2g) Interrupted suture and 2h) Coe-Pak placed.

Figures 2i and 2j) Postoperative photographs at 1 month and 6months follow up .

CASE 3

A 39 years old female patient came to the department with a chief complaint of elongated upper front teeth. She had a noncontributory medical history. She presented with Millers Class I recession in relation to 12, 11, and 21 with 2mm and 22 with 3mm recession. The procedure was same as the above (Fig. 3 a, b, c, d, e and f,)

Figure 3a) Millers Class I gingival recession in 11,12,21and 22. 3b)Midline incision placed using no.15 BP blade.3c) Tunnel preparation was done using VISTA elevator.

Figure3d) PRF membrane was procured. 3e) Coronally anchoring suture was done on facial aspect. PRF membrane was placed into the subperiosteal tunnel.3f) Midline suturing done.

Figure 3g and 3h) Preoperative and at 2 months follow up.

DISCUSSION

The major therapeutic goals of mucogingival surgery are esthetics, hypersensitivity management and prevention of root surface caries. Management of multiple gingival recession is quite challenging.^[9] Miller^[10] defined complete root coverage as

the location of soft tissue margin at the CEJ, presence of clinical attachment to the root, sulcus depth of 2 mm or less and absence of bleeding on probing. More frequently gingival recessions affect group of adjacent teeth. Treatment of isolated or multiple gingival recessions depends on many factors like defect size, thickness of the gingiva, presence or absence of keratinized tissue adjacent to the defect.^[11]A wide variety of options are available for recession defects. Some have limitations like need for harvesting donor tissues and associated tissue morbidity, color mismatch, and compromised vascularity. Minimally invasive vestibular incision subperiosteal tunnel access (VISTA) overcomes these limitations.

In the above mentioned three cases, a total of 12 teeth managed, excellent results have been obtained ,except for one tooth (#12 in Case1). 91.7% coverage has been attained. There was reduction in the recession width, and recession depth at first month and six month from baseline, and there was gain in clinical attachment level at first month, 2 months and six months follow up.

In the VISTA technique, a single vestibular incision can provide access to the underlying alveolar bone and root dehiscence. This incision reduces the possibility of traumatizing the gingiva of the teeth being treated. The subperiosteal dissection reduces the tension of the gingival margin during coronal advancement and maintains the anatomical integrity of the interdental papillae by avoiding

papillary reflection.^[12] A vertically placed vestibular incision is considered for optimum blood supply and esthetics.

The gingival margin, with its membrane, is placed at the most coronal level of the adjacent interproximal papillae. Better results are obtained by sufficient mobilization and stabilization of sutures that are secured to the facial/palatal aspect of each tooth thereby preventing apical relapses of the gingival margin. Fixation of the gingival margins is done with coronally anchored suturing technique which minimizes micromotion of the regenerative site. Zadeh et al^[12] used Bioguide as a membrane in the VISTA technique in maxillary anterior teeth. Along with VISTA the use of PRF membrane, which is easy to procure and economical, results in optimum esthetics and excellent gingival biotype. None of the patients had any discomfort or post-operative complications. In a study by Gupta et al.^[13] mean root coverage of 97.22% was attained at treated sites using PRF along with VISTA. Chattered et al.^[14] reported 96% of root coverage in two clinical cases with Miller’s Class I and Class II multiple recession defects treated by VISTA approach and PRF membrane. Comparing to these reports, coverage obtained in the above presented cases are excellent and comparable.

CONCLUSION

Multiple recession defects pose a significant problem to the population. Different treatment options are available for multiple recession defects which presents certain limitations like harvesting the graft, patient discomfort, two surgical sites etc. However VISTA overcomes several limitations of other root coverage procedures with long term results.

REFERENCES

1. Glossary of periodontal terms.3-ed.Chicago: The American Academy of Periodontology; 1992.American Academy of Periodontology (AAP)
2. A. J. Miller, J. A. Brunelle, J. P. Carlos, L. J. Brown, and H. Loe, Oral Health of United States Adults. The National Survey of Oral Health in U.S. Employed Adults and Seniors: 1985-1986, NIH publication no. 87-2868.
3. Huang, L.H., Neiva, R.E., Wang, H.L. Factors affecting the outcomes of coronally advanced flap root coverage procedure. J. Periodontol. 2005; 76 (10), 1729–1734.
4. Zucchelli, G., Cesari, C., Amore, C., Montebugnoli, L., De Sanctis, M. laterally moved, coronally advanced flap: a modified surgical approach for isolated recession-type defects. J. Periodontol. 2004; 75 (12), 1734–1741.
5. Miller PD. Jr.Root Coverage with the Free Gingival Graft. J. Periodontol.1987; 58:10, 674-681.
6. Langer, B., Langer, L. Subepithelial connective tissue graft technique for root coverage. J. Periodontol. 1985; 56 (12), 715–720.

7. Harris, R.J. GTR for root coverage: a long-term follow-up. Int. J. Periodont. Rest. Dent.2002; 22 (1), 55–61.
8. Murata, M., Okuda, K., Momose, M., Kubo, K., Kuroyanagi, Y., Wolff, L.F. Root coverage with cultured gingival dermal substitute composed of gingival fibroblasts and matrix: a case series. Int. J. Periodont. Rest. Dent. 2008; 28 (5), 461–467.
9. Paolantonio M. Treatment of gingival recession by combined periodontal regenerative techniques, guided tissue regeneration, and sub pedicle connective tissue graft: A comparative clinical study. J Periodontol.2002; 73:53–62.
10. Miller PD., Jr Root coverage with free gingival graft. J Periodontol. 1987;58:674–81.
11. Cetiner D, Bodur A, Uraz A. Expanded mesh connective tissue graft for the treatment of multiple gingival recessions. JPeriodontol. 2004; 75:1167–1172.
12. Zadeh HH. Minimally invasive treatment of maxillary anterior gingival recession defects by vestibular incision subperiosteal tunnel access and platelet-derived growth factor BB. Int J Periodontics Restorative Dent. 2011; 31:653–660.
13. Gupta.,Puri.,Bansal. Platelet-Rich Fibrin-Reinforced Vestibular Incision Subperiosteal Tunnel Access Technique for Recession Coverage. Clinical Advances in Periodontics (2015):5.4 248-253.
14. Chatterjee A, Sharma E, Gundanavar G, Subbaiah SK. Treatment of multiple gingival recessions with vista technique: A case series. J Indian SocPeriodontol. 2015; 19(2):232-235.

CASE 3



Fig. a) Millers Class I gingival recession in 11,12,21and 22 Fig. 3b) Midline incision placed using no.15 BP blade. Fig. 3c) Tunnel preparation was done using VISTA elevator. Fig. 3d) PRF membrane was procured

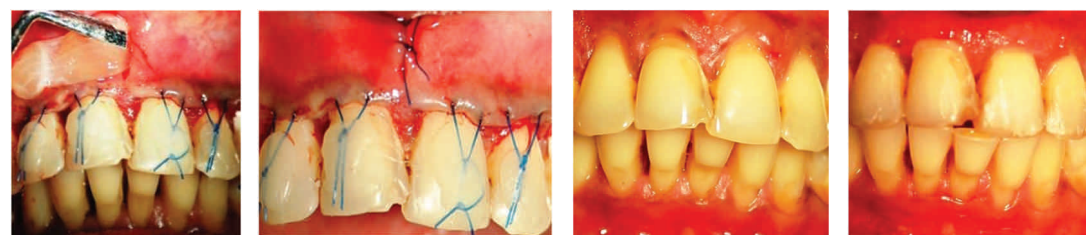


Fig. 3e) Coronally anchoring suture was done on facial aspect. PRF membrane was placed into the subperiosteal tunnel. Fig. 3f) Midline suturing done. Fig.3g and Fig. 3h Preoperative and at 2 months follow up.

Chronic inflammatory gingival hyperplasia associated with malpositioned teeth: A case report

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ABSTRACT:

Gingival enlargement is a common clinical problem, usually associated with specific condition. The aim of publishing this case report is to present the clinical, histopathological features and treatment of chronic inflammatory gingival enlargement which disturbed the aesthetics and masticatory function of the patient. A case of 17 years old male presenting with maxillary localized chronic inflammatory gingival enlargement associated with malpositioned teeth. Surgical therapy followed by orthodontic therapy was carried out to provide a good aesthetic and masticatory function.

Key words: Gingival enlargement, hyperplasia, chronic inflammatory, malpositioned teeth

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INTRODUCTION

Gingival enlargement or gingival overgrowth, is characterized by an increase in the size of gingiva. Gingival enlargements are quite common and may be either inflammatory, non-inflammatory or a combination of both.^[1] It is a multifactorial condition that develops as interactions between the host and the environment or in response to various stimuli. It may be plaque-induced, associated with systemic hormonal disturbances or occur as a manifestation associated with several blood dyscrasias, such as leukemia, thrombocytopenia or thrombocytopeny.^[2] The extent of these enlargements may lead to functional

disturbances like difficulty in mastication, altered speech, aesthetic and psychological problems.

Malocclusion is the third most important problem in the world population that affects the oral cavity. Abnormal tooth positions may already be present in the deciduous dentition. Therefore, dental care professionals, such as pediatric dentists and orthodontists, should act preventively to ensure correct tooth positioning and to avoid or reduce malocclusion that may perpetuate in the mixed and permanent dentitions.^[3] Tooth malposition, such as diastemas, crowding, rotated teeth, incisor proclination and mandibular molar tipping, may result in early tooth loss

due to the formation of periodontal pockets on the mesial surface of the tooth involved, because the bone crest tends to follow the cemento-enamel junction.^[4] Malocclusion alone does not result in periodontal disease.^[5,6] Individuals had deficient oral hygiene and consequent accumulation of bacterial plaque, which may cause, gingival inflammation, the most common periodontal problem. When any type of malposition is diagnosed, teeth should be aligned to redirect occlusal forces that act along the tooth axis and are harmoniously distributed and to prevent occlusal trauma, which may affect periodontal health.^[4, 7] It also revealed the importance of oral hygiene instructions and referral to orthodontic treatment as preventive measures.

Classification of gingival enlargement is based on the degree of overgrowth as: Grade 0: No signs of gingival enlargement; Grade I: Enlargement confined to interdental papilla; Grade II: Enlargement involving interdental papilla and the marginal gingiva; and Grade III: Enlargement covering three-quarters or more of the crown.^[8] The most common form of enlargement is inflammatory hyperplasia which is due to plaque induced inflammation of the gingival tissues. It can be localized or generalized.^[9]

In the inflammatory type of enlargement, the gingiva is soft, edematous, hyperemic or cyanotic and usually painful. This gingiva is quick to bleed when probing and the normal stippling has usually been lost and appears smooth and distended. Pitting can be observed after application of a point source of pressure. Non-inflammatory enlargement of the gingiva appear normal in color or even somewhat pale, and stippling may be normal or exaggerated.^[10] The treatment modalities include non-surgical periodontal therapy, i.e., scaling and root planing provided the size of enlargement does not interfere with complete removal of deposits from the involved tooth surfaces. When chronic inflammatory gingival enlargements include a significant fibrotic component that does not undergo shrinkage after scaling and root planing or are of such size that they obscure deposits on the tooth surfaces and interfere with access to them, surgical removal is the treatment of choice. Two techniques are available for this purpose: gingivectomy and flap operation.

This case report presents a localized chronic inflammatory gingival enlargement associated with malpositioned teeth.

Case report

A 17 year old male patient reported to the Department of Periodontology, A J Institute of Dental Sciences, Mangalore with a chief complaint of swelling in the gums of upper left front tooth region. The patient had noticed the swelling 1 year prior and reported that it had increased in size since then. He also complained of bleeding from the gums while brushing and having functional disturbances like difficulty in mastication,

aesthetic problems with the extent of this enlargement. There was no other relevant medical, drug, or family history. Mouth breathing, hormonal variation is not reported. On clinical examination the maxillary lateral incisor was placed slightly palatally and canine was buccally placed with mild crowding and local factors, like plaque extending over all interproximal, buccal and lingual surfaces and an abundance of supra and sub gingival calculus were present. The gingiva seemed to be markedly enlarged Grade III gingival enlargement [Figure: 1, 2]. The enlargement involving attached gingiva, marginal gingiva, and interdental papilla that extended palatally. The enlargement was diffuse, soggy in appearance and fibrotic accompanied by an inflammatory component with probing depth of more than 5 mm and generalized gingival bleeding on probing and teeth were non mobile and no radiographic abnormalities.

On the first visit, oral hygiene instructions were given after scaling and root planing. The patient was recalled after phase I therapy, when re-evaluated, the gingiva was soft and friable. On the basis of the size of the enlargement and character of the tissue after scaling and root planing, gingivectomy was planned. A written consent was obtained before surgical procedure. So, in this case, external bevel gingivectomy was performed and residual plaque and calculus was removed and thorough root planing was done [figure: 3, 4]. Periodontal dressing was given and the excised tissue was sent for histopathological examination. The patient was given amoxicillin (500mg TDS) for 5 days and ibuprofen (400mg BD) for 3 days, and chlorhexidine mouthwash twice daily for 3 weeks. Post-operative oral hygiene instructions were given and the patient was recalled after 10 days for reinforcement of oral hygiene and recalled after 3 weeks and subsequently once a month. After two months orthodontic treatment was initiated with the objective of aligning both upper and lower arches. [figure: 5]

HISTOPATHOLOGY

The histopathology of the tissue showed a hyperplastic parakeratinized stratified squamous epithelium with fibrocellular connective tissue. The connective tissue showed variable areas of cellularity, collagen fibers, blood vessels and a moderate degree of chronic inflammatory cell infiltrate. These features were suggestive of inflammatory gingival hyperplasia. [figure: 6]

DISCUSSION

Few studies in the literature investigated the interrelation between irregular tooth positioning and malocclusion with periodontal health in groups of adult patients. Most studies focused on children and adolescents.^[5, 6] This case showed that there were pathological periodontal changes associated with

malocclusion, which corroborates previous findings. The main etiological factor of periodontal disease is the bacterial plaque; other factors are usually associated. In Present case, malpositioned teeth are predisposing factors because oral hygiene becomes more difficult, so, bacterial plaque is retained and accumulates, therefore, leads to gingival enlargement. Patients that had malpositioned teeth also had some type of periodontal disease, such as chronic marginal gingivitis, gingival recession and chronic periodontitis in several degrees of severity.

Gingival overgrowth varies from mild enlargement of isolated interdental papillae to uniform marked enlargement affecting either one or both the jaws. Enlargements are a common clinical finding mostly represents a reactive hyperplasia which is a result of plaque-related inflammatory gingival disease.^[11,12] gingival enlargements is usually caused by local conditions such as poor oral hygiene, food impaction, or mouth breathing. Systemic conditions such as hormonal changes, drug therapy, or tumor infiltrates may complicate the process or even set the stage for the development of unfavorable local conditions that lead to food impaction and difficulty with oral hygiene .When the enlarged gingiva consist largely of dense fibrous tissue as a consequence of chronic inflammation or other causes, the condition is referred to as fibrotic gingival hyperplasia. The term “chronic hyperplastic gingivitis” is often used for either process. Loss of interseptal bone and drifting of the teeth occurs in long standing cases of inflammatory enlargement. These changes are commonly referred to as periodontal disease when the process involves the loss of gingival attachment and the subsequent loss of inter proximal bone.^[13] The plaque and calculus deposited on tooth surface could be the cause of chronic irritation of gingival tissues resulting in its proliferation.

Inflammatory enlargement caused by local factors is self perpetuating since it is often impossible to properly clean the “pseudopockets” which are formed by bulging tissue. The situation is exacerbated as bacterial colonization proceeds within the dental plaque and the host response to microbial products intensifies. A foul breath results as food debris is degraded by the accumulating microorganisms. While local etiologic factors are almost always present in cases of inflammatory type gingival enlargement, there are also several important systemic factors which may contribute to the problem and compromise the success of therapy directed at elimination of focal irritants.^[10]

When chronic inflammatory gingival enlargements include a significant fibrotic component that does not resolve completely after initial periodontal therapy or does not meet the aesthetic and functional demands of the patient; surgical removal is the treatment of choice. The most widely employed surgical

approaches for the treatment of gingival enlargements is gingivectomy or the flap technique by laser, electrocautery, or conventional method.^[14] The treatment of gingival enlargement depends on the clinical, radiographic and histopathologic assessment supported by hematologic and hormonal investigations. Surgical excision with maintenance of proper oral hygiene rarely leads to the recurrence of the condition.^[15]

CONCLUSION

The local factors, i.e., the plaque and calculus are known to be responsible for gingival enlargement and the thorough understanding of pathogenesis is essential. The importance of occlusion, oral prophylaxis and regular checkup cannot be overlooked and the size of hyper plastic tissue interacting with the patient ability to chew and causing serious esthetic problems in present case. This case report highlights the importance of patient motivation and interdisciplinary treatment planning.

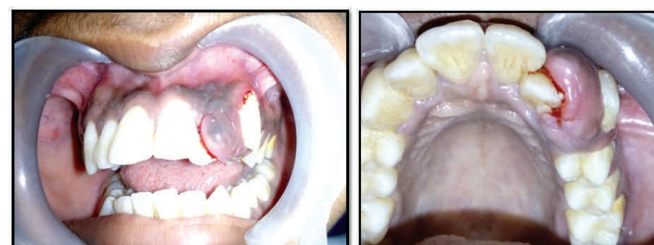


Figure 1

Figure 2

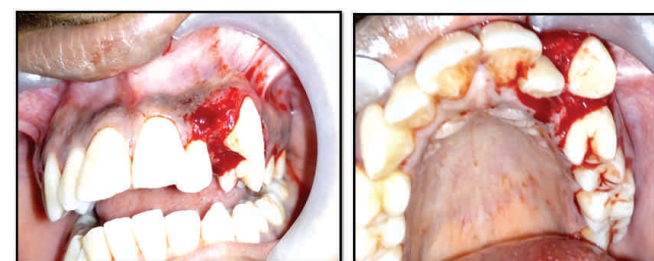


Figure 3

Figure 4

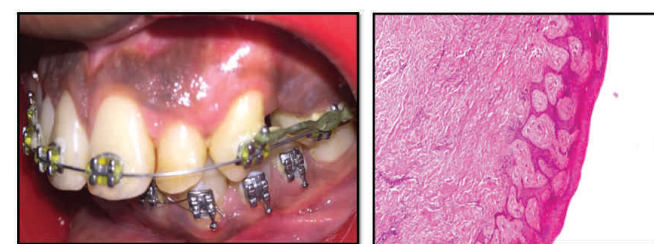


Figure 5

Figure 6

REFERENCES

- 1) R. Rajendran and B. Shivpathasundharam: Shafer's Textbook of Oral Pathology, 5th ed, Elsevier 2007, page 543-548
- 2) Newman MG, Takei HH, Klokkevold PR, and Carranza FA. Gingival enlargement Carranza's Clinical

Periodontology. 11th ed. Philadelphia, Penn: W.B. Saunders Company; 2006:373–390.

- 3) Facal-García M, Suárez-Quintanilla D, De Nova-García J. Diastemas in primary dentition and their relationships to sex, age and dental occlusion. Eur J Paediatr Dent.2002; 3(2):85-90.
- 4) Hallmon WW. Occlusal trauma: effect and impact on the periodontium. Ann Periodontol. 1999; 4(1):102-8.
- 5) Abu Alhaija ES, Al-Khateeb SN, Al-Nimri KS. Prevalence of malocclusion in 13-15 year-old North Jordanian schoolchildren. Community Dent Health. 2005; 22(4):266-71.
- 6) Abu Alhaija ES, Al-Wahadni AM. Relationship between tooth irregularity and periodontal disease in children with regular dental visits. J Clin Pediatr Dent. 2006; 30(4):296-8.
- 7) Maino BG. Orthodontic treatment and periodontal problems. III. Mondo Ortod. 1989; 4(6):839-46.
- 8) Inglés E, Rossmann JA, Caffesse RG. New clinical index for drug induced gingival overgrowth. Quintessence Int 1999;30:467-73
- 9) Seymour RA. Effects of medications on the periodontal tissues in health and disease. Periodontol 2000 2006; 40:120–129.
- 10) Hassell TM, Jacoway JR. Clinical and Scientific Approaches to Gingival Enlargement (I) Periodontics and Oral Hygiene 1980; 10:1-5.
- 11) Tiwana PS, Kok IJ, Stoker DS, Cooper LF. Facial distortion secondary to idiopathic gingival hyperplasia: surgical management and oral reconstruction with endosseous implants. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2005; 100(2):153–157.
- 12) Agrawal N, Agrawal K, Mhaske S. An uncommon presentation of an inflammatory gingival enlargement responding to non-surgical periodontal therapy. Int J Dent Hyg 2011; 9:303–307.
- 13) Greenberg and Glick: Burket's Oral Medicine- Diagnosis and Treatment, 10-ed, BC Decker Inc Elsevier 2005; page 179-186
- 14) Jhadhav T, Bhat KM, Bhat GS, Varghese JM. Chronic Inflammatory Gingival Enlargement Associated with Orthodontic Therapy – A Case Report. J Dent Hyg.2013; 87(1):19-23.
- 15) Kalburge j v, metgudrashmi. Unilateral gingival enlargement—a case report. pravara med rev 2010;2(2)

Gingival Prosthesis for Esthetics: A case report

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ABSTRACT:

Periodontal diseases and its treatment can result in loss of gingival tissue of the teeth in anterior esthetic zones due to gingival recession and loss of interdental papilla. Tissue management in these situations surgically is often unpredictable. Use of Gingival prosthesis or gingival veneer can provide a cost effective option for patients and can be used effectively to mask the gingival defect. Acrylic resins or silicones are used either in their natural shade or with additives to match the shade of gingiva to prepare these inexpensive veneers.

Key words: Acrylic resins, silicones, gingival veneer, periodontal attachment loss, interdental papilla

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INTRODUCTION

Periodontal disease is a silent disease of chronic nature. Patients frequently become aware of the disease process when gingiva begin to recede in the anterior region or when there is tooth mobility and extrusion of teeth creating an unesthetic appearance. Apart from periodontal disease and its treatment, dental extractions, congenital absence of tooth or trauma may result in loss of papilla and open interdental spaces creating a unesthetic situation for many patients.^[1]

Such defects in the anterior region may be managed by surgical or prosthetic approaches. Surgical treatments include minor procedures to rebuild papillae and grafting procedures that may involve soft-tissue manipulation as-well-as bone

augmentation to support the soft tissue.^[2] But these methods are unpredictable when a large volume of tissue is missing. When gingival defects are severe and involve multiple teeth, gingival replacement with artificial substitutes are more useful. Gum veneer or artificial gingiva fabricated in acrylic resin, silicone or copolyamide is of value in such cases.^[3]

The following case report illustrates the management of lost soft tissue with a comfortable and accurately fitting gingival prosthesis. It is very stable, economical, esthetic and useful in maintenance of oral hygiene for the patient.

CASE REPORT

A 32-year old married female patient reported to the Dept of Periodontics with

the chief complaint of unesthetic smile. She had undergone periodontal treatment one year back for her teeth which had abscesses and mobility at a private establishment. After few months gingiva began to recede and resulted in the present unacceptable appearance for the patient. [Figure 1]

Clinical examination revealed excellent gingival health but class IV recession in upper anterior teeth along with grade I mobility of upper central incisors. Patient wanted to improve her smile as she was psychologically depressed after the surgical treatment because of the postoperative loss of soft tissue. Considering the urgent need of the patient and the severe interdental bone loss and high smile line resulting in a gummy smile, a removable gingival veneer prosthesis was planned for her which was fabricated in acrylic resin.

FABRICATION

The lingual embrasures of the patients upper anterior teeth were blocked using utility wax. A buccal approach was used to create the master impression with a complete interproximal detail without tearing the impression upon removal from the mouth. A custom tray was used to make a final impression using polyether impression material. The cast was prepared using type IV die stone, and a gingival prosthesis was waxed up [Figure 2] and processed in heat-cured acrylic resin.^[4,5,6] The shade for the gingival veneer was selected by comparing gingival color shade guide (Ivoclar) with the maxillary gingivae.^[5] Characteristics of healthy gingiva were reproduced by using extrinsic acrylic stains. Retention was achieved with minor interproximal undercuts. The prosthesis was made extremely thin and flexible so as to engage the undercuts [Figure 3]

The patient was instructed on use of prosthesis as well as maintenance of oral hygiene. [Figures 4,5]

DISCUSSION

Periodontal disease progression, pocket elimination procedures, and resective osseous surgeries often lead to creation of recession and the potential for a compromised esthetic outcome, especially in the maxillary anterior region.^[7] Surgical correction of gingival defects with methods like papilla reconstruction and soft and hard tissue grafting are not predictable when the defects are large and involve multiple teeth.

Currently, there is no predictable surgical method for correcting esthetic deformities that result from generalized attachment loss. In such situations, gingival prosthesis can be used and various authors have described their uses and methods of construction.^[4,5,6]

The gingival veneer prosthesis can be used to cover the exposed root surfaces, improve esthetics, prevent food impaction and improve speech following periodontal surgery. It may be included in complete treatment of a patient or in transitional phases pending treatment with fixed or removable partial dentures. It may be used in combination with a fixed partial denture to mask severe alveolar bone loss or similar situations with a fixed implant prosthesis.^[8,9]

Several materials have been described in the literature for the fabrication of gingival veneer. Among all these materials, acrylic resin is widely available and relatively cheap, colour stable and long lasting but are hard, rigid and difficult in fitting accurately around multiple teeth. Another alternative is the use



Figure 1



Figure 2



Figure 5



Figure 3



Figure 4



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of a flexible gingival mask made of silicone.^[7] This is both comfortable and accurately fitting. The main drawback is that it requires refabrication every year, as the prosthesis loses its properties like color, flexibility and dimensional stability.

The advantage of this prosthesis is that it can be easily cleaned, creates an ideal contour with removable prosthodontic materials, and does not disturb the other dental units. Plaque control and cleanliness are of prime importance. Smoking and frequent drinking of tea or coffee are discouraged. In the present case the prosthesis provided an esthetic result, prevented food lodgement, and improved phonetics.

Gingival veneer is also known as gingival mask, flange prosthesis^[10], artificial gingival epithesis, and party gums.

CONCLUSION:

Esthetic and functional clinical problems can happen for patients with periodontal disease or other situations especially in the anterior segment of the mouth. Such scenarios are a challenge to the periodontist and calls for multidisciplinary teamwork to satisfy the patient. Removable gingival prosthesis are a good treatment option in advanced tissue loss, achieving esthetic results and patient satisfaction.

The acrylic resin gingival veneer is an easily constructed, inexpensive, and practical device to optimize the esthetic and functional outcome in the management of loss of gingival tissue. In this case it provided an immediate and sustained solution for the patient as the follow up showed a satisfied patient and excellent gingival health.

REFERENCES

1. Prato GPP, Rotundo R, Cortellini P, Tinti C, Azzi R. Interdental papilla management: a review and classification of the therapeutic approaches. *Int J Periodontics Restorative Dent* 2004; 24: 246-255.
2. Reddy MS. Achieving gingival esthetics. *J A D A* 2003;134:295-304.
3. Dr.Verdine Virginia Antony, Dr.Rahamathulla Khan. Gingival mask—Restoring the lost smile. *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)* e-ISSN: 2279-0853, p-ISSN: 2279-0861. Volume 5, Issue 3 (Mar.-Apr. 2013), PP20-22.
4. Greene PR. The flexible gingival mask: An aesthetic solution in periodontal practice. *Br Dent J* 1998; 184:536-40.
5. Barzilay I, Irene T. Gingival prostheses: A review. *J Can Dent Assoc* 2003;69:74-8.
6. Mekayarajjnananth T, Kiat-amnuay S, Sooksuntisa koonchai N, Salinas TJ. The functional and esthetic deficit replaced with an acrylic resin gingival veneer. *Quintessence Int* 2002;33:91-4.
7. Mule SA, Dange SP, Khalikar AN, VaidyaSP. Gingival prosthesis: An aesthetic solution for a periodontally compromised patient-A case report. *J Indian Dent Assoc* 2011; 5(5): 652-653.
8. Patil S, Prabhu V, Danane NR. Gingival veneer: mask the unesthetic. *J Indian SocPeriodontol* 2011; 15(3): 284-287.
9. Shah Ankur. Gingival veneer: non-invasive approach in the management of lost interdental papilla. *Int J Dent Case Reports* 2012; 2(3):54-58
10. Blair FM, Thomason JM, Smith DG. The flange prosthesis. *Dent Update* 1996;23:196-9.

CASE REPORT

Management of Aberrant Frenum by Free Gingival Graft: A Case Report

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ABSTRACT:

The frenum is the attachment of the lip and cheek to the tooth supporting structures which comprises of the gingiva, alveolar mucosa and the underlying periosteum. It is a mucous membrane formed by muscle and connective tissue fibres. The frenal attachment when butt in with the gingival margin it leads to plaque accumulation, increase in the rate of progression of gingival recession, inadequate attached gingiva thereby non-maintainable site and thus leading to recurrences even after the non surgical treatment. Management of aberrant frenum by frenectomy sometimes leads to reattachment of the frenum with an inadequate zone of attached gingiva. The present case report is aimed to approach aberrant double simple frenum using free gingival graft.

Key words: Free gingival graft, aberrant frenum, attached gingiva, prognosis.

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INTRODUCTION

Oral cavity exhibits most notably the maxillary labial frenum, the mandibular labial frenum, and the lingual frenum. Labial frenum attachments are thin folds of mucous membrane containing muscle fibres originating from orbicularis oris muscle which provides attachment to the alveolar mucosa and underlying periosteum.^[1] The primary function of frena is to provide stability to the upper and lower lips and the tongue. The exact role and extent of their involvement in mastication is controversial.^[2] The frena may also jeopardize the gingival health

by causing a gingival recession when they are attached too closely to the gingival margin, either because of an interference with the proper placement of a toothbrush or through the opening of the gingival crevice because of a muscle pull.^[3]

This gingival recession brings along with it, many compromised situation such as progressive loss of attached gingiva, inadequate tooth supporting structure and increased mobility which is sometimes irreversible if untreated, over a period of time which in turn, will ultimately result in tooth extraction.

Aberrant frenum attachment, contribute to the progression of recession by generating tension on the marginal tissues.^[4] The presenting case report demonstrates the correction of an anomalous mandibular labial frenum using soft tissue augmentation. The stability and clinical parameters of the same were assessed longitudinally for more than a year.

CASE REPORT

29 years old male patient reported at Annoor Dental College, Muvattupuzha with a chief complaint of bleeding while brushing since 6 months and was unable to maintain the lower front teeth. The patient's medical history was not significant. The oral hygiene status was fair. On intraoral clinical examination left lower mandibular central incisor #31 and right lower mandibular central incisor #41 were labially positioned associated with slight mesiodistal rotation in relation to #41 (Fig. 1). The marginal gingiva around the teeth was inflamed, bleeding on probing was detected, and also there was class IV recession, with presence of double simple frenum. It was diagnosed as class IV recession both according to Miller's (1986) and Mahajan's Modification of the Miller's Classification (2010).

Other findings include grade I mobility and presence of periodontal ligament (PDL) widening with only apical one-third horizontal bone (<30%) remaining radiographically. In addition, pulp vitality was checked, and teeth were vital. With this clinical and radiographical finding the prognosis of #31 and #41 was determined as questionable prognosis. A surgical phase included, free gingival graft (FGG) augmentation along with root coverage in relation to the lower mandibular anterior region.

Clinical Parameters:

Table 1: All measurements were recorded at baseline before surgery:

Clinical Parameters	Measurements	
	#31	#41
Recession height	7.0 mm	6.0 mm
Probing depth	1.0 mm	1.0 mm
Wide of attached gingiva	0.0 mm	0.0 mm
Clinical attachment level	8.0 mm	7.0 mm

Preoperative

After treatment planning, informed consent was obtained, and the treatment was begun. There was grade I mobility present in relation to the compromised teeth. On examination, fremitus

test was positive and thus trauma from occlusion was confirmed. An occlusal correction was made and hence the teeth were relieved from traumatic occlusion. Thereafter, the patient was subjected to initial scaling and root planing along with a detailed oral hygiene instruction which comprised of self demonstration of the instructed tooth brushing technique. After one week, gingival inflammation had reduced and subsequently required surgical procedure was carried out.

Preparation of recipient site

After antisepsis the area was anesthetized using local infiltration by using xicaine 2% with epinephrine 1:80,000. A horizontal incision was made through the mucogingival junction extending from distal most aspect of #31 to the other side of the distal aspect in relation to #41, which also detached the simple double labial frenum (Fig. 3). The incision was extended to the desired width and depth which will allow for 50% contraction of the graft after healing is complete. Also, de-epithelization of the interdental papilla at the recipient site was done and tissue tags were removed. This was done in an attempt for partial root coverage in addition to increase in width of attached gingiva.

Donor site preparation

The left palate was chosen as the donor site. The thickness of the palatal tissue was measured by penetrating to the bone with a periodontal probe, which was approximately 3.0 mm. A tinfoil template was used to guide the palatal incision. An approximately 1.5mm thick gingival graft is dissected from the palate of appropriate dimension to match the recession defect. The graft is then secured to the recipient bed using 3-0 non resorbable braided silk sutures (Fig. 4) and pressure applied for 5 minutes followed by an application of periodontal dressing (COE-PAK, GC America INC., USA).

Post operative management

The patient was given post surgical instructions and was prescribed amoxicillin 500 mg tid for 5 days and ibuprofen 400 mg tid for 3 days. A chlorhexidine gluconate mouthwash (0.2%) was prescribed to maintain his routine oral hygiene. The patient was recalled after 10 days for removal of periodontal pack and sutures placed. The patient was advised not to brush at the recipient site for almost a week. Pulling or retracting of the lip or cheek was strictly forbidden.

Results

The patient was asymptomatic and healing was uneventful both at the recipient and donor site. The patient was recalled at 1, 3 and 6 months followed by a 6 months of interval (Fig. 5). There was a significant gain in clinical attachment level and 1-2 mm root coverage achieved.

Clinical Parameters:

Table 2. Measurements recorded at one year after surgery

Clinical Parameters	Measurements	
	#31	#41
Recession height	5.0 mm	5.0 mm
Probing depth	1.0 mm	1.0 mm
Wide of attached gingiva	5.0 mm	6.0 mm
Clinical attachment level	6.0 mm	6.0 mm

DISCUSSION

Friedman stated that "inadequate" zone of gingiva would facilitate subgingival plaque formation because of improper pocket closure resulting from the movability of the marginal tissue. In an observational study, Lang and Loe suggested a width of at least 2 mm of keratinized mucosa, of which 1 mm was to be attached. However, several studies have challenged this concept. Findings reported from controlled clinical trials demonstrated that it is possible to maintain clinically healthy marginal tissue even in areas with less than 1 mm of keratinized tissue.^[5] Reeves et al. stated that an extremely thin gingival tissue has to be treated surgically or a tissue grafting is recommended 6-8 weeks prior to crown lengthening procedure to improve the thickness of the keratinized tissue.^[6]

Abnormal labial frena are capable of retracting gingival margins, creating diastemas, and limiting lip movement. When these frena are present, the traditional frenectomy alone generally is successful. However, when the frenulum is extensive, the possibility of coronal reformation exists. Several procedures have combined the frenectomy with either a lateral pedicle flap, free papilla graft, or free gingival (mucosal) graft taken from the palate.^[7] Augmentation avoids the scarring, prevention of re-attachment of the frenulum and causes deepening of the vestibule.

In addition to this, to prevent the recurrence of soft lesion and to protect adequate keratinized tissue width, free gingival graft operation is an excellent and predictable surgical procedure. Patel et al. used the same approach to treat a peripheral odontogenic fibroma case and obtained a favourable outcome where lesion recurrence was observed.^[8] Aberrant frenulum attachment with inadequate attached gingiva can contribute to the progression of recession by generating tension on the marginal tissues. Treating such defects is a two stage procedure-frenectomy and recession coverage procedure.^[9]

frenum, shallow vestibule, gingival recession and an inadequate attached gingiva. This case report was present with 0mm attached gingiva, probing depth 1mm, severe interdental soft tissue loss clinically and radiographically <30% of bone remaining. A single stage procedure was done wherein a FGG was used to treat class IV recession which resulted in significant improvement in clinical parameters such as increase of width of attached gingiva from 0mm to 5-6mm, clinical attachment gain from 8mm to 6mm in #31 and 7mm to 6mm in #41. These parameters were clinically stable and have been followed for more than a year with a regular periodic recall visit.

On the contrary, disadvantages of the FGG for root coverage include increased discomfort and potential for postoperative bleeding from the donor area by virtue of a large wound that heals by secondary intention. While comparing with other soft tissue techniques for root coverage, the FGG results are an unpredictable colour match between the grafted tissue and adjacent gingival tissues. Grafted tissue with a lighter colour than desired may persist for long periods of time after the initial healing. Selection of the palatal donor site should avoid the rugae areas because they may persist in the grafted tissue for as long as 9 years and consequently compromise aesthetics.^[10]



Figure 1. Preoperative

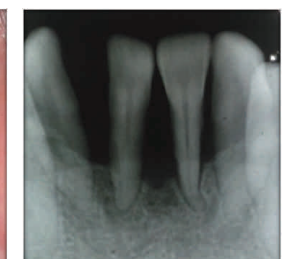


Figure 2. Intraoral Periapical Radiograph



Figure 3. Recipient Site



Figure 4. Placement of FGG to the recipient site



Figure 5. Follow up after 1 year

CONCLUSION

The presence of an aberrant frenum poses a risk of gingival tissue damage. Such a frenum can be surgically managed by involving the correction of the attachment site and length of the frenum using free gingival graft or other mucogingival treatment. There are still lot of controversies, in regard with increase of attached gingiva which was considered critical for the maintenance of gingival health and prevention of periodontal disease progression with several advantages and disadvantages. The main disadvantage is the mismatch of the colour on the recipient site which is aesthetically unpleasing. But in this procedure FGG not only helped, in maintenance of oral hygiene which was the patient's chief complaint but also revert back his gingival health and function to normal. And, evaluation for the same was followed for more than 1 year that which was questionable and supposedly to go for extraction, was retained. Periodical recall maintenance is highly recommended for any periodontal treatment procedure.

REFERENCES

1. Gurpreet Kaur, Sujata Malik, Deepak Grover, Anupriya Sharma. Surgical Management of Aberrant Labial Frenum Using Modified Z-Frenuloplasty: A Case Report. *IJSS Case Reports & Reviews* 2015;1(10):5-8.
2. Sandeep Anant Lawande and Gayatri S. Lawande. Surgical management of aberrant labial frenum for controlling gingival tissue damage: A case series. *Int J Bioinformatics Res.* 2013;4 (10):574-78.
3. Devishree, Sheela Kumar Gujjari, and P.V. Shubhashini. Frenectomy: A Review with the Reports of Surgical Techniques. *J Clin Diagn Res.* 2012 Nov; 6(9): 1587-1592.
4. Deshmukh J, Khatri R, Fernandes B, Kulkarni VK, Singh S. Frenectomy with semilunar coronally repositioned flap: A single stage approach - simple solution for complex problem. *J Indian Soc Periodontol.* 2015 Jul-Aug; 19 (4): 454-7.
5. Mehdi A, Mohammad S, Mahasti S. Significance of the width of keratinized Mucosa on the health status of the Supporting tissue around implants Supporting overdentures. *JOI.* 2009; 35(5): 232-237
6. Reeves WG. Restorative margin placement and periodontal health. *J Prosthet Dent.* 1991 Dec; 66 (6): 733-6.
7. Breault LG, Fowler EB, Moore EA, Murray DJ. The free gingival graft combined with the frenectomy: a clinical review. *Gen Dent.* 1999 Sep-Oct; 47 (5): 514-8.
8. Nurcan T, Suleyman EM, Burcu K, et al. Soft Tissue Reconstruction with Free Gingival Graft Technique following Excision of a Fibroma. *Case Rep Dent.* 2015 Aug; 18, Article ID 248363, 4 pages.
9. Jeevanand D, Richa K, et al. Frenectomy with semilunar coronally repositioned flap: A single stage approach - simple solution for complex problem. *J Indian Soc Periodontol.* 2015 Jul-Aug; 19(4): 454-457.
10. Mehmet S, Serhat K. Treatment of localized gingival recessions with free gingival graft. *Eur J Gen Dent.* 2012; 1(1): 10-14.

CASE REPORT

Management of Endo Perio-Lesion with Buccal Space Involvement in Maxillary Molar: A case report

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ABSTRACT:

Facial space infections are usually odontogenic in origin and present with distinct clinical signs and symptoms. The facial space involvement as a result of combined endo-perio lesions are difficult to treat. An Endo-perio lesion can have varied pathogenesis. These combined lesions require a thorough understanding and scientific knowledge on the clinician's part. This case report presents a complex case of primary periodontal lesion resulting in endodontic involvement leading to buccal space infection. A sequential multidisciplinary approach is required to treat such lesion and to preserve the teeth involved.

Key words: Buccal space infection, endo-perio lesions, facial space management

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INTRODUCTION

The pulp and periodontium have embryonic, anatomic and functional inter-relationships. The first documentation of influence of periodontal disease on pulp has been done in 1918 by Turner and Drew,^[1] but it was in 1964 the actual relationship between periodontal and pulpal disease was described by Simring and Goldberg.^[2] Endo-perio lesions complicate both diagnosis and treatment of involved teeth. Failure to appreciate the concomitant existence of both lesions would result in treatment failure and morbidity to patient. The prime etiologic factor for this condition is microorganisms such as bacteria, fungi,

and viruses which is complicated by various contributing factors such as trauma, root resorptions, perforations, and dental malformations. Numerous classification systems have been developed by various authors to explain the disease and devise appropriate treatment plan.^[3] Current Literature explains the pathogenesis of the disease, how endodontic lesion influences periodontal disease and vice versa. In this case we would like to report a primary periodontal lesion which led to buccal space infection and how the case was managed.

Case Description

A male patient aged 50 years reported to

department of dentistry of our institution with the complaint of extra oral swelling of the left side of the face along with pus discharge and pain in the upper left back teeth. The complaint of pus discharge had been present since 1 month; however the swelling was noticed by the patient couple of days prior to the day of reporting. Patient was a controlled diabetic and on medication since 10 years. On extra oral examination there was a noticeable swelling on the left middle third of the cheek, not involving the orbital and the lower third of the face. The swelling was firm and mild tender to touch. (fig 1) Patient had fever and on examination the submandibular lymph nodes were enlarged and tender

The intra oral examination revealed patient's poor oral hygiene status along with the fact that patient was habitually not eating from the left side for a long time, which the patient admitted. There was abundant calculus deposits with respect to maxillary left posteriors (fig 2). There was an abscess extending from the attached gingiva into the vestibule on both buccal and palatal in the region of second premolar, first and the second molar (fig 2). The second premolar and first molar were tender on percussion, non-mobile and non-vital on pulp testing. There was a 10mm periodontal pocket on buccal and mesial of first molar when measured with William's periodontal probe (fig 3). Probing with Naber's probe suggested Grade II furcation involvement.

Investigations

Intraoral periapical radiograph (IOPA) (fig 4) and orthopantomograph (OPG) were advised. From the radiographic examination, vertical bone loss till the apical third on the distal aspect of the first molar and mild bone loss on the mesial aspect could be seen. The roots of first and second molar extended into the maxillary sinus. There was periapical radiolucency on the second premolar and distal root of first molar.

Diagnosis

The clinical and the radiographic picture suggest endo-perio lesion of primary periodontal with secondary endodontic involvement resulting in buccal space involvement.

Treatment

The immediate approach was to drain the abscess. The abscess was drained by an external incision in the vestibule opposite to first and second molar followed by access opening of first molar and second premolar to establish drainage through teeth. The patient was put on antibiotics (Amoxicillin 500mg t.i.d and metronidazole 400mg t.i.d for 7 days) along with analgesics for patient comfort. The second visit following abscess drainage was scheduled after 10 days. The patient had no pain and the swelling had subsided (fig 5). A thorough mechanical

debridement along with root planning was done. Thereafter root canal treatment was initiated and a temporary restoration was done (fig 6).

Patient was kept on recall for regular checkup. After a span of 3 months, the tooth was asymptomatic, and the periodontal pocket of 8mm was present. A periodontal flap surgery with bone graft and GTR collagen membrane was performed at the third visit to treat and arrest the furcation defect and the periodontal bone loss. A 6 months post op clinical picture shows the improved periodontal conditions, reduction of periodontal pocket from 8mm to 5mm (fig 9) and significant bony fill (fig 10).

DISCUSSION

Fascial spaces (also termed fascial tissue spaces, or tissue spaces), are potential spaces that exist between the fascia and underlying organs and other tissues.^[4] These spaces can be classified according to their anatomic location, in relation to upper and lower arch. In relation to maxilla, there are three primary spaces- canine space, buccal space and the infratemporal space. The demarcation between these spaces requires thorough knowledge of anatomy of face. In the present report, the patient present with an extra oral swelling confined to the cheek, localized in the middle third of the face. The patient's maxillary first molar presented with deep periodontal pocket of 10mm, furcation involvement, non-vital pulp and a lateral abscess suggesting the periodontal infection leading to pulpal involvement. The necrotic pulpal content extends through the buccal cortical plates leading to formation of vestibular abscess. The buccal space becomes involved from the maxillary teeth when the infection erodes through the bone superior to the attachment of the buccinator muscle. Buccal space abscesses typically cause a facial swelling over the cheek that may extend from the zygomatic arch above to the inferior border of the mandible below, and from the anterior border the masseter muscle posteriorly to the angle of the mouth anteriorly.⁴ There is circumferential eyelid edema, however the orbital contents are protected. Cavernous sinus thrombosis as a complication of buccal space infection is a rarity. The ideal proposed treatment of vestibular infection is immediate extraoral or intraoral drainage. In the present report, intral oral was suggested to prevent facial scarring. There was an easy access intraorally to establish drainage. Antibiotics were prescribed post drainage and patient was kept on recall. In the current case, the buccal space involvement was a secondary manifestation of complex endodontic periodontal communication.

The relationship between the periodontium and the pulp was first discovered by Simring and Goldberg in 1964.^[2] Since then, the term 'perio-endo lesion' has been used to describe lesions

due to inflammatory products found in varying degrees in both periodontium and pulpal tissues. The first classification of endodontic-periodontal lesions based on pathology of origin was proposed by Simon et al⁵ as follows

- Primary endodontic lesions
- Primary periodontal lesions
- Primary endodontic lesions with secondary periodontal involvement
- Primary periodontal lesions with secondary endodontic involvement
- True combined lesions.

By comprehensive understanding of the pathogenesis and investigations, the clinician can make a sound diagnosis, formulate an appropriate treatment plan and assess the prognosis of these lesions. In the present scenario, it was a combined periodontal infection leading to pulpal necrosis. The success rate of the endodontic-periodontal combined lesion without a concomitant regenerative procedure has been reported to a range from 27% to 37%.^[6,7]

The pre-surgical assessment includes establishing and verifying the non-vital status of the pulp, the extent and severity of the periodontal destruction, and therapeutic prognosis of the planned regenerative procedure. Once the therapeutic prognosis of the periodontal regenerative procedure is determined to be favourable, then endodontic therapy should be

provided. In the present scenario, the tooth was non mobile with moderate bone loss. In the second visit, the root canal therapy was completed in a single visit and a healing period of 3 months was a periodontal treatment was planned. This sequence of treatment allows sufficient time for initial tissue healing and better assessment of the periodontal condition.^[8] After the healing period, the inflammation had subsided, tooth was asymptomatic. The regenerative therapy of Guided tissue regeneration was planned for the patient as there was grade II furcation with 10mm pocket. A beta-tricalcium phosphate bone graft with a collagen GTR membrane were used. Beta tricalcium is an osteoconductive bone graft, enhances bone formation by acting as a scaffold for entrapment of new osteoblasts, promotes new bone formation over a period of 3-6 months as it resorbs very slowly. GTR collagen membrane provided epithelial exclusion, maintains space, hence promoting bone regeneration. At 6 months recall period, significant bone formation had occurred with periodontal pocket reduced from 10mm to 4mm and radiograph demonstration significant bony fill.

CONCLUSION

Diagnosis of an Endo-Perio lesion with concomitant space infection is a complex task and requires thorough examination of the patient's clinical status, evaluation of medical and dental history. The management requires an inter-disciplinary approach for successful management of lesion and reduction of



Fig 1: Extraoral swelling on right side of face



both buccal and palatal side



Fig 3: Pocket of more than 10mm on buccal side



Fig 4: 7 days following abscess drainage



Fig 5: IOPA showing bone loss till apical third of distal root of 26 and furcation involvement



Fig 6: IOPA 3 months after completion of RCT



Fig 7: Flap reflection showing bone loss



Fig 8: Graft placement



Fig 9: 6 month post operative probing depth

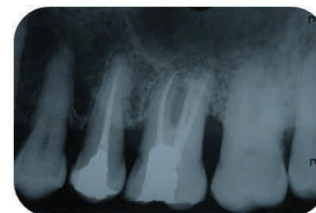


Fig 10: IOPA showing adequate bone fill

morbidity to patient, through prompt diagnosis and a meticulous treatment the affected tooth can be salvaged and maintained in function.

REFERENCES

1. Turner JG, Drew AH. An experimental inquiry into the bacteriology of pyorrhea. *Proc R Soc Med* 1919;12(Odontol Sect):104-118.
2. Simring M, Goldberg M. The pulpal pocket approach: Retrograde periodontitis. *J Periodontol* 1964;35:22-48
3. Ahmed, HM. Different perspectives in understanding the pulp and periodontal intercommunications with a new proposed classification for endo-perio lesions; 2012 Volume 6, Issue 2 87-104
4. Hupp JR, Ellis E, Tucker MR (2008). Contemporary oral and maxillofacial surgery (5th ed. ed.). St. Louis, Mo.: Mosby Elsevier. pp. 317-333.
5. Simon JH, Glick DH, Frank AL. The relationship of endodontic-periodontic lesions. *J Periodontol* 1972;43:202-8.
6. Parolia A, Gait C T, Porto IC, Mala K. Endo-perio lesion: A dilemma from 19 th until 21 st century. *Journal of interdisciplinary dentistry*. 2013;3:2-11.
7. Oh SL, Fouad AF, Park SH. Treatment strategy for guided tissue regeneration in combined endodontic-periodontal lesions: Case report and review. *J Endod* 2009;35:1331-6.
8. Paul BF, Hutter JW. The endodontic-periodontal continuum revisited: New insights into etiology, diagnosis and treatment. *J Am Dent Assoc* 1997;128:1541-8

REVIEW

Osteitis in Periodontics

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ABSTRACT:

Periodontitis is a multifactorial disease associated with several risk and susceptibility factors. Risk factors are part of the causal chain, or expose the host to the causal chain. Periodontitis are destructive forms of periodontal diseases that are characterized by inflammation of the periodontal tissue, leading to an apical migration of the epithelial attachment and loss of periodontal soft and hard tissues. Periodontal disease is characterized by both inflammation and bone loss. The concept of inflammation has a long history. In this review, we discuss several aspects of the immuno-inflammatory host response that ultimately results in loss of alveolar bone. A proposal is made that periodontal inflammation not only stimulates osteoclastogenesis but it also interferes with the uncoupling of bone formation and bone resorption.

Key words: Inflammation, RANK L, osteoimmunology, periodontal disease

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Source of Support: Nil

INTRODUCTION

Inflammation and bone loss are hallmarks of periodontal disease (PD). The question is how the former leads to the latter. Although investigations into the pathogenesis of periodontitis have traditionally centered on the role of bacterial infection, over the past 2 decades there has been increasing interest in the host response factors that drive periodontal disease (PD).^[1,2,3] The initial response to bacterial infection is a local inflammatory reaction that activates the innate immune system.^[4,5] The failure to encapsulate this "inflammatory front" within gingival tissue results in expansion of the response adjacent to alveolar bone.^[4] Advances in research have led to a new appreciation of not only each field but also the intimate relationship between inflammation and bone loss. The recognition that periodontitis involves an inflammatory component as well as altered bone metabolism has provided a new perspective on the etiology of the disease. The newer investigations of pathogenesis of periodontal disease is now under the shield "OSTEOIMMUNOLOGY". This shield is now a framework which is catalyzed to continue advances in knowledge of specific cytokines and associated mediators involved in the pathway of

inflammatory response in periodontitis and in further elucidation of the mechanisms underlying bone resorption.^[5]

THE ROLE OF INFLAMMATION.

Inflammation depends upon two critical factors that leads to bone destruction. First is concentration of inflammatory mediators present in gingival tissue must be sufficient to activate pathways leading to bone resorption. Second, inflammatory response should penetrate the tissue to reach bone within a critical distance. Critical concentrations of inflammatory mediators that lead to bone resorption depends on the expression of proinflammatory cytokines, such as interleukin (IL)-1, -6, -11, and -17, tumor necrosis factor-alpha (TNF-a), leukemia inhibitory factor, and oncostatin M.^[6,7,8] From an experimental study it is shown that micro organisms like Pg has a major role in expansion of the inflammatory front to alveolar bone. These findings suggested that inhibition of the inflammatory

mediators can prevent the inflammatory front from reaching alveolar bone, and it was associated with a reduction in bone loss.

CYTOKINES

Numerous cytokines and chemokines have been detected in the gingival crevicular fluid (GCF), exudates collected at the gingival margin, and in gingival tissue from patients with periodontitis. Several pro inflammatory cytokines including IL-1, IL-6, IL-12, IL-17, IL-18, IL-21, TNF α and IFN- γ have been demonstrated to be involved in the pathogenesis of periodontitis.^[9,10,11,12] The prominent cytokines IL-1 and IL-6, for example, are produced in the B-cell/plasma cell response which characterises the progression of periodontitis. IL-6 is produced by epithelial cells, lymphocytes, monocytes and fibroblasts in response to bacterial LPS, IL-1. Higher expression of IL-6 was reported in diseased gingival tissues when compared with healthy tissue in periodontitis patients. The inflammatory cytokines IL-1 and TNF α play a prominent role in the pathogenesis of periodontitis. TNF α is involved at an early stage in the inflammatory cascade, as it is released from mast cells in response to bacterial challenge. In the clinical context, TNF α and IL-1 have been found in increased concentrations in GCF and gingival tissue of periodontitis sites. At the cellular level, these two cytokines are involved in the induction of several other inflammatory mediators, such as IL-6, IL-8, matrix metalloproteinases (MMPs) and PGE2. TNF α and IL-1 seem to occupy a spider-in-the-web position among mediators of the inflammatory cascade in periodontitis.

CHEMOKINES

Chemokines are cytokines involved in inducing chemotaxis in

responsive cells. In periodontitis, the chemokines IL-8, monocyte chemoattractant protein-1 (MCP-1) and macrophage inflammatory protein-1 α (MIP1 α) attract neutrophils and other leucocytes to the inflammation site. The chemokine MCP-1 is produced by endothelial cells, epithelial cells and fibroblasts in response to bacterial components such as LPS or inflammatory mediators.^[13,14] The nature of the inflammatory response is collectively influenced by individual genetic differences in the host, specific components of the oral microbiome and past history of periodontal infection.

Arachidonic acid metabolites – prostaglandins

A range of arachidonic acid metabolites are produced in the gingival tissues. Possible role for LTB4 has been suggested in the progression of periodontal disease because of the findings that the substantial increase in GCF LTB4 concentrations, which are associated with the severity of periodontal disease, decreased following periodontal treatment.^[15,16]

Prostaglandins are a group of potent arachidonic acid-derived inflammatory mediators with the capacity to induce a wide variety of biological responses. Among prostaglandins, PGE2 is the most prominent in the pathogenesis of periodontitis. PGE2 is produced by immune cells, fibroblasts and other resident gingival cells and has a wide range of biological effects on the cells of the diseased gingiva.^[17] The actions of PGE2 include the stimulation of inflammatory mediators and MMPs, as well as osteoclast formation via receptor activator of nuclear factor- κ B ligand (RANKL). Several clinical alterations observed in periodontal disease can be associated with PGE2, especially when IL-1 and TNF α are present in the gingival tissue. PGE2 is detected at significantly higher levels in human inflamed gingival tissue and especially from periodontal sites exhibiting recent attachment loss. Altogether, over-production of PGE2 is suggested to have a significant role in the pathobiology of periodontitis.^[15]

Inflammatory mediators and tissue destruction

Maintenance of the extracellular matrix is important for normal development and function of gingival tissue. Proteolytic MMP enzymes and their endogenous inhibitors, tissue inhibitors of metalloproteinases (TIMPs), are involved in the homeostasis of the extracellular matrix in healthy tissue, but they are also key players in the process of tissue destruction in inflammatory diseases. MMP expression and activity are in general low in noninflamed periodontium but increase to pathologically high levels in inflamed gingiva, where increased levels of inflammatory mediators upregulate MMP expression. MMP-3 and TIMP-1 mRNA expression were significantly higher in diseased tissues than control tissues and that polymorphisms of MMP-3 and TIMP-1 are associated with chronic periodontitis.^[15] The main stimulatory cytokines for matrix

metalloproteinases are tumor necrosis factor alpha, interleukin-1 and interleukin-6. It is also known that active matrix metalloproteinases are capable of activating other matrix metalloproteinases in a mutual activation cascade. Regulation of matrix metalloproteinase activity is a function of tissue inhibitor of metalloproteinases. The tissue inhibitor of metalloproteinases class of enzymes function in the regulation of extracellular matrix metabolism.

Inflammatory mediators and bone resorption (Fig.1)

Bone resorption is a well-regulated process which depends on the differentiation of monocytes to osteoclasts capable of bone resorption. Although bone formation and bone resorption are processes which occur continuously in healthy alveolar bone, in periodontitis, the normal balance is shifted towards resorption through mechanisms including increased osteoclast activation. Cytokines such as IL-1 β , TNF α , IL-6, macrophage colony-stimulating factor (M-CSF), IL-17 and PGE2 are among the more important proinflammatory mediators reported to stimulate osteoclast activation.^[14] The TNF family cytokine RANKL induces the differentiation of osteoclasts in the presence of M-CSF^[15] and activates TRAF6 (member of TNF receptor associated factor), c-Fos and calcium signalling pathways, which are indispensable for the induction and activation of nuclear factor of activated T cells (NFAT) c1, a key transcription factor for osteoclastogenesis. Elevated levels

of RANKL and reduced levels of osteoprotegerin (OPG) were detected in the GCF samples of patients with periodontitis and the RANKL/OPG ratio was suggested as a possible biomarker test for detection of bone destruction. OPG acts as a decoy receptor for RANKL and inhibiting OPG expression enables RANKL to interact with its receptor RANK on other cells. RANKL then binds to RANK on osteoclast lineage cells to drive differentiation to osteoclasts.^[16] IL-1 and TNF stimulate bone resorption by increasing osteoclast formation and furthermore, IL-1 also mediates the osteoclastogenic effect of TNF by enhancing expression of RANKL and differentiation of osteoclast precursors. The major pathway by which the inflammatory mediator PGE2 stimulates bone resorption is generally considered to be via the up-regulation of RANKL expression and the inhibition of OPG.

HOST RESPONSE AND PERIODONTAL BONE LOSS (Fig. 2)

Manipulation of the host response can attenuate periodontal bone loss.^[2] When the host response is reduced either through the application of inhibitors or through genetic manipulation, the severity of bone loss stimulated by periodontal pathogens is typically reduced, even if antibacterial defenses may be weakened. There are several classes of molecules that activate

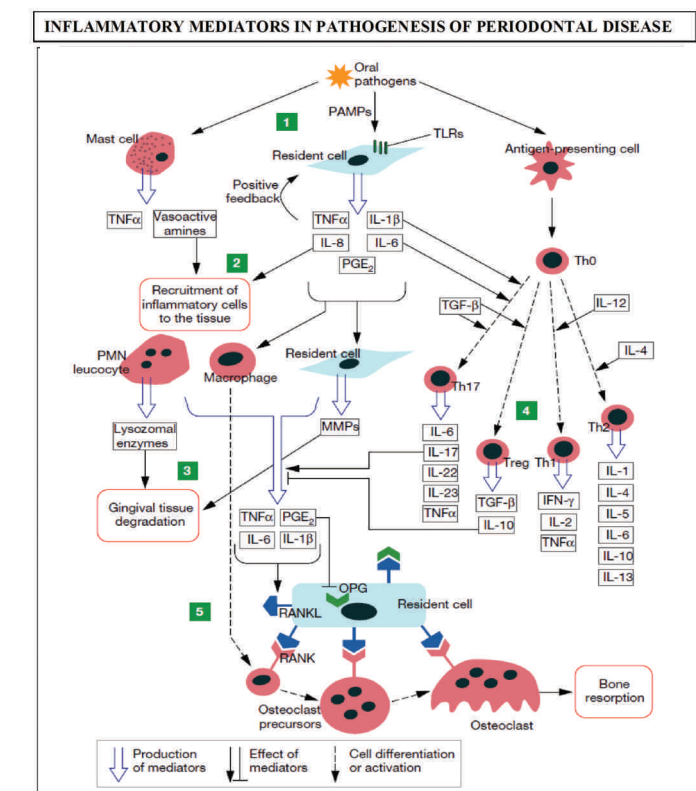
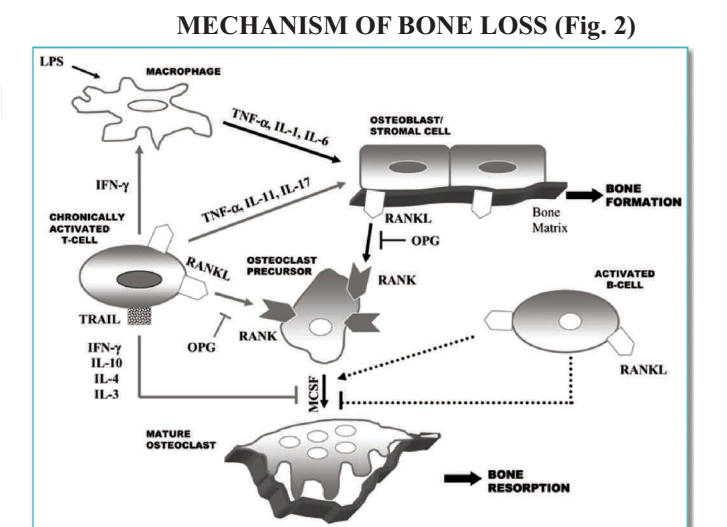
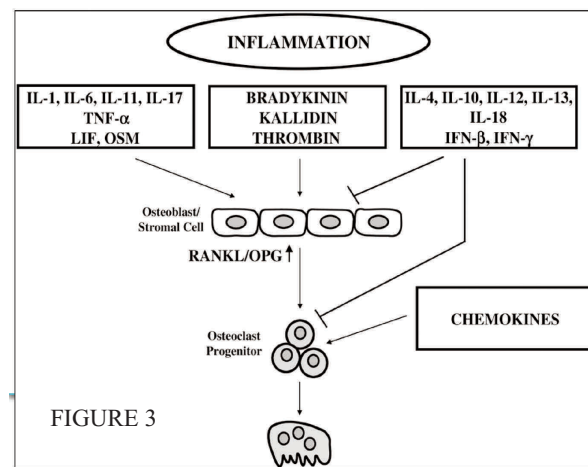


Fig. 1



a host response that can stimulate osteoclastogenesis either directly or indirectly, including lipid-based mediators such as prostaglandins or leukotrienes, cytokines, and chemokines. Cytokines also play a prominent role in bacteria-induced periodontal bone resorption. During an inflammatory response, cytokines, chemokines, and other mediators stimulate periosteal osteoblasts. IL-1 stimulates osteoclastogenesis and bone resorption, largely through up-regulation of receptor activator for nuclear factor- κ B (RANK) ligand, while TNF can stimulate osteoclastogenesis directly or

indirectly through RANK ligand.^[6] Lymphocytes are thought to be a particularly important source of RANK ligand in periodontal disease, while in physiologic bone remodeling, RANK ligand appears to be principally from bone-lining cells.^[11] Inhibition of RANK ligand caused a decrease in alveolar bone loss in several models of periodontal disease.^[11] Mitogen-activating protein (MAP) kinase inhibitors also reduce lipopolysaccharide-induced alveolar bone loss, consistent with the role of MAP kinase in mediating the effects of pro-inflammatory signals.^[9] Application of a p38 MAPK inhibitor reduced LPS-induced osteoclast formation and periodontal bone loss.



Stimulation and Inhibition of osteoclast formation and bone resorption involves the interplay between a number of inflammatory cytokines and other mediators acting through RANKL binding to RANK on osteoclast progenitor cells. LIF-leukemia inhibitory factor; OSM-oncostatin M.^[8]

COUPLING AND UNCOUPLING OF BONE

In a healthy adult with physiologic tissue turnover, an episode of bone resorption is followed by an equivalent amount of new bone formation, a well-accepted process referred to as coupling. Bone is masterfully programmed to repair itself through the coupling of bone formation to bone resorption. This balanced bone formation and bone resorption require adequate availability of osteoblast precursor cells, osteoblast differentiation, and the formation of bone matrix in response to coupling signals. In periodontitis there is a failure to form bone, resulting in net bone loss. Therefore, the pathologic process that leads to net periodontal bone loss logically resides in the failure to form bone, either the inability to form compensatory bone in the quantity of bone resorbed (incomplete coupling) or the inability to form bone at all subsequent to the bone resorption episode (total uncoupling).

The inflammatory process that leads to osteoclastogenesis and

bone resorption may also be responsible for the failure to form an adequate amount of new bone, *i.e.*, inflammation causes uncoupling of bone formation following bone resorption. Inflammation not only stimulates the formation of osteoclasts and bone resorption, but also affects bone by altering the function of osteoblasts and limiting reparative bone formation. Several other disease processes involve both inflammation and bone uncoupling. Similar to periodontal disease, osteoporosis is also characterized by uncoupling due to deficient bone formation following bone resorption. When NF κ B was specifically blocked in osteoblasts, the capacity to form bone was enhanced without change in inflammation and without affecting osteoclast activities. Pro-inflammatory cytokines, such as IL-1 α and TNF- α , contribute to uncoupling in bone by reducing bone formation. Decreased osteoblast numbers can be achieved from reduced proliferation or enhanced apoptosis of osteoblasts or their precursor cells, both of which may be affected by inflammation.

Osteoblast survival is thought to be an important aspect of bone coupling. One of the causes of bone uncoupling could be diminished osteoblast or osteoblast precursor survival through induced apoptosis. Pro-inflammatory cytokines may directly stimulate osteoblast or osteoblast precursor apoptosis or indirectly affect it by stimulating expression of Fas, a potent proapoptotic mediator^[18,19] TNF- α -induced apoptosis of periodontal ligament cells may affect the pool of osteoblast precursors^[20] Another mechanism for uncoupling is reduced function of osteoblasts mediated by diminished production of bone matrix proteins. Bone matrix has organic and inorganic components, with the majority of the former consisting of type I collagen as well as other proteins and including osteocalcin and alkaline phosphatase. Production of non-collagen bone matrix proteins is inhibited by pro-inflammatory cytokines. TNF- α and IL-1 α induce a two- to three-fold reduction in osteocalcin synthesis in osteoblastic cells. The spatial location of inflammation in relationship to bone and its duration are both critical features of the disease. If the inflammation lasts to the period of bone formation, then uncoupling is likely to occur, and the capacity to repair the resorbed bone is likely to be compromised. With regard to the temporal component, if the inflammation is brief and does not extend into the phase of bone formation, the impact on periodontal bone loss may be relatively small, since there should be a considerable amount of coupling and new bone formation. The second consideration is spatial. If the inflammation is localized to the sub-epithelial space, it is unlikely to damage the underlying bone. If the inflammatory infiltrate progresses toward bone at some critical distance, the proximity of the inflammatory mediators to the bone surface will stimulate the recruitment of osteoclast precursors, osteoclastogenesis, and bone resorption. If the

infiltrate persists near bone, uncoupling will occur and result in net bone loss. Alternatively, if the inflammation near bone is transitory coupling would occur and new bone formation would occur, leading to little or no net bone loss.^[16]

RANKL-RANK-OPG AXIS

There is a balance between bone resorption and bone formation.^[10] This balance promotes bone homeostasis, including the maintenance of structural integrity and calcium metabolism.^[6] Excessive formation of bone may be attributed to an abundance of OPG or reduced expression of RANKL, resulting in a net increase in OPG, also known as a decrease in the RANKL/OPG ratio. During an inflammatory response, proinflammatory cytokines, such as IL-1 α , -6, -11, and -17 and TNF- α , can induce osteoclastogenesis by increasing the expression of RANKL while decreasing OPG production in osteoblasts/stromal cells.^[12] Microorganism such as *Aa* has an effect on this ratio. Some studies^[13] found an increase in soluble RANKL concentrations without a corresponding change in OPG levels in individuals with chronic periodontitis compared to healthy controls. The RANKL/OPG ratio was higher in individuals with periodontitis than in healthy controls.^[13] These findings correspond well with the critical role of RANKL in driving osteoclastogenesis and bone loss in PD.^[3]

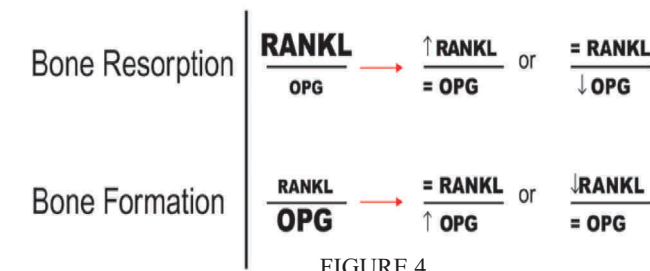


FIGURE 4

CONCLUSION

An appreciation of the relationship between immune processes and the bone metabolism in various inflammatory bone diseases has given rise to the field of “osteimmunology.” For years, we clinicians have identified periodontal disease on radiographs by examining the amount of bone loss that occurs around the dentition. Through a better understanding of inflammation and bone metabolism, possible new levels of evidence has to be explored.

REFERENCES

1. Page RC, Kornman KS. The pathogenesis of human periodontitis: An introduction. *Periodontol* 2000 1997; 14:9-11
2. Graves D. Cytokines that promote periodontal tissue destruction. *J Periodontol* 2008; 79(8 Suppl):S1585-S1591
3. Taubman MA, Kawai T, Han X. The new concept of periodontal disease pathogenesis requires new and novel therapeutic strategies. *J Clin Periodontol* 2007; 34:367-369
4. Graves DT, Cochran D. The contribution of interleukin-1 and tumor necrosis factor to periodontal tissue destruction. *J*

5. Garlet GP, Cardoso CR, Silva TA, et al. Cytokine pattern determines the progression of experimental periodontal disease induced by *Actinobacillus actinomycetemcomitans* through the modulation of MMPs, RANKL, and their physiological inhibitors. *Oral Microbiol Immunol* 2006; 21:12-20.
6. Wei S, Kitaura H, Zhou P, Ross FP, Teitelbaum SL. IL-1 mediates TNF-induced osteoclastogenesis. *J Clin Invest* 2005 115:282-290.
7. Bar-Shavit Z. The osteoclast: A multinucleated, hematopoietic-origin, bone-resorbing osteoimmune cell. *J Cell Biochem* 2007; 102:1130-1139.
8. Lerner UH. Inflammation-induced bone remodeling in periodontal disease and the influence of postmenopausal osteoporosis. *J Dent Res* 2006; 85:596-607
9. Rogers JE, Li F, Coatney DD, Otremba J, Kriegl JM, Protter TA, et al. A p38 mitogen-activated protein kinase inhibitor arrests active alveolar bone loss in a rat periodontitis model. *J Periodontol* 2007; 78:1992-1998.
10. Jin Q, Cirelli JA, Park CH, Sugai JV, Taba M Jr, Kostenuik PJ, et al. RANKL inhibition through osteoprotegerin blocks bone loss in experimental periodontitis. *J Periodontol* 2007; 78:1300-1308
11. Teng Y, Nguyen H, Gao X, Kong Y, Gorczynski R, Singh B, et al. Functional human T-cell immunity and osteoprotegerin ligand control alveolar bone destruction in periodontal infection. *J Clin Invest* 2000; 106:R59-R67.
12. Nakashima T, Kobayashi Y, Yamasaki S, et al. Protein expression and functional difference of membranebound and soluble receptor activator of NF-kappaB ligand: Modulation of the expression by osteotropic factors and cytokines. *Biochem Biophys Res Commun* 2000; 275:768-775
13. David L. Cochran Inflammation and Bone Loss in Periodontal Disease *Journal of Periodontology* 2008; 79: 8
14. Schett, G. Effects of inflammatory and antiinflammatory cytokines on the bone. *European Journal of Clinical Investigation* 41
15. Takayanagi, H. Mechanistic insight into osteoclast differentiation in osteoimmunology. *Journal of Molecular Medicine (Berlin)* 2005; 83, 170-17
16. Bartold, P.M., Cantley, M.D. and Haynes, D.R. Mechanisms and control of pathologic bone loss in periodontitis. *Periodontology* 2000 200; 53, 55-69
17. Peters-Golden, M. and Henderson, W.R., Jr. Leukotrienes. *New England Journal of Medicine* 2007; 357, 1841-1854
18. Ali Cekici, Alpdogan Kantarci, Hatice Hasturk, and Thomas E. Van Dyke Inflammatory and immune pathways in the pathogenesis of periodontal disease *Periodontol* 2000. 2014 February; 64: 57-80.
19. Tsuboi M, Kawakami A, Nakashima T, Matsuoka N, Urayama S, Kawabe Y, et al. Tumor necrosis factor-alpha and interleukin-1 beta increase the Fas-mediated apoptosis of human osteoblasts. *J Lab Clin Med* 2000 134:222-231.
20. Thammasitboon K, Goldring SR, Boch JA (Role of macrophages in LPS-induced osteoblast and PDL cell apoptosis. *Bone* 2006 38:845-852.

Systemic antibiotics in Periodontics: Right use and misuse

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ABSTRACT:

Conflicting reports exist in relation with the usage of antibiotics in Periodontics. With the advanced knowledge and changing concepts of therapeutic approach to plaque biofilm, the usage of antibiotic even as an adjunct to non surgical periodontal therapy seems to be unjustified. A review is attempted here to venture into the present trends of antibiotic usage in periodontal practice with special emphasis on most prescribed antibiotics. The various aspects of action of antibiotics against plaque biofilm and its usage following periodontal surgeries are dealt separately.

Key words: Antibiotics, periodontal treatment, current trends in antibiotic therapy, biofilm

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INTRODUCTION

With the recognition of microbial origin of periodontal disease, it led to an increased interest in the use of antibiotics in periodontal therapy. But there exists conflicting reports on the administration of antibiotics in the management of periodontal disease. This is because of their intensive abuse, both over-prescription and also administration for inappropriate reasons which has led to the worldwide problem of bacterial resistance. This review aims to provide with an update on the current literature evidence regarding the use of systemic antibiotics in periodontal therapy. The study was initiated with the thought provoking news (CDC's antibiotic resistant threats in the United States,

2013) that, infections from multi drug resistant organisms are responsible for more than 14000 deaths per year and affecting the health of at least 2 million people every year. The present article will be limited to the usage of antibiotics related to periodontal non surgical and surgical therapy.

Are antibiotics effective against the biofilm?

It is not surprising that a wide range of systemic antibiotics have been used as part of periodontal treatment aimed at targeting potential pathogenic bacterial species within the periodontal bio film, but their exact role in destroying the pathogens have been questioned. This is essentially because of the complex biofilm structure providing added

benefits to the microorganisms residing in it, in resisting the action of antibiotics compared to the same species in a planktonic state.^[1] The mechanical debridement has always been considered as the initial line of treatment in the management of periodontitis by disrupting the biofilm.

Bacteria inside the oral cavity are exposed to constant threats from various environmental factors, chemicals, antibiotics etc. They also have to compete with the beneficial organisms found inside the oral cavity. But the biofilm can act as a protective barrier to some extent against these microorganisms. There are microbes outside the biofilm also. It was found that after antibiotic therapy, the microbes outside the biofilm offer lesser resistance than those residing inside the biofilm. How does these microorganisms acquire antibiotic resistance is not completely understood. Because the mechanism of resistance differ from species to species, the understanding of the same is very difficult. It appears that the microbes inside the biofilm grow slowly compared to microorganisms in planktonic state and this renders them less susceptible to antibiotics. Within the biofilm, there exists a difference in environmental condition between the deeper cells and cells in the periphery. As already stated, lowering the growth renders the microbes less susceptible to antibiotics, the survival rate of the deeper cells increases as there is a decline in the rate of growth when exposed to antibiotics, when compared to cells in the periphery.

The biofilm have an exo-polymer matrix which can't prevent but retard the diffusion of antibiotics by acting as an ion exchanging resin which will remove chemically reactive agents. The slow growing cells in the deeper part of biofilm show increased synthesis of exo-polymer thereby increasing the bacterial resistance. Positively charged hydrophilic antibiotics are destroyed by various enzymes that are concentrated in the extracellular matrix like β -lactamase, formaldehyde lyase etc. Since this mechanism affects hydrophilic antibiotics, hydrophobic antibiotics like macrolides are unaffected. The genetic expression also differs among the species of biofilm community which enables them to retain the antibiotic resistance even when they are removed from the biofilm. The antibiotics that act by blocking the cell wall synthesis are removed from the cells by multi drug resistance pumps which extrude the chemical from the cells. Considering the fact that the biofilm contains a large variety of pathogenic organisms which are protected from body's defense mechanisms and antibiotics, sometimes it may be necessary to employ combination of therapies to treat periodontal infections. The effectiveness of antibiotics against microorganisms were studied on microorganisms in planktonic state rather than biofilms, the application of this knowledge in the treatment of periodontitis is questionable^[2]

Can antibiotics be effective as mono therapy?

Two studies however showed similar clinical results for scaling and root planing as for antibiotics (amoxicillin plus metronidazole) prescribed as a monotherapy.^[3,4] Haffajee et al. in a systematic review addressed the question, whether antibiotics prescribed as a monotherapy, with no mechanical debridement are efficacious in the treatment of periodontitis stated that the effect of the antibiotic alone was minimal and short term. Studies evaluated the role of metronidazole alone or metronidazole combined with amoxicillin as monotherapy, showed inferior results in terms of probing depth reduction, clinical attachment level gain and reduction in bleeding compared with scaling and root planing. Therefore mechanical debridement ensuring adequate disruption of the biofilm continues to be regarded as the first appropriate treatment approach when prescribing systemic antibiotics.

Periodontitis being a mixed infection, single drug regimen is often insufficient. Various drugs have been used for the treatment of periodontitis. Several studies support the use of combination of metronidazole and amoxicillin which effectively reduce the numbers of *Aggregatibacter actinomycetemcomitans* and the members of the red complex. Being a tissue invading microbe, *Aggregatibacter actinomycetemcomitans* is not affected by subgingivally applied tetracyclines as they cannot penetrate sub gingival connective tissue. Apart from metronidazole and amoxicillin combination, another combination which is effective in periodontitis is metronidazole and ciprofloxacin combination.^[5]

Are systemic antibiotics needed after nonsurgical periodontal therapy?

It has been well documented that the majority of patients with chronic periodontitis can be successfully treated with mechanical debridement, adequate oral hygiene and regular supportive maintenance care. Many microorganisms are often seen to be located deep in the gingival tissue; therefore limiting the treatment to mechanical debridement will result in the continued progression of the disease. The pathogens causing periodontitis are not exclusive to periodontal pockets, they are found in colonies on even other part of oral mucosa like cheek and dorsum of tongue. Therefore, even after the removal of these microorganisms from the periodontal pocket, there are chances that they can recolonize and cause reinfection by translocation from these sites to gingival sulcus. There lies the importance of administration of systemic antibiotics as an adjunct to mechanical debridement. It removes pathogens including *Aggregatibacter actinomycetemcomitans* that are still remaining after non- surgical therapy from the periodontal pockets and also from other sites of oral cavity.^[5]

A systematic review by Herrera et al. concluded that systemic antibiotics used in conjunction with scaling and root planing

can offer an additional benefit over scaling and root planing alone in terms of probing depth reduction and clinical attachment level gain in deep pockets.^[4] Haffajee et al, in 2002 reported similar findings and stated that systemically administered antibiotics can improve clinically determined periodontal attachment level beyond that achieved by nonsurgical therapy alone.^[4]

Do antibiotics offer any advantage when prescribed after periodontal surgery?

Haffajee et al. reported an additional clinical benefit in attachment level gain when systemic antibiotics were prescribed as an adjunct to surgical mechanical debridement in deep pockets.^[1] However, in a literature review by Herrera et al. concluded that there was insufficient data as to whether adjunctive antibiotics were beneficial when combined with periodontal surgery.^[4]

How to make the right choice of antibiotic?

The literature reports a wide range of antibiotics used in conjunction with non-surgical and surgical mechanical debridement for the treatment of periodontitis. The most commonly employed antibiotics include tetracyclines, penicillins (amoxicillin), metronidazole, macrolides (spiramycin, erythromycin, azithromycin), clindamycin and ciprofloxacin.^[6]

Periodontitis, being a mixed microbial infection makes the choice of antibiotic regimen difficult. Different antibiotics target specific parts of the biofilm. Metronidazole mainly targets the gram-negative strict anaerobes whereas amoxicillin has a broader spectrum of action lowering counts of gram negative anaerobes as well as decreasing the counts and proportions of *Actinomyces* species during and after antibiotic therapy.^[6] Conflicting reports exist on the beneficial effects of azithromycin when used as adjunct to mechanical debridement in the treatment of mild/moderate chronic periodontitis, aggressive periodontitis or in smokers. However, it has been observed that metronidazole+amoxicillin combination produced more pronounced beneficial change in the subgingival microbial profile than azithromycin.^[7] Moreover this antibiotic combination was able to increase three beneficial species (*Actinomyces gerencseriae*, *A. naeslundii* and *Streptococcus sanguinis*).

A major concern in prescribing antibiotics is that microorganisms can be intrinsically resistant to antimicrobials or can develop acquired resistance by emergence of resistant strains of bacteria that would otherwise be considered to be sensitive to the antimicrobial. It is evident that the literature does not provide a clear indication of the superiority of one antibiotic regimen over another and the choice of antibiotic should be made on an individual basis.

What is the ideal duration, dosage and timing of the recommended antibiotic?

Feres et al. suggested that the adjunctive use of the metronidazole+ amoxicillin combination for 14 days, irrespective of the metronidazole dosage, offers short-term clinical and microbiological benefits over scaling and root planing alone in the treatment of advanced periodontitis.^[7]

The dosage and duration of the antibiotic prescribed also varies widely among studies and there is no consensus on the ideal regimen. It is important to prescribe an antibiotic in sufficient dose for adequate duration as they have a direct impact on the desirable and undesirable effects of these drugs.

Another important clinical question is when to start the antibiotics in relation to the mechanical phase of treatment. Indirect evidence suggests that antibiotic intake should start on the day of debridement completion and debridement should be completed within a short period of time. However, Feres et al. suggested that no important differences were observed in the clinical and microbiological parameters when adjunctive metronidazole+amoxicillin therapy started together or immediately after scaling and root planning.^[7]

CONCLUSION

This review suggests that systemic antibiotics can help in the management of periodontitis, though the optimum method of employment has not been clearly defined. However, there is no single universal protocol that can be followed while prescribing these drugs and are often seen to be one of major misused group of drugs. Thus it has become clear that, the administration of systemic antibiotics for the management of periodontal infections should be strictly based on scientific data and not on individual biases. Though they can be used in severe or recurrent periodontitis, the right antibiotic should be selected based on microbiological analysis. Thus these valuable and life-saving drugs can only retain its position in both medicine and dentistry if used with care and prescribed appropriately. Reminding the famous quote of Sir Alexander Fleming in 1945 after discovering penicillin “The thoughtless person playing with penicillin treatment is morally responsible for the death of the man who succumbs to infection with the penicillin-resistant organism”

REFERENCES

1. Haffajee, Socransky, Gunsolley. Systemic Anti-infective Periodontal therapy. A Systematic Review. *Ann Periodontol* 2003; 8: 115-81
2. Dental biofilms: difficult therapeutic targets Sigmunds. Socransky & Anne D. Haffajee *Perio* 2000.2002; 28: 12-55

3. Lopez NJ, Socransky SS, Da Silva I, Japlit MR, Haffajee AD. Effects of metronidazole plus amoxicillin as the only therapy on the microbiological and clinical parameters of untreated chronic periodontitis. *J Clin Periodontol* 2006; 33: 648-60.
4. Lopez NJ, Gamonal JA. Effects of metronidazole plus amoxicillin in progressive untreated adult periodontitis: results of a single 1-week course after 2 and 4 months. *J Periodontol* 1998; 69: 1291-8.
5. Systemic antibiotics in the treatment of periodontal disease Jorgen Slots & Miriam ting *Perio* 2000. 2002; 28: 106-76
6. LJA Heitz-Mayfield .Systemic antibiotics in periodontal therapy. *Australian Dental Journal* 2009; 54: S 96-101
7. Feres et al. Systemic antibiotics in the treatment of periodontitis. *Perio* 2000. 2015; 65: 131-86

Haptics: Virtual reality in periodontal education

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ABSTRACT:

The simulation of clinical situations with the acquisition of fine motor skills is an essential component of the dental students' learning experience. The traditional approach to dental skills training has drawbacks in terms of cost, availability, lack of real world cases, with the restraints of time, clinical supervision, and the funding of raw materials such as real and plastic teeth. The introduction of dental haptics opens the door to a more realistic clinical experience which can be free from the previous constraints. Also, haptics offers the possibility of unlimited training hours by which students can gain skills without demands on manpower and resources. This paper provides a comprehensive review of literature on haptics for training of dental procedures and in particular periodontal procedures.

Key words: Dental simulator, haptic device, haptic recording and playback, haptic rendering, haptics, virtual reality.

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INTRODUCTION

Over the last decade there has been a marked increase in the use of technology in medical education^[1,2]. Concomitantly, dental education has also seen an increased use of technology in both learning and training. Routinely, dental students obtain their skills training from various sources. The traditional one relies on practicing procedural skills on plastic teeth or sometimes live patients under supervision of dental experts. However, it is being challenged because of complications in surgery, increasing cost of training materials, the ethical concerns for safety of patients, and the unavailability of many real-world

challenging cases. Apart from that, during learning procedures, it appears that there is a difficulty in understanding certain aspects of the physic world without the actual sense of it, because vision and hearing is required in order to fully perceive the physic phenomena and the laws that rule them. Dentistry is one such field where diversity and complexity in anatomical structure in the operating field makes it almost impossible to learn and plan treatment as a rule or as presented in texts.

HISTORY

Haptic technology comes from the Greek word "haptesthai", meaning to touch. Haptic technology is *intuitive*.

The interactive systems we are more familiarly faced with today focus on visual and audio aspects. Haptics is hoping to increase the human-computer interaction by enhancing the quality of communication between humans and their physical environment through touch. This takes advantage of the sense of touch by applying forces, vibrations, or emotions to the user. They are devices such that they provide users with the sensations of heat, pressure, and texture, overall motion that support the already existing visual and audio aspects.

Wang et al. worked on a simulator that allows probing and cutting a virtual tooth, but the virtual tool implementation was limited to a spherical shape for simplicity.^[4] Kim et al. developed a dental training system with a multi modal workbench providing visual, audio, and haptic feedback. This system is a volume based haptic modeling which represents a tooth as a volumetric implicit surface. It allows burring and drilling on the tooth with a spherical tool.

Yau et al proposed a dental training system utilizing material stiffness and spring force function. This simulation uses adaptive octree data structure for a tooth model and oriented bounding box for the boundary of the cutting tool. Different shapes of a cutting tool are introduced but details on how the forces are rendered for irregular shaped cutting tools is missing as well as how to handle the torque that might occur in the case of nonspherical tool. Luciano developed PerioSim, which allows trainee to practice diagnosing periodontal diseases that does not require deformation of tooth surface. Haptic Applications allow operator to interact with the sense of touch, along with visual and acoustic representations of objects and scenes. A Haptic Application requires a Haptic Interface Device through which the user interacts with the application.

Many such models available in international market provide realistic 3D models with features like

1. Haptic sensing,
2. Replay and recording ability,
3. Unlimited practice time, and
4. Ability to share recordings of the procedures online.

These features combine to make it an ideal supplement to traditional teaching methods to improve skills and challenges associated with treatment procedures and for better understanding and decision making in treatment plan.

THE CONCEPT BEHIND HAPTICS

Haptics refers to the modality of touch and associated sensory feedback. Researchers working in the area are concerned with the development, testing, and refinement of tactile and force feedback devices and supporting software that permit users to sense 'feel' and manipulate three-dimensional virtual objects

with respect to such features as shape, weight, surface textures, and temperature. In addition to basic psychophysical research on human haptics, and issues in machine haptics such as collision detection, force feedback, and haptic data compression, work is being done in application areas such as surgical simulation, medical training, scientific visualization, and assistive technology for the blind and visually impaired.

The basic principle behind haptic rendering is simple: Every millisecond or so, the computer that controls the PHANToM reads the joint encoders to determine the precise position of the stylus. It then compares this position to those of the virtual objects the user is trying to touch. If the user is away from all the virtual objects, a zero voltage is sent to the motors and the user is free to move the stylus (as if exploring empty space). However, if the system detects a collision between the stylus and one of the virtual objects, it drives the motors so as to exert on the user's hand (through the stylus) a force along the exterior normal to the surface being penetrated. In practice, the user is prevented from penetrating the virtual object just as if the stylus collided with a real object that transmits a reaction to the user's hand. Different haptic devices such as Immersion Corporation's Cyber Grasp operate under the same principle but with different mechanical actuation systems for force generation.

Touch is one of the most fundamental ways for people to perceive physical objects,^[3] until recently VR simulators focused primarily on the audio and visual aspects of simulation.^[5] However, to explore an object of interest we would like to be able to sense its physical properties by applying forces to it.^[6-8] This is possible by using special mechanical tools, called haptic devices that enable the user to feel the feedback forces.^[8]

Two types of dental simulators currently available are as follows:

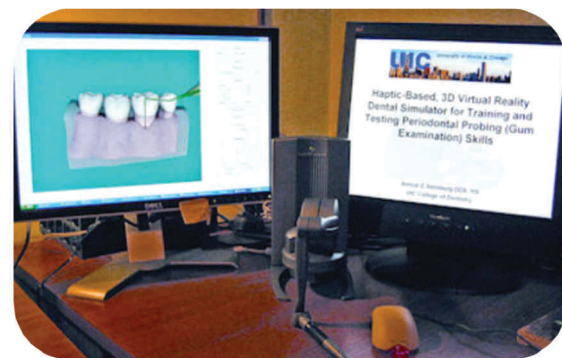
1. Manikin based simulators: Consist of a physical model of the patient's head and mouth on which dental procedures can be performed using real dental instruments; and

2. Haptics based simulators: Consist of a haptic device and virtual models of a human tooth or mouth which acts as a platform to facilitate dental practicing. Instead of using real dental instruments, the trainee holds the haptic device stylus to manipulate a set of virtual instruments that are shown on a monitor screen. The tactile feedback reproduces clinical sensations in the hand of the operator using dental instruments. Unlike manikin based, haptics based simulators are much more fast and cost effective as no physical models need to be replaced. In addition, as the haptic device measures the forces applied by the trainee when touching the virtual patient's mouth, it is possible to detect when the student's action is

potentially aggressive. Some of the most well known haptics based dental simulators previously developed are virtual reality dental training system, Iowa dental surgical simulator, three dimensional (3D) dental, haptically enabled dental simulator, and volume based dental simulator. All these are used for restorative purposes such as caries preparation or filling of cavities, none of them focuses on the simulation of periodontal procedures.

Recent technological advances have resulted in the production of a variety of affordable haptic devices, such as PHANTOM Desktop,^[9] providing possibilities for creating sophisticated simulation systems with vastly improved touch-based human-machine interfaces. Haptics allow the user to feel, manipulate and interact with the object displayed on the PC monitor. The user can touch, move and feel an existing distant object indirectly through a robotic arm. Furthermore, haptics provide force feedback to humans interacting with virtual or remote environments since the robotic arm is able to provide preprogrammed guidance. The field of periodontics is that field of dentistry which requires dentists to depend primarily on their tactile sensations, for both diagnostic and surgical procedures. This makes haptics ideally suited for periodontal simulators.

Currently, periodontal procedures are taught by time consuming teaching process of instructor demonstration, use of practice manikins and, finally, by actual work in the patient's mouth which requires excessive one on one instructor/student interaction. Haptics based dental simulators could be beneficial for the training of dental and hygiene students as they aid in diminishing the instruction time period, enhance the learning curve, and provide for unlimited practice of these treatments.^[9]



PHANTOM HAPTICS Eg: PERIOSIM



MANIKIN BASED HAPTICS; Eg: DENTSIM, IGI

VIRTUAL DENTAL PATIENT (VDP) AND SIMULATOR COMPONENTS

There are multiple companies in market which provide various virtual simulators specifically for medical and dental use. These systems comprise combination of hardware and software which in integrity works as a VDP. The simulator system consists of a high-end computer workstation with appropriate software, a haptic device, and a stereoscopic computer monitor with stereo glasses. The computer renders three-dimensional (3D) graphics that can be viewed with the stereo glasses, and operates the haptic device that provides a realistic tactile sensation. Onscreen VR instruments can be manipulated on this monitor by operating the haptic device stylus for sensing life-like contact and interaction with teeth and associated anatomic structures.

FOUR MAJOR ASPECTS OF VDP

1. Physical setup – includes dental tools to be used, mounting of monitors, workspace size similar to that of a mouth, a device for users' fingers to rest on, and so on.
2. Graphic screen display – includes 'nearrealistic' image of an oral cavity, graphic dental tools, motion representations of hand and dental tools matching those in the physical setup, different angular views of an oral cavity relative to users and patients' position.
3. Multi-sensory feedback – includes modeling of sound effects, tactile feedback, and color change when drilling at different pressure and speed of a dental tool, and when cutting different parts of a tooth.
4. Data sources for modeling requirements – includes sources of actual 'data' to produce 3D representation of the oral cavity and tooth (i.e. CT scans, discarded bones of teeth and jaw).

The first working prototype for the dental specification has following component in particular and was marketed with the name of PHANTOM Desktop (SensAble Technologies, Woburn, MA, USA). It includes an actual dental headpiece. The position and orientation are matched to the graphic headpiece displayed on the monitor. It has a 3D stereoscopic display monitor. The user wears spectacles with polarized lenses. To produce the optical illusion of 3D perception, different visual signals are sent to the eyes. It has a motion-tracking camera. A typical digital camera is attached to the 3D monitor. The camera tracks a marker placed on the spectacles.

SIMULATOR FUNCTIONALITY

The simulator consists of several functional blocks realized in its software. These include model selection, graphics and haptics control as well as record and replay functionality. They

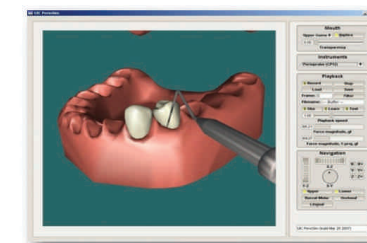
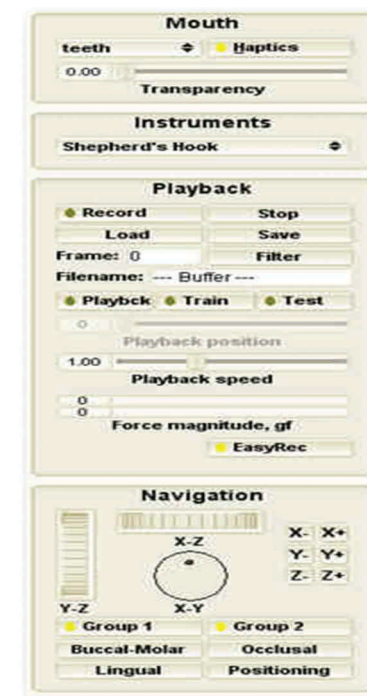
are necessary for the complete functionality and agility in the oral work environment, e.g. It is well documented that the force of around 20 gf (0.196 N) is all that is required for periodontal probing.^[10,11,12] However, it is difficult, if not impossible, to describe to a student how much force this is. With the use of a haptic device, the exact force reading can be viewed and felt by instructor and student, thus greatly enhancing the learning experience.

1. INSTRUMENT SELECTION

Currently there are over 10 dental instruments which may be chosen for haptic use, new instruments, and models can be added easily when desired.

2. GRAPHICS CONTROL

In the main window of the simulator the user can see the full-screen 3D model of area of interest in a dental arch along with the main control panel. The main control panel contains a variety of controls for navigation which include options to select and manipulate gingiva, teeth, bone and any other model objects. The operator can induce varying degrees of transparency of the selected objects using a slider bar



3. HAPTICS CONTROL

In the main window of the simulator the user can control the haptic properties of the simulation process. This includes the basic ability to turn haptics on or off for each selected object. The haptic parameter like Viscosity, Stiffness, Static friction, Dynamic friction^[13,14] can be controlled and be altered separately for each object.

By moving the haptic stylus, a trainee can move the virtual instrument on the tooth surface and feel the crevice or pocket area within the margin of the gingiva (gums) along the root surface of the tooth. The 3D virtual periodontal probe can be used to determine and measure crevice or pocket depths around the gingival margins of the teeth. The textural feel of pocket areas can be differentiated and regions of sub gingival calculus can be located. Since the root surface is covered by gingiva, the trainee cannot see the area being probed or the underlying calculus and must depend totally on haptic feedback to identify these areas. This situation corresponds to conditions encountered clinically.

To assist visualization of what he/she is feeling, control panel adjustments can introduce varying degrees of gingival transparency. Graphical and haptic parameters can be altered by an instructor using control panel adjustments to provide the "feeling" or feedback he/she wishes to impart to the trainee. The system permits any instructor to generate a diagnostic and/or treatment procedure for student use.

4. RECORD AND REPLAY FUNCTIONALITY

An important functionality in the simulator is 3D haptic recording and playback capability allowing the user to record the motion of an instrument for certain time, such as cavity preparation, which can be stored and played back on the computer in future, either from storage media or over the Internet.^[15,16] The recorded 3D motion can be played back in one of the three modes^[17]

- A. Observation mode
- B. Learning mode
- C. Testing mode

HAPTICS AND BONE SURGERY

In the Stanford BioRobotics Laboratory, a visuohaptic simulation of bone surgery for training and evaluation has been devised. A hybrid data structure is used to represent the bone: A volumetric array stores the density values and attributes of the data, whereas a surface triangulation is used to render the bone graphically. The volume data and surface triangles are obtained from computer tomography or magnetic resonance data after a preprocessing procedure. The simulation also provides the ability to assess the trainee's performance using predefined metrics together with visual and written feedback. Moreover,

the system simulates bone dust, provides drilling sounds, and can incorporate a second haptic device as a suction and irrigation tool.^[2] Another computer aided support system for implant surgery, BoneNavi, has been developed in Japan to simulate implant placement and surgical guide fabrication for dental implant surgery. To accomplish these objectives, this system involves manipulating a 3D computed tomography image of a jawbone with a virtual reality force feedback device. To achieve enhanced haptic realism, this system also provides the haptic experience of bone drilling with virtual vibration and the sound of contra angle handpiece. These simulation features are useful for inexperienced dentists and for training dental students in bone drilling in dental implant operations.^[10]

ADVANTAGES

- Improved usability: Haptics improve usability by engaging touch, sight, and sound
- Enhanced realism: Haptics injects a sense of realism into user experiences by exciting the senses and allowing the user to feel the action of the application. The inclusion of tactile feedback provides additional context that translates into a sense of realism for the user
- Restoration of mechanical feel: By providing users with intuitive and unmistakable tactile confirmation, haptics can create a more confident user experience and can also improve safety by overcoming distractions especially during sub gingival calculus detection, determining bone defects without flap reflection and performing periodontal surgery
- Cost effective: Haptics provide a new and low cost approach whereby dentists can practice procedures as many times as they want at no incremental cost and training can take place anywhere
- Self evaluation: It has the ability to give instant, consistent, and unbiased feedback based on evaluation of the procedure in the form of felt sensations in the hand
- Correct ergonomic positioning: Incorrect operator or patient positioning can result in blocking the camera from reading the light emitting diode sensors and prevents the user from continuing by warning signals which encourages the students to support and reinforce good ergonomic habits
- Standardized evaluation: Consistency and uniformity for preclinical evaluation
- Faster acquisition of skills: Students develop skills more efficiently in a shorter period of time as compared with the traditional simulator units (phantom heads), which can result in smoother transition for students into the clinic

- Haptics provide effective learning without any fear of making mistakes on a patient
- Haptics technology along with a visual display can be used to train people for tasks requiring hand– eye coordination, such as surgery. Haptics offers an additional dimension to a virtual reality or 3D environment
- Reinforcement of learned dental concepts
- It allows proper selection and manipulation of dental instruments to perform periodontal procedures.^[11]

DISADVANTAGES

- The tactile perception for gingiva is not very real
- The feel of working on dental chair is lacking as it uses desktop system
- Single hand held haptic arm does not provide the feel of using mouth mirror and working instrument together
- The initial cost of this advanced technology simulation can be substantial
- Difficult equipment to maintain and repair: Technology based systems require faculty/engineering staff to be available for training and supervision of the laboratory.

Limitations

In a study done by Koo et al., it was concluded that the haptic exercises with the manual dexterity module software were not superior in improving the dexterity of students for tooth cavity preparations in short term. Benefits of ease of use and fun learning experience can be further investigated in further studies.

FUTURE OF HAPTIC SYSTEMS AND ITS APPLICATION

In an reality assessment experiment, thirty experienced dental and hygiene instructors from a variety of clinical areas were then used to assess the realism of this system and determine which components required further development.^[18,19] Faculty / practitioners found the images very realistic for teeth and instruments, but less so for gingiva. Tactile sensation was realistic for teeth but not so for gingiva. This gives a space for further development of the device. Present haptic systems although fulfills most of the working criteria but they do lack some, and that's the area for further development as the system in use are desktop system so they lack the feel of working on dental chair. Single hand held haptic arm does not provide the feel of using mouth mirror and working instrument together are some problem for example. In future high fidelity simulator designed specially to teach the trainee how to drill and perform procedure in realistic and virtual manner, mimicking the burs, blade and other instruments used by the dentists as for the tasks

like removal of tooth decay, cavity filling, and repair fractured teeth etc. are some examples. Its applications are immense and in future they are expected to be used in all specialty of dentistry.

CONCLUSION

The growing use of computers, networking, the Internet, multimedia programs, use of 3D, VR simulators, and finally haptics have contributed to the enhancement of dental education. It has become obvious that, Haptics Technology improves the level of perception for some areas of the Physic World due to the increased immersion it provides. As the additional sense, the touch and feel, reduces the distance between the virtual and the real world. The need and efforts towards the creation of the Virtual Dental Patient (VDP) i.e. a 3D face and oral cavity model constructed using human anatomical data that is accompanied by detailed teeth models obtained from digitized cross sections of extracted teeth has finally given its way. There by Haptics offer an excellent complementary mean of training and not a replacement for the existing ones.

REFERENCES:-

1. L. Kim, Y. Hwang, S. H. Park, and S. Ha, "Dental training system using multimodal interface," *Computer/Aided Design & Applications*. 2005; 5(2): 591–8.
2. H. T. Yau, L. S. Tsou, and M. J. Tsai, "Octree based virtual dental training system with a haptic device," *Computer/Aided Design & Applications*. 2006; (3), 415–24.
3. Gardner, H. *Frames of mind: the theory of multiple intelligences*. New York: Basic Books; 1983
4. Laycock, S., & Day, A. Recent developments and applications of haptic devices. *Computer Graphics Forum*. 2003; 22(2): 117–32.
5. Van Schaik, P., Turnbull, T., Van Wersch, A., & Drummond, S. Presence within a mixed reality environment. *CyberPsychology & Behavior*. 2004; 7(5): 540–52.
6. Broeren, J., Sunnerhagen, K., & Rydmar M. A kinematic analysis of a haptic handheld stylus in a virtual environment: A study in healthy subjects. *Journal of Neuro Engineering and Rehabilitation*. 2007; 4(1): 13.
7. Bird M, Gill G. Individual differences and technology attributes: An examination of educational technology considerations related to trade and industry training. *Australian Journal of Educational Technology* 1987; 3(2) 108–18
8. Thurffjell, L., McLaughlin, J., Mattsson, J., & Lammertse, P. Haptic interaction with virtual objects: the technology and some applications. *Industrial Robot: An International Journal*. 2002; 29(3): 210-5.
9. Massie, T. H., & Salisbury, J. K. The PHANToM haptic device: A device for probing virtual objects. In *Proc. of ASME Winter Annual Meeting, Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems*. 1994: 295-300.
10. Magnusson, I., Clark, W. B., Marks, R. G., Gibbs, C. H., Manouchehr-Pour, M., & Low, S. B. Attachment level measurements with a constant force electronic probe. *Journal of Clinical Perio-Dontology*. 1988; 15(3), 185-8.
11. Mallikarjun S, Tiwari S, Sathyanarayana S, Devi P. Haptics in Periodontics. *J Indian Soc Periodontol*. 2014; 18(1): 112
12. Van Der Velden, U. Probing force and the relationship of the probe tip to the periodontal tissues. *Journal of Clinical Periodontology*. 1979; 6(2),
13. Lord, M. P. *Macmillan dictionary of physics*. London: The Macmillan Press Ltd. 1986
14. Parker, S. P. *McGraw-Hill dictionary of physics*. New York: McGraw-Hill Book Company. 1984
15. Butterworth, S. On the theory of filter amplifiers. *Wireless Engineer*. 1934; 7: 536–41.
16. Williams, R. L., Srivastava, M., Conaster, R., & Howell, J. N. Implementation and evaluation of a haptic playback system.
17. Steinberg, A. D., Ashrafi, S., Zefran, M., & Kolesnikov, M. Facilitate learning periodontal probing skills by using a CD with 3D video recordings. *ADEA 85th Annual Session and Exhibition*. 2008
18. Steinberg, A. D., Bashook, P. G., Drummond, J. L., Ashrafi, S., & Zefran, M. Assessment of faculty perception of content validity of PerioSim, a haptic-3D virtual reality dental training simulator. *Journal of Dental Education*. 2007; 17: 1574–82.
19. Steinberg A D, Drummond, J. L., Bashook, P G, Zefran, M, & Ashrafi S. Haptic 3D virtual reality dental training simulator reality validation. *Journal of Dental Research*, 2006; 85, A: 1264.

Guidelines for Finite Element Analysis in Dental Implantology

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ABSTRACT:

The biological structures and clinical problems concerned are complex, particularly in the case of dental implantology. In order to examine the intractable and inaccessible interface of dental implant assembly, a numerical predictive tool is necessary to analyze the biomechanical performance as well as the clinical factors on implant success. Finite Element Method (FEM) is a most commonly used numerical technique that involves a series of computational procedures to calculate the mechanical performance. This method is extremely useful for predicting the mechanical behavior of biomaterials and human tissue that can hardly be measured in vivo. Although a thorough understanding of the theory, method and application of finite element method is necessary to interpret the results and extrapolate these results to clinical situations. This article reviews the basic concept, assumptions and the Finite Element Procedure from a researcher viewpoint interested in dental implantology studies.

Key words: Finite element method (FEM), dental implant, biomechanical performance, masticatory force.

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INTRODUCTION

A dental implant is a biocompatible fixture surgically placed into the jawbone in order to replace missing tooth and to support prosthetic tooth crown. Fig. 1 shows the 3D view of a typical implant design and Fig. 2 shows the cross sectional view of tooth and a dental implant. An optimum stress profile is required for the process of implantation to maintain a strong and healthy jawbone. If the stress become excessive and exceeds the limit, damage to the jawbone occurs. It is not easy to

determine why and when the failure process is initiated in the system. If the implantation technique is not proper, implant may fail shortly after insertion. So it is necessary to apply the engineering knowledge in the various areas of dentistry to understand the biomechanical behaviour which cannot be measured in vivo.

The finite element method is the most extensively used numerical technique for analyzing the stress and deformation in the surrounding tissue. The result obtained from FEA is based on the nature

of the modeling system and so, the procedure is very important in creating the model.

Although there are various literatures that discuss the application of FEA in dental implantology, this paper strives to describe the various steps involved in FEA for modeling and

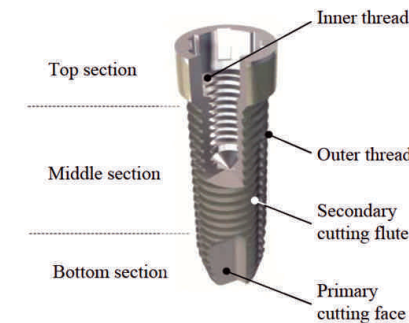


Fig. 1 Dental Implant 3D view (Courtesy: Neoss Australia Pty. Ltd)

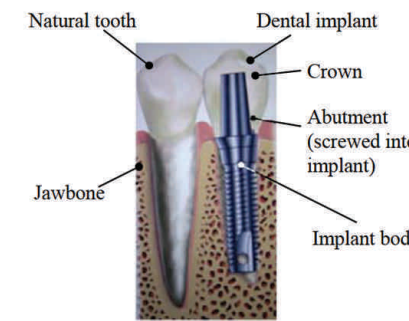


Fig. 2 Cross-sectional view of natural tooth and a dental implant (Source: www-hsc.usc.edu)

The finite element method is the most extensively used numerical technique for analyzing the stress and deformation in the surrounding tissue. The result obtained from FEA is based on the nature of the modeling system and so, the procedure is very important in creating the model.

Although there are various literatures that discuss the application of FEA in dental implantology, this paper strives to describe the various steps involved in FEA for modeling and analyzing dental implant systems from a practical perspective.

FINITE ELEMENT PROCEDURE

Fig. 3 shows the layout of basic steps involved in finite element process. Detailed explanation of finite element analysis in dental implantology is explained afterwards.

Geometric Modeling

The jawbone and the implants used in dentistry are complicated structures. Several models created using Finite Element Analysis (FEA) have been extensively used in solving dentistry

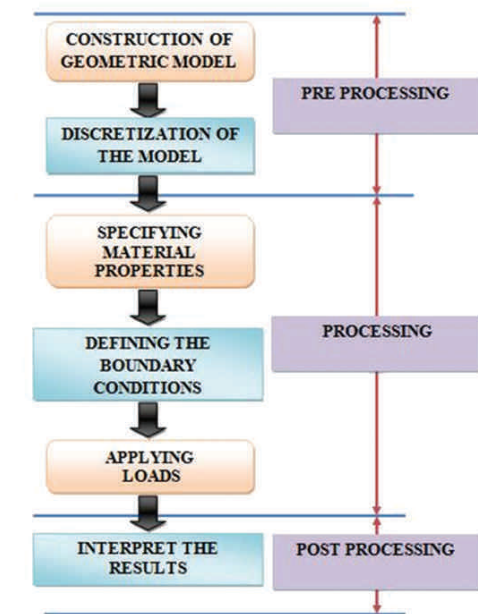


Fig. 3 Layout of FEM Procedure

related problems.^[1,2] Such a model should resemble the actual structure, with respect to both dimensions and material properties. The decision to choose between 2D and 3D modeling techniques depends upon the accuracy of the results, the complexity of the problems and the depth of the problem in hand. Using engineering software, developing an accurate analytical model of a dental implant is appropriate for obtaining realistic and reliable solutions. Assumptions in modeling and software limitations led to a number of inaccuracies in the obtained results. Fig. 4 shows a simplified 2D model of a dental implant, surrounded by the mandible. Generally the dental implant is assumed to be of rectangular shape modeled in 2D with no cutting edge, screw thread and surface structure.^[3]

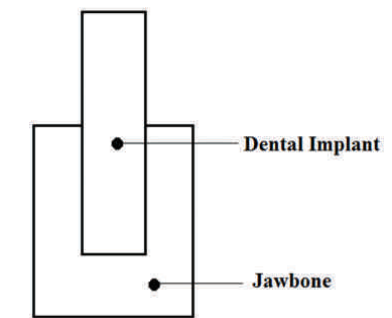


Fig. 4 Simplified 2D model of a dental implant

3D models have an upper hand over their 2D counterparts in that they are more realistic and present a better visualization of internal areas. However it is difficult to create an exact and valid 3D model of these implants and jawbone structures. In

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earlier studies, 2D models were extensively used, which is a more time and cost effective method as compared to 3D. They are moreover simpler to construct, but are a failure when it comes to realizing real world problems, such as the difference between cortical and trabecular bones. This leads to the calculated results being far from the actual situation in this case. Due to this, 2D modeling using FEA cannot be used as an appropriate guidance to the implant treatment. On the other hand, 3D models, being more realistic, require a mesh refinement, more complex analysis, and full assessments which yield accurate results, the computational cost of which is greater.^[4] Here they represent the biomechanical interactions of the human anatomy, restorations and implant components as a complex more superiorly than 2D models^[5], capturing the geometry of complex structures as close to reality as possible.

The 2D representation of implant and jawbone structures is adopted based on the assumption of axial symmetry of loads or geometry.^[6,7,8] A majority of the 2D studies claim that the translation of a clinical condition to a 2D model gives sufficient insight into the behaviour of jawbones around implants. However the stress in the jawbone obtained by the 2D model is less accurate than that obtained by its 3D counterpart.

The analysis technique is to construct the FEA model, specify the material properties, loading and boundary conditions, for simulation of the desired scenarios. The implant and jawbone are simulated using various mechanical modeling software such as AutoCAD, Solid Works, CATIA, Pro/Engineer, Rhino 3D, UG NX etc. However, this Computer Aided Design software have a shortcoming in that measurements cannot be taken and implemented with accuracy and are hence tedious. Digital Imaging options such as computed Tomography (CT) scans and Magnetic Resonance Imaging (MRI) help us to view dental anatomy from different angles. These provide a platform for 3D models to be manually constructed or generated.

The model thus obtained was defined in parasolid format and then fully rendered to the analysis software to do the simulation part.

Discretization

Discretization is the process of dividing the infinite geometry into finite elements, connected with nodes. Normally two types of meshes are used in FEA namely fine and coarse mesh. In a coarse mesh the size of the mesh will be larger compared to the fine mesh. This is fine in the case of simple geometries. But clinical cases or situations are complex, so it is better to use fine mesh even though it increases computational time. Also, to increase the accuracy of the analysis mesh density can be increased at the critical areas.

Sometimes mesh error also occurs due to the complexity of the geometry, in that case it is better to mesh using finite element pre processor called Hyper Mesh. It supports a wide variety of CAD and solver interfaces.

Material Properties

Material properties which include those of living structures and mechanical non-living entities such as implant fixtures, abutments and restorations greatly influence the stress and strain distributions.^[9] These properties can be modeled in FEA

as isotropic, anisotropic, transversely isotropic and orthotropic. In order that the FEA represents the dental implant as close to reality as possible, it is necessary that the material properties and loading conditions of the implant be considered. However in most of the studies, the materials used are assumed to be homogeneous, isotropic and linear elastic. It is also assumed that a single value of Young's modulus and Poisson's ratio are used to represent the elastic material and its behaviour.

Bone has different properties along different axes, making it anisotropic. The FEM employs full orthotropy for cortical bone. Orthotropy is a form of anisotropy in which the internal configuration of the material results in unique elastic behavior along the three orthogonal axis of the material. In this case, three elastic (E) and shearmodulus (G) and six Poisson's ratios are necessary for model input.^[4] It has been proven by several authors that cortical bone is neither homogeneous nor isotropic.^[9]

However, by assuming cancellous bone to be transversely isotropic, that means it behaves identically in all plane perpendicular to the axis of symmetry, lead us more closer to the actual clinical conditions of bone. Orthotropy is not in itself a problem for the finite element method. However, the cross-sectional shape of the mandible does not easily lend itself to the use of orthotropic material properties, for which the symmetry axes would presumably change from point to point, following the irregular elliptical shape of the mandibular cross section. The unique symmetry axis for compact bone was along the mesio-distal direction with the bucco-lingual plane being a plane of elastic isotropy. The unique symmetry axis for cancellous bone of the edentulous mandible was in the infero-superior direction with the anatomic transverse plane being a plane of elastic isotropy.^[9,10]

Table 1. Material Parameters used in FEA of Dental Implants^[2]

Material	Young's Modulus(Pa)	Poisson's Ratio
Enamel	4.14 x 10 ¹⁰	0.3
Dentin	1.86 x 10 ¹⁰	0.31
Periodontal Membrane	171	0.45
Cortical Bone	1.34 x 10 ¹⁰	0.30
Trabecular Bone	1.37 x 10 ⁹	0.31
Mucosa	10	0.40
Pure Titanium	117 x 10 ⁹	0.30
Ti-6Al-4V	110 x 10 ⁹	0.33
Type 3 Gold Alloy	100 x 10 ⁹	0.30
Ag-Pd Alloy	95 x 10 ⁹	0.33
Co-Cr Alloy	218 x 10 ⁹	0.33
Porcelain	68.9 x 10 ⁹	0.28
Resin	2.7 x 10 ⁹	0.35
Resin Composite	7 x 10 ⁹	0.2
Blood Interface	7 x 10 ⁹	0.3

Boundary Conditions

The boundary conditions were applied to have enough nodal displacements to prevent the structure from moving the space like a free floating rigid body. Existing studies mostly deal with analysis of finite element model by considering a small part of the mandible surrounding the implant, thereby applying fixed constraints to the lower region of the mandible.^[7,11,12,13] In the above case, the application of boundary condition is simple by making all the degree of freedom to zero.

A sensible approach can be taken by modeling the entire jawbone structure modeled along with the ligaments, muscles, tendons and other supporting tissues. This makes the approach more realistic as it precisely simulates the collective force transmitting unit. The complexity of the above approach lies in setting the boundary conditions. In the above scenario ligaments can be assumed as spring-damper constraints and muscle with spring constrains rather than fixed constraints in the earlier studies.

Loading

In this part of the procedure the force acting on the structure is applied to simulate the actual clinical conditions. Studies related to the masticatory force reveal that the magnitude of force varies from one point to other point of the mouth according to the variations related to gender, muscle size and tonicity, parafunctional habits, age and degree of edentulism.^[9] It is reported that bite force in a premolar region varies from 40-600N and for young adults the average force range from 50-400N in the molar region.^[14] Fig. 5 shows the load direction and Table 2 shows the corresponding load level.

Direction	Specification	Load Level (Mean+/- SD) N	
Vertical	Intrusion force	70+/-15	
	Transverse	Buccal movement	170+/-50
		Oral movement	90+/-12
		Buccal transverse force at crestal bone margin	21+/-6
Mesiodistal	Oral transverse force at crestal bone margin	11+/-1.5	
	Mesial movement	52+/-26	
	Distal movement	35+/-17	

Bite forces acting on dental implants can result in undesirable stress within the surrounding jaw bone which in turn can cause bone rejection to the implant, leading to eventual failure of the implant. For a proper assessment of biomechanical behavior of implant-jawbone structure, it is essential to consider realistic loading magnitudes and directions.

Load transfer at the bone-implant interface depends on the: (1) type of loading (2) material properties of the implant and prosthesis (3) implant geometry, length and diameter as well as

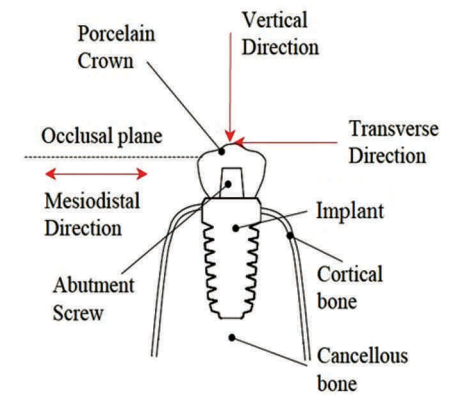


Fig. 5 Load directions^[3]

shape (4) implant surface structure (5) nature of the bone-implant interface and (6) quality and quantity of the surrounding bone.^[2] Initially the load should be applied to the restoration and then transmitted through the abutment to the implant and surrounding bone tissue. Loading can be static or dynamic and can be applied axial, non-axial or mixed (combination of axial and non-axial loading). In static loading oblique occlusal forces must be included to achieve more realistic analysis.

In the real scenario the load is acting dynamically to the implant system. More realistic analysis can be done by applying forces dynamically. Fig. 6 illustrates the bite force direction.

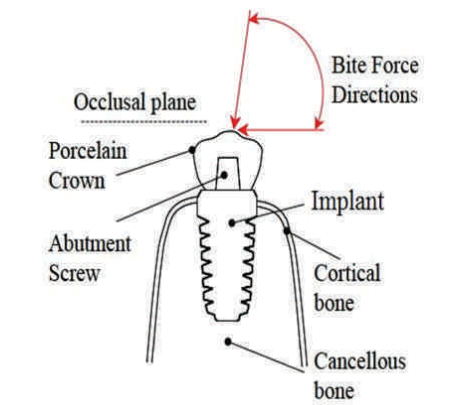


Fig. 6 Bite force directions^[3]

Interpretation of results

The results obtained from FEA are of numerical form consisting of nodal values of field variables and its derivatives. Apart from numerical form, the contours of the field variables can be plotted and displayed. Results of Finite Element Analysis are usually presented as either von Mises stress, maximum and minimum principal stresses or maximum and minimum principal strains. Most of the studies published earlier have used von Mises stress as an analysis criterion which usually deals with ductile materials. However most of the dental materials are brittle in nature and so principal stress would be the better criterion for failure analysis.

Validation of FE results

The results generated have to be validated especially when they have clinical/biological implications. Validation is done by comparing the results with the available data in the literature on the subject matter. In order to validate FEA, either conduct parallel invitro/vivo experiments or analytical studies on the same study matter. Once the FE model is validated, it can be used in future control trials.

CONCLUSION

Finite element method is a well established numerical analysis method having wide application in various fields of dentistry. It has been extensively used to predict biomechanical performance of dental implants systems as well as the cause of clinical factors on the success of implantation. Knowledge of stress distributions and deformations within the implant and the surrounding jawbone will aid to optimize the implant design and insertion technique. The modeling of living tissue and its response to the application of masticatory forces is the prime difficulty in simulating the biomechanical behavior of dental implants. Instead of conducting in vitro/in vivo experiments or clinical trials, modeling and simulation saves a lot of money and time.

REFERENCES

- DeTolla D H, Andreana S, Patra A, Buhite R and Comella B, "Role of The Finite Element Model in Dental Implants", *Journal of Oral Implantology*, Vol. 26, No. 22000, pp:77-81.
- Geng J P, Tan K B and Liu G, "Application of Finite Element Analysis in Implant Dentistry: A Review of the Literature", *Journal of Prosthetic Dentistry*, Vol.85, No. 6, 2001, pp:585 - 598.
- Van Staden R C, Guan H and Loo Y C, "Application of the Finite Element Method in Dental Implant Research", *Computer Methods in Biomechanics and Biomedical Engineering*, Vol.9, No. 4, 2006, pp:257-270.
- Piccioni and Mayra Andressa R V, "Application of the Finite Element Method in Dentistry", *RSBO*, Vol. 10, No. 4, 2013, pp: 369-377.
- Amilcar Chagas Freitas Júnior, Eduardo Passos Rocha, Paulo Henrique dos Santos and Ching-Chang, "Mechanics of the Maxillary Central Incisor. Influence of the Periodontal Ligament Represented by Beam Elements", *Computer Methods in Biomechanics and Biomedical*, Vol.13, No. 5, 2010, pp: 515-521.
- Canay S, Hersek N, Akpınar I and Asik Z, "Comparison of Stress Distribution Around Vertical and Angled Implants with Finite Element Analysis", *Quintessence International*, Vol. 27, No. 9, 1996, pp: 591-598.
- Patra A K, DePaolo J M, D'Souza K S, DeTolla D and Meenaghan M A, "Guidelines for Analysis and Redesign of Dental Implants", *Implant Dentistry*, Vol. 7, No. 4, 1998, pp: 355-368.
- Lewinstein I, Banks-Sills L, and Eliasi R, "A Finite Element Analysis of a New System (IL) for Supporting an Implant-Retained Cantilever Prosthesis", *International Journal of Oral Maxillofacial Implants*, Vol. 10, No. 3, 1995, pp: 355-366.
- Faisal Moeen, Saleha Nisar and Nimra Dar, "A Step By Step Guide to Finite Element Analysis", *Pakistan Oral and Dental Journal*, Vol. 34, No. 1, 2014, pp: 164-169.
- Chang, Ming-Lun Hsu and Chih-Ling, "Application of Finite Element Analysis in Dentistry", *Finite Element Analysis*, by David Moratal, 2010, pp: 43-60. Sciyo.
- G Papavasiliou, P Kamposiora, S C Bayne and D A Felton, "3D-FEA of Osseointegration Percentages and Patterns on Implant-Bone Interfacial Stresses", *Journal of Dentistry*, Vol. 25, No. 6, 1997, pp: 485-491.
- Laurent Pierrisnard, Franck Renouard, Patrick Renault and Michel Barquins, "Influence of Implant Length and Bicortical Anchorage on Implant Stress Distribution", *Clinical Implant Dentistry and Related Research*, Vol. 5, No. 4, 2003, pp: 254-262.
- Tada Shinichiro, Stegaroiu Roxana, Kitamura Eriko, Miyakawa Osamu and Kusakari Haruka, "Influence of Implant Design and Bone Quality on Stress/Strain Distribution in Bone Around Implants: A 3-dimensional Finite Element Analysis", *International Journal of Oral & Maxillofacial Implants*, Vol. 18, No. 3, 2003, pp: 357-368.
- Olmsted M J, Wall C E, Vinyard C J and Hylander W L, "Human Bite Force: The Relation Between EMG Activity and Bite Force at a Standardized Gape", *American Journal of Physical Anthropology*, Vol. 40, 2005, pp: 160-161.
- Orozco, Carlos Aparicio and Paulina, "Use of 5-mm-Diameter Implants: Periotest Values Related to a Clinical and Radiographic Evaluation." *Clinical Oral Implant Research*, Vol. 9, No. 6, 1998, pp: 398-406.

REVIEW**Real-time diagnosis of oral Lesions: Towards realization of a dream**

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ABSTRACT:

Early diagnosis of suspicious lesions especially malignancies, not only affords early intervention but also the best chance of cure. Though, the current gold standard and traditional method of diagnosis largely depends on histopathology, diagnosis by direct visualization has always been a dream of any pathologist. Recent advances in fiber optics, light sources, and detectors have led to the development of several novel methods which provide an early, real-time, non-invasive, and in situ diagnosis, makes this dream a reality. This review introduces contact endoscopy, a novel noninvasive optical imaging method that uses the properties of light that enable an instant diagnosis, and significantly shortening the patient's journey toward definitive treatment.

Keywords - Optical biopsy, contact endoscopy, oral mucosal lesions.

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INTRODUCTION

Histological assessment of a tissue sample is regarded as the most reliable criteria for correct diagnosis. Diagnosing by dynamic microscopic visualization of the lesion had always been a dream of any pathologist. Advances in fiber optics, light sources and detectors have led to the development of optical biopsy technique which uses the properties of light to significantly improve our ability to visualize and evaluate human epithelium in vivo. Contact endoscopy is a novel non invasive optical imaging method which allows in vivo and in situ examination of the cellular architecture of the superficial layers of the mucosal epithelium.^[1] This technique produces

real time magnified image of cellular architecture and surface mucosa comparable to histology without the need of biopsy. This technique allows assessment of precancerous and cancerous lesions in vivo and also has significant potential in the histopathologic diagnosis of many suspicious head and neck mucosal lesions without tissue biopsy.^[1] Unlike a small area studied by histopathological examination, it could scan large areas quickly. This feature can be of great help in selection of most suitable area for biopsy.

Contact Endoscopy was first introduced by Hamou, as a technique for screening and diagnosis of cervical as well as uterine pathology by visualization of

cervical and uterine epithelial cells.^[2,3] Later the use of contact endoscopy in head and neck, was explored by Andrea,^[1] who evaluated various pathology of larynx using this technique. Thereafter its use has been reported in the study of recurrence of cholesteatoma in the ear,^[2] preoperative identification of parathyroid glands, and in diagnosing mucosal lesions of nose, nasopharynx, hypopharynx, oropharynx and even in oral cavity. Studies were done previously to investigate the diagnostic accuracy of contact endoscopy in detecting malignancy as well as other lesions like hyperkeratosis, ulceroproliferative lesions, lichen planus,^[3,4] oral submucous fibrosis affecting oral mucosa. Contact endoscopy had been suggested as a promising non invasive technique to know cellular architecture and vascular patterns in vivo for evaluation of oral mucosal lesions due to its simplicity and high sensitivity, specificity and accuracy.^[5]

OPTICAL BIOPSY THROUGH CONTACT ENDOSCOPY

The technique used in contact endoscopy is optical biopsy,^[5] where the method of detection is limited to the observation of reflected visible light from the mucosal surface. The principle behind the procedure is that, the light photons reflected by the tissue of focus, passes through the endoscope,

which act as the compound microscope, resulting in the formation of a magnified image. Hence optical biopsy through contact endoscopy requires a contact endoscope, a high quality camera and a monitor. Contact endoscope come in a variety of lengths, diameters and viewing angles. Length of these scopes mainly come as 23 cm and 18cm and the diameter is either 4 mm or 5.5mm.^[1] Depending on the angle, two types of endoscope are available, straight forward (0°) and forward-oblique telescopes (30°), and it has a fitted rotating screw which allows magnification of 1x, 60x, and 150x^[1] and also helps in focusing and de-focusing at specific depths of field. These endoscopes require a high intensity xenon light source via fiber optic cable, and a high quality camera attached via adaptor connected to monitor.

The basic technique of contact endoscopy(CE), comprises of staining the superficial cells of the mucosa with a contrast dye, (1% methylene blue)^[1,2,3,6,7] followed by placing a zero degree contact endoscope against the mucosal surface after which, magnified cytological images are recorded. The mucosa to be visualized should be free of saliva or any other secretions. So after carefully drying the mucosa, the area of interest is



Figure 1. (A) Zero-degree (top) and thirty-degree (bottom) contact endoscope. (B) Contact endoscopy procedure. Photographs taken from the reference article (1).



Figure 2. A) Contact endoscopy image of blood vessels in normal mucosa. B) Early stages of cancer. C) Advanced stage of cancer. Photographs taken from the reference article (2).



Figure 3. A) Figure 2.A) Contact endoscopy image of cellular architecture in normal mucosa. B) Early stages of cancer C) Advanced stage of cancer. Note the densely stained nuclei and their nuclear atypism (arrows) and the increased N/C ratio. Photographs taken from reference article (6).

illuminated by the light source (Xenon light). After illumination, endoscope is placed gently over the area to be visualized and is moved slowly over the whole area of interest. The magnified image that formed are magnified 60 times or 150 times, of the original size, which is digitally captured by a good quality camera, and the image, comparable to histology is visualized by a cytopathologist in the monitor and is finally recorded as photograph or as video. So the stored still images and videos can be reviewed as many times as necessary [Fig 1].

DIAGNOSIS BY DIRECT DYNAMIC VISUALIZATION

Contact endoscopy (CE) that enables the detection of specific pattern for specific pathology e.g. inflammation, metaplasia, dysplasia and neoplasia, had been extensively used in gynaecological, laryngeal and also in cervical and visceral tissues. Contact endoscopy used in larynx, is called laryngomicroscopy.^[8] Evaluation of laryngeal mucosa, requires passage of contact endoscope through a suspension laryngoscope under anaesthesia. Rigid laryngoscopy is also available for systematic observation of many details in the large area of the vocal fold mucosa, particularly when access to the larynx is difficult, and helps in the dynamic monitoring and immediate pathology consultations inside the operating room. Despite its introduction in otolaryngology, many researchers had proved its high efficacy in diagnosis of mucosa lesions on other sites of head and neck such as hypopharynx, nasopharynx, oropharynx and oral cavity. Atypical patterns considered in previous studies are (i) irregularly arranged, tortuous or absent blood vessels (ii) heterogeneously distributed cells (iii) increased nucleus/cytoplasm (N/C) ratio or (iv) heterogeneous, deeply stained, or absent nuclei.^[2,3,6,8] On the basis of the degree of atypical patterns, CE diagnosis was determined. The same endoscopic characteristics, that are used in various pathologies in other head and neck regions, forms a basis for the diagnoses of oral lesions too.

DIAGNOSIS OF ORAL CANCER BY CONTACT ENDOSCOPY

Diagnosis of oral cancer is based on

- 1) Evaluation of vasculature
- 2) Evaluation of cellular architecture

Evaluation of vasculature

During transformation of normal oral mucosa to carcinoma there is an increase in number of blood vessels, due to the process of neoangiogenesis. This change in vasculature has been used as one of the parameters in diagnosis of oral cancer. For evaluation of vasculature, no vital staining is mandatory^[2,6]. In normal mucosa there are parallelly arranged blood vessels or regularly arranged loop forms and few anastomoses. As it

transform to early squamous cell carcinoma there is an increase in number of blood vessels with more bifurcation or anastomoses. There is a complete loss of parallelism, extensive anastomoses and vascular loop formation in advanced squamous cell carcinoma [Fig 2].

Evaluation of cellular architecture

For visualisation of cellular architecture, the mucosa should be stained with 1% of methylene blue for 5 minutes to increase the contrast of the cells. Nucleus takes dark blue color and cytoplasm takes light blue color. This increases the contrast of the cells and makes the visualization better. Methylene blue is used because it is non-toxic and the staining is reversible. After staining the area of interest by 1% methylene blue^[1,3,6,7] for 5 minutes, care should be taken to remove the excess stain by washing the area with a copious amount of normal saline using suction and irrigation. The pattern of arrangements of cells can be clearly visualized after vital staining. The pattern of arrangement of cells varies from normal mucosa to dysplasia to squamous cell carcinoma. Cellular features considered are distribution of cells, cell density, nuclear cytoplasmic ratio, nucleoli, and nuclear staining pattern. In normal mucosa cells are arranged in a homogeneous pattern, as it progresses to squamous cell carcinoma there would be a heterogeneous pattern of cellularity and dysplastic features like hyperchromatism, pleomorphism, and mitotic figures can be easily appreciated by contact endoscopy [Fig 3].

DIAGNOSIS OF OTHER MUCOSAL LESIONS

In addition to oral cancer, many studies were done on premalignant lesions and conditions like leukoplakia and oral submucous fibrosis, hyperkeratosis and lichen planus (Fig. 4).

EFFICACY DATA FROM CONTACT ENDOSCOPY TRIALS

The prospective clinical contact endoscopy trials done by various authors have obtained a sensitivity of 79–100%, a specificity of 81–100%, and an accuracy of 88–94%. Various clinical trials that have been done previously are as follows:

In 2008, Cikojevic^[1,2,9] demonstrated that it was superior to frozen-section histopathology in diagnosing laryngeal pathology and compared intra-operative utility of CE in 142 patients with frozen section examination in the diagnosis of laryngeal pathology. The lesions identified by contact endoscopy as malignant were confirmed by comparing the findings of contact endoscopy with the histopathology. Out of 142 cases, CE failed to identify malignancy in only 10 patients, thus giving CE a sensitivity of 79.6%, specificity of 100%, and accuracy of 93%. In a study by Warnecke (2010)^[1,2] about 42 patients^[3] with suspicious lesions of larynx and pharynx were examined under general anaesthesia. All were biopsied after endoscopy and samples were subjected to histopathological

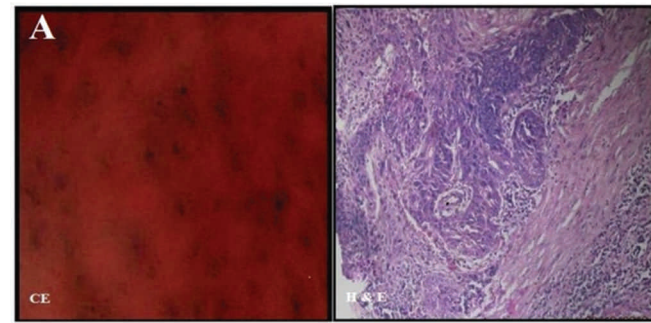
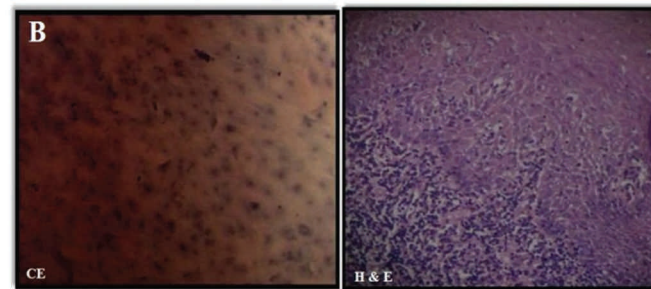


Figure 4. CE image of A) Floor of malignant ulcer compared with histopathology. The image shows large and heterochromatic nuclei, and mitotic figure. Corresponding histopathology image shows hyperchromatic nuclei with extensive cellular as well as nuclear pleomorphism. B) Lichen planus compared with histopathology. Slight variation in size and shape of cells and nuclei is seen. There is infiltration by inflammatory cells. Corresponding histopathology image shows intense infiltration by inflammatory cells. Photographs taken from reference article (3).

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examination. The end result of this study proved the role of contact endoscopy in diagnosing various mucosal lesions in pharynx and larynx but its dependence on the experience of the examiner was also brought out. Later, in 2011 Nobuo Saeki [6] proved that CE is a helpful real-time diagnostic technique for lesions in the oral cavity and also in lingual lesions. He did a study on 66 subjects, out of which 46 were squamous cell carcinomas (SCC), 10 leukoplakias, and 10 were benign lesions (1 fibroma, 1 mucosal cyst,

2 hyperplasia, 6 inflammatory lesions). Out of 66 patients, in 4 patients with SCC, malignancy was underestimated by CE findings. In his study, it was proved that the overall diagnostic rate of the CE was 93.9% (62/66 patients). The sensitivity and specificity of SCC were 91% (42/46 patients) and 100% (20/20 patients), respectively. In 2014, Col Awadhesh Kumar Mishra [3] investigated the diagnostic accuracy of contact endoscopy in detecting oral mucosal lesions other than oral cancer. His study was on 74 patients out of which 45 were males and 29 were females, having ages from 21 years to 73 years. Average age was 35-56 years. Clinical lesions were comprised of ulceroproliferative lesion, leukoplakia, erythroplakia, lichen planus

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and oral submucous fibrosis in 34, 19, 9, 5, 7 patients respectively. The cases were diagnosed with the histopathological examination, and showed a sensitivity of 84.21%, specificity of 94.44% and accuracy of 89.19%. Predictive value of positive test (PPV) was 94.11% while predictive value of negative test (NPV) was 85%.

ADVANTAGES OF CONTACT ENDOSCOPY

- It is a non-invasive, simple, quick, repeatable and helps in in vivo examination of cellular architecture and also vascular pattern of the mucosa.
- Quick examination and evaluation of large and multiple areas can be done in a single sitting, compared to limited areas assessed by biopsy. [2]
- Avoids risks, tissue damage and changes in cells which can occur due to repeated biopsy and also during tissue processing, for histopathological examination. Thus suspicious lesions can be followed up serially without antecedent morbidity associated with surgical biopsy. [2]
- The Contact endoscopy can be performed just before surgical excision, and helps the surgeons [2,8], in deciding, a precise site for biopsy by identifying areas of cellular atypia and also improves the yield of biopsy. Even it helps in deciding the margins of resection during tumour removal by differentiating tumour areas from normal mucosa. And also helps in mapping the tumor.
- Can be employed both in outpatient department and also in operation theatre. [2]
- Results are immediate without delay. [2,6]
- Video and still images can be stored and reviewed as many times as necessary. [2]

LIMITATIONS OF CONTACT ENDOSCOPY

Despite its advantages, it does have its own limitations, contact endoscopy can only evaluate the most superficial cell layer of mucosal epithelium. This is most likely due to the poor penetration of the stain [2] and short focal distance of the scope (Contact endoscopy can only assess a depth of 80 μ at 60x and 30 μ at 150x). [1] Hence it might not be always possible to detect very early dysplasia, this also makes differentiation between *in situ* from early invasive *ca* difficult at times and also there are chances of optical artifact at high magnification, due to glare from light reflected from cells not in focus.

CONCLUSION

Contact endoscopy represents a promising optical technology that may afford reliable, accurate and noninvasive in vivo assessment of pathology. Future investigation into better penetrating dyes, advances in digital optics and image enhancement will eventually would translate contact endoscopy in becoming an accurate diagnostic tool which in

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turn will make our dreams of real time visualization of pathology a reality.

REFERENCES

- 1) Christopher Szeto et al. Contact Endoscopy as a Novel Technique in the Detection and Diagnosis of Mucosal Lesions in the Head and Neck: A Brief Review. 2011 (2011).
- 2) Awadhesh Mishra et al. Contact Endoscopy -A promising tool for evaluation of laryngeal mucosal lesions. *Journal of Laryngology and Voice*. 2012; 2 (2):53-59.
- 3) Col Awadhesh Kumar Mishra et al. Contact Endoscopy of mucosal lesions of oral cavity Preliminary experience. *Medical journal armed forces india*. 2014; (70): 257-263.
- 4) S. Pelucchi, C. Bianchini. Contact endoscopy of the oral mucosa: preliminary results. *Acta Otorhinolaryngologica Italica* 2007; 27:59-61.
- 5) Optical and molecular techniques to identify tumor margins within the larynx. *Head Neck*. 2010; 32(11):1544-53.
- 6) Nobuo Saeki et al. Utility of real-time diagnosis using contact endoscopy for oral and lingual diseases. *Auris Nasus Larynx* 2011; 38:233-239.
- 7) T Upile, W Jerjes et al. Microendoscopy: a clinical reality in the intraoperative margin analysis of head & neck lesions. *Head Neck Oncol*. 2012; 4(2):43.
- 8) R.A. Deditis, E.G. Pfuetsenreiter JR Contact endoscopy of the larynx as an auxiliary method to the surgical margins in frontolateral laryngectomy. *Acta Otorhinolaryngol Ital* 2009; 29:16-20.
- 9) Cikojevic D, Gluncic I, . Comparison of contact endoscopy and frozen section histopathology in the intra-operative diagnosis of laryngeal pathology. *J Laryngol Otol*. 2008; 122(8):836-9.
- 10) Gyl Henrique Albrecht Ramos, PhD et al. Contact Endoscopy (Stomatoscopy) Versus Histological Diagnosis of Lesions of the Lower Lip Vermilion Area. *Applied Cancer Research* 2010; 30(1) 216-220.
- 11) Wardrop PJ, Sim S, McLaren K. Contact endoscopy of the larynx: A quantitative study. *J Laryngol Otol* 2000; 114:437-40.
- 12) Hamou JE. Microhysteroscopy. *Clin Obstet Gynecol* 1983; 26:285-301.
- 13) Andrea M, Dias O, Santos A. Contact endoscopy of the vocal cord: Normal and pathological patterns. *Acta Otolaryngol* 1995; 115:314-6.
- 14) Andrea M, Dias O, Santos A. Contact endoscopy during microlaryngeal surgery: A new technique for endoscopic examination of the larynx. *Ann Otol Rhinol Laryngol* 1995; 104:333-9.
- 15) Hamou JE. Microhysteroscopy. *Clin Obstet Gynecol* 1983; 26: 285-301.

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Plumes: Is it as light as smoke?

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INTRODUCTION

New emerging technologies have changed the therapeutic modalities of dentistry making treatment faster and comfortable to both clinician and patient. Dentistry started to develop as a science and became popular with the discovery of anesthesia. With every procedure that aimed at making it more painless, fine and precise tissue handling to blood less procedure, dentistry became more acceptable among the patients. In surgical field, tissue management had always been the prime concern, but choice between conventional blade and tip- used modalities like electro cautery and Laser etc were always uncertain. While fine precision and blood less field are advantages for the newer techniques, the health hazards of these newer techniques are also a matter of equal importance.

The types of hazards that may be encountered with these modalities within clinical practice of dentistry include major hazards like ocular injury, non target oral tissue, skin, respiratory hazards and minor hazards like chemical, fire and explosion, electrical shock and other collective hazards.^[1,2] Recently, more alert has been given for the aerosol contamination of modern therapeutic modalities. The cutting, vaporization or coagulation methods of recent blade less techniques results in

charring of tissues and releasing of aerosols. The vapor, smoke and particulate debris produced during these surgical procedures are called Plumes. They are today at the alert of having bio- aerosols, pathogens, blood fragments in it and also for being an irritant and at certain situation, a carcinogen. To a larger extend these drawbacks are dependent upon its duration of exposure. The factors which would affect the amount and content of smoke plume are type of procedure, surgeon's technique, pathology of the target tissues, type of energy transferred, power levels used, and the amount of cutting, coagulation, or ablation performed.^[3] Surprisingly, there are not much of literature that has addressed the hazardous aspects of these plumes generated by cautery instruments and Laser equipments.

Literature review:

One of the earliest studies on this matter was reported in 2002 by Garden JM, which reported plumes collected from a bovine papillomavirus- induced cutaneous fibropapillomas treated by Carbon dioxide laser, developed similar disease when it was inoculated into the skin of calves.^[4] Tomita et al has demonstrated carbon dioxide laser smoke had harmful effects on the respiratory system in animal models.^[5] A detailed study has been reported by David T Kuhar on the need of respiratory

protection in surgeries involving surgical lasers and electrosurgical smoke plumes. The study concluded that there is likely that viable Human papilloma virus (HPV) could be present in laser /electrosurgical smoke plumes.^[6] The risk for Human papilloma virus (HPV) transmission to health care professional during smoke generating procedures seems low but needs further study. Owing to the least exposure, there are only a few studies in relation to plumes generated in the dental clinics.

DISCUSSION

The discomfort and irritation following inhalation of surgical plumes is unquestionable, the recent health hazard issues discussed here add to the draw backs associated with plume generating equipments. There are only few human studies proving it, but animal studies have proved causing re infection and harmful effects related to this aerosol.^[4,5]

In a systematic review of literature conducted by division of sexually transmitted disease prevention (Center for disease control and prevention-CDC), 25 articles related to this including 2 guidelines were identified. But it was interesting to note that no randomized trials were identified in this review. Seven studies showed HPV DNA in laser plumes and one in electrocautery plumes.^[6] There were four studies that demonstrated HPV contamination of face/nose and oral mucosa of health care personals, of which only one study confirmed it. There were two case reports of laryngeal papillomas reported in health care workers. Three studies identified the incidence of warts among laser surgeons who treated HPV associated lesions.^[6]

There is no literature supporting this health hazard among dental surgeons, though in most studies they give emphasis to the possibility of disease transmission and strict emphasis in following Personal protective equipment rules (PPE rules) among every health workers exposed to such aerosols.

Summary and Conclusion

There are not much studies done with regard to surgical plumes, but every study emphasize the possibility of disease transmission and all health care professional are ought to follow the Occupational safety and health administration- OSHA rules.

Contaminants generated by laser and electrosurgical units can be controlled by Ventilation, safe work practice and personal protective equipment.^[7] Sterilization also play a major role in generating this hazardous plumes. It is important to examine, cleave, polish and sterilize optical fibers and contact tips after each use. Alternatively, sterile, single -use, disposable devices can be used.^[8] General room ventilation is not sufficient to remove air contaminants. In this aspect, Plume scavenging system or smoke evacuator helps to capture and neutralize plume. High volume suction tip close to the procedure also help

to reduce the amount of exposure of contaminants

All staff who works near the laser or electrosurgical unit should receive

- Training on proper procedures for safe use of equipment
- Instruction about how to keep equipment in good working condition
- Instruction and training to protect patient and client from exposure
- Education about possible health and safety hazard to all workers.

All health workers should wear appropriate respiratory and eye protection devices. The masks should cover the nose and mouth snugly and should be able to filter up to 0.1micron. Mask should be of single use and be changed between every patient or when they become moist. Properly fitted protective lenses that meet ANSI (American National standard institute) requirement of laser will be a safeguard for eyes from exposure to plumes.^[9]

To summarize the interest of this article, contaminants liberated by laser or electrosurgical units carries a risk of disease transmission but the toxic chemical liberated from the machine can be effectively controlled by Plume Scavenging systems (PSS) and personal respiratory protection devices. Biological agents in plumes should not be taken lightly even during short dental procedures and every protective measures to ensure the operator and patient security is the duty of a health professional.

REFERENCE

1. Caroline Sweetney, Donald J Coluzzi, Penny Parker, Steven PA Parker, John G Sulewski, Joel M White. Laser safety in dentistry: A position paper. J laser dent 2009;17:39-49.
2. Pradeep S, Anita S R, Ravi S. Laser safety in dental practice. Sch.J.Dent.Sci 2015;2:192-4.
3. Nilay R Shah. Commentary on: "Surgical smoke- A health hazard in the operating theatre: A study to quantify exposure and a survey of the use of smoke extractor systems in UK plastic surgery units". Annals of Medicine and Surgery 2012;1:23-4.
4. Garden JM, O'Banion MK, Bakus AD, Olson C. Viral Disease Transmitted by Laser-Generated Plume (Aerosol). Arch Dermatol. 2002;138:1303-7
5. Miserendino L, Pick PH. Laser in dentistry. Quintessence Pub Co, 1995.
6. www.cdc.gov/hicpac/pdf/mm/hicpac-summary-november-6-7-2013.pdf
7. Laser plumes—Health care facilities. Available at: http://www.ccohs.ca/oshanswers/phys_agents/laser_plume.html.
8. Frank YW Yung. Infection control. J laser dent 2010;2:68-70

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A voyage into the histology of gingival tissue: true delight of a beginner!

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ABSTRACT:

A basic research project with the following protocol was designed to have an insight into the histological features of gingiva in health and disease.

Aim: To observe and study the histology of gingiva in health and disease.

Objectives:

- 1) Observe and identify histological features of clinically normal appearing gingiva
- 2) Observe and identify the histological features of gingival wall of a deep periodontal pocket

Materials and Method: 5 Gingival tissue obtained from gingivectomy of healthy tissue during gingival pocket excision and 5 sample tissues obtained by excision of pocket wall of gingiva in undisplaced flap surgery for periodontal pocket elimination were subjected to histological examination. The tissue were processed, stained and viewed under binocular light microscope by the same examiner.

Results: Comparing the histology of normal healthy gingiva and inflamed gingiva, the tissues exhibited common features among the normal and similarly within the inflamed tissues. The normal outer gingival epithelium was seen composed of parakeratinised stratified squamous epithelium with elongated rete pegs overlying connective tissue with mild infiltration of inflammatory cells. The inflamed gingiva instead, exhibited increased formation of rete pegs that penetrated the connective tissue and also dense infiltration of inflammatory cells. Each cells found in the sample tissue were identified and labeled in the project.

Conclusion: Microscopic understanding of gingival tissue, seeing for ourselves on what you work on, opens a new insight in the field of a specialization in this science.

Keywords: Gingiva, periodontal ligament, epithelium, collagen, connective tissue, epithelial attachment

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INTRODUCTION

Gingiva has been attributed to perform a major role in the field of Periodontology in terms of its contribution to its physiology and pathology.^[1,2] It also contributes in the field of diagnosis and assessing progression of disease. The subject of periodontal medicine and every surgical procedure in periodontics are dependent upon this tissue.^[3,4] The feature of this oral mucosa has been well explained in any text book of Periodontology. Hence, every specialist depends on those text book pictures and gives least importance in knowing the histological feature of this tissue through a direct approach. Understanding the microscopic features of any tissue a surgeon operate on, is an important aspect of his training.

Rationale: Assessing the need to have a closer view of this tissue, a pre clinical project was taken up to understand the microscopic nature of this tissue that appears healthy or inflamed under clinical conditions. The project also had an intention to understand the method of tissue processing for histopathological examination, through which the clinician learn the best way to procure biopsy.

MATERIALS AND METHODS:

The histological study was performed on two distinct type of gingival tissue collected from two different clinical situations. All tissue samples under study were tissues excised for genuine clinical reasons and the patients were informed and consent regarding the samples being subjected to study were obtained. 5 clinically normal appeared gingival tissues procured from gingivectomy surgery for gingival pocket excision was collected and subjected to histological examination under compound binocular light microscope following its processing. Another 5 gingival tissue samples of periodontal pocket wall excised during apically displaced flap surgery was also assessed microscopically. The former were considered to be clinically healthy gingival and the later were considered clinically unhealthy being a tissue wall of periodontal pocket wall. The obtained tissue was taken for histopathological examination to department of Oral pathology and Microbiology by the clinician and the same procedure for processing and examination of biopsy tissue was performed by an oral pathologist with the investigator recording and assisting the procedure.

Armamentarium required for histopathological investigation:

Sterilized mouth mirror, BP handle with blade no.15, Green cloth, Blotting paper, Tweezer, Two rulers, Marking pencil, Paint brush, Petridish, Cassette, Compound binocular light microscope, Glass slides, Cover slips, Microtome, Water bath.

Chemicals needed:

Albumin, 10% formalin, Eosin dye, 70% alcohol, 80% alcohol, 90% alcohol, Absolute alcohol, Two changes of Xylene, Harris hematoxylin solution, 2% ammonia water, Mounting medium (DPX)

Procedure:

1. All Gingival tissue samples were obtained by gingivectomy of pseudo pocket tissue or soft tissue wall of deep periodontal pocket wall in apically displaced flap surgery.
2. The tissue samples were transported to the oral pathology department in 10% formalin along with the surgeon's requisition form which included a detailed clinical description of the tissue sample.
3. Grossing, processing and staining of the tissue samples were done on the subsequent days.
4. The stained sections were then observed under binocular light microscope.^[5]
5. Each cells that could be identified with maximum magnification with a light microscope were identified, photographed and labelled for record.

HISTOPATHOLOGICAL OBSERVATION:

In the sample of gingiva obtained from gingivectomy (normal healthy gingiva), thin layer of keratinised stratified squamous epithelium, elongated rete pegs and underlying connective tissue with scanty infiltration of mixed inflammatory cells were seen. (Figure 1)

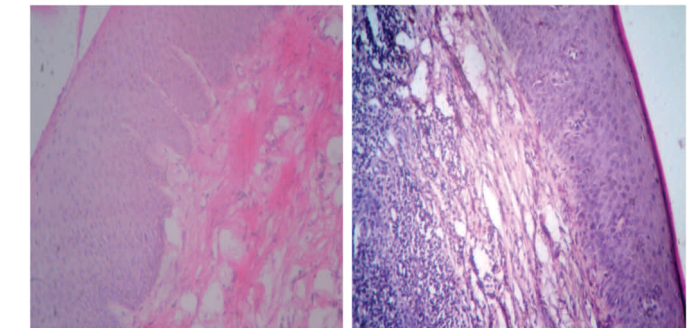
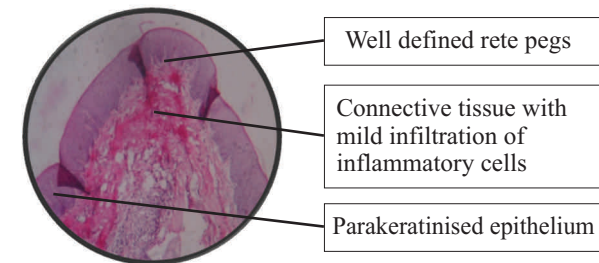


Figure 1: Histology of normal healthy gingiva

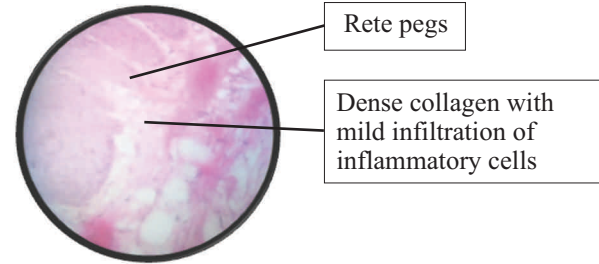
Figure 2: Histology of inflamed gingival tissue

In the sample of gingiva obtained from apically displaced flap (inflamed gingiva) managing deep periodontal pocket, outer gingival epithelium exhibiting proliferation of rete pegs and underlying connective tissue where found having dense infiltration of acute and chronic inflammatory cells (Figure 2)

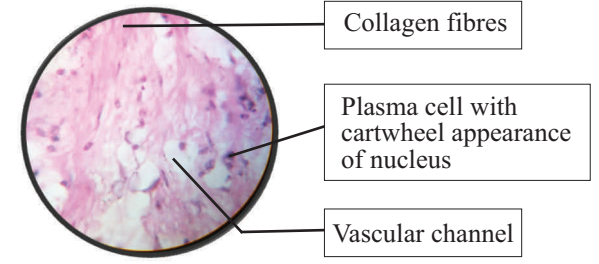
The inflammatory cells in deep soft tissue pocket wall sections were further observed under higher magnification and following cells were identified (Figure 3)



Well defined rete pegs
Connective tissue with mild infiltration of inflammatory cells
Parakeratinised epithelium

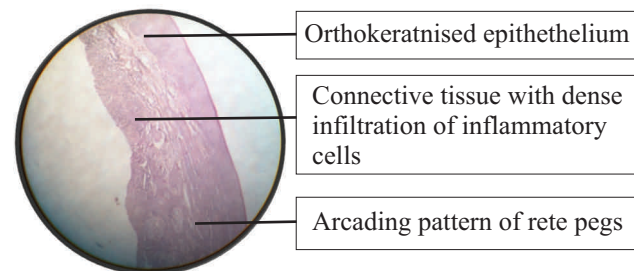


Rete pegs
Dense collagen with mild infiltration of inflammatory cells

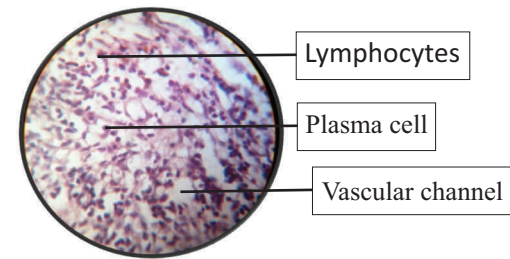


Collagen fibres
Plasma cell with cartwheel appearance of nucleus
Vascular channel

INFLAMMED GINGIVA



Orthokeratinised epithelium
Connective tissue with dense infiltration of inflammatory cells
Arcading pattern of rete pegs



Lymphocytes
Plasma cell
Vascular channel

DISCUSSION

Though the histology of healthy gingiva had been studied extensively, it is today not a part of a specialized teaching curriculum. Nothing innovative or of special interest has been observed in the present study. Microscopic examination of our

present tissue sample also revealed that, gingiva is composed of stratified squamous epithelium and underlying central core of connective tissue as it appears in any other text books.^[2] The connective tissue was mainly made of by a dense network of collagen fibers. However an infiltrated zone of inflammatory cells (about 25% of the connective tissue) was always present even in clinically normally appeared tissue. The infiltrated zone showed a certain number of differences with the non-infiltrated zone (collagen decrease, increase in oedema, vessels and mainly in inflammatory cells, principally monocytes, polymorphonuclear leukocytes and lymphocytes.^[4]

The oral epithelium is keratinised or parakeratinised or presents various combinations of these conditions. The prevalent surface, was however parakeratinised^[2] which was composed of stratum basale, stratum spinosum, stratum granulosum and stratum corneum with pyknotic nuclei, elongated rete pegs. The underlying connective tissue exhibited mild infiltration of inflammatory cells even in non inflamed conditions. The presence of this inflammatory cells are attributed to fact that gingiva will be always exposed to irritational factors.

In gingiva procured from deep periodontal pocket, epithelium was orthokeratinised indicative of increased keratinisation due to gingival irritation. It was composed of stratum basale, stratum spinosum, stratum granulosum and stratum corneum without pyknotic nuclei, proliferation of rete pegs and underlying connective tissue with dense infiltration of mixed inflammatory cells.

LIMITATIONS OF THE STUDY

Gingiva is always associated with some amount of inflammation due to local irritational factors. Hence, it was difficult to achieve a normal gingiva from a gingivectomy tissue sample. Hence a study of absolute gingiva without any inflammation could not be achieved for comparison with an inflamed gingiva.

CONCLUSION

Gingiva is the part of oral mucosa, composed of epithelium and underlying connective tissue.

The present study was an attempt to identify the changes in inflamed gingiva compared to normal healthy gingiva. Within the limitation of the present study, as stated previously, various changes in epithelium and connective tissue were found. Identification of inflammatory changes provided us information on the pathogenesis of the disease progression underneath a clinically healthy appearing tissue, thus enabling the clinician to advance his practical knowledge so as to improve the treatment quality.

Our basic research project was not aimed at searching for anything different from the normal histological feature of

gingiva in health or disease that is being featured in any standard text books. But it was directed at learning the microscopic features of a tissue that form the basis, deciding health or disease of the area that a periodontists specialize in – the periodontium. In this era where students seek for video based education to see things for real, utilizing such ordinary facilities to derive a true information of our own helps a researcher or a practitioner to aspire novel innovations in this science based on their dreams. This study can firmly conclude that this live microscopic view and understanding of gingival tissue opens up a new insight in the mind of an investigator and we recommend this preclinical exercise for anyone who wishes to be a surgeon in this speciality.

REFERENCES

- 1) Anatomical Characteristics of Gingiva. A Clinical and Microscopic Study of the Free and Attached Gingiva- Jukka Ainamo and Harald Løe. Journal of periodontology 1966 volume37DOI 10.1902/jop.1966.37.1.5
- 2) Carranza's clinical periodontology,10/e;Newman et al 2006,134-169
- 3) Histologic characteristics of clinically healthy gingiva in adolescents- Laurell et al- J Dent Res. 1987 Dec;95(6):456-62
- 4) Stereological analysis of human gingival connective tissues[Clinically healthy gingiva]-Daniel A,Dupont M-J Biol Buccale 1980 Jun;8(2):141-53.
- 5) Bancroft's theory and practice of histological techniques- 7th edition

Attitude and practices of general dentists towards pediatric dental patients: A survey

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ABSTRACT

The purpose of this study was to assess the attitude and practice of general dental surgeons towards pediatric dental patients. Out of the 250 questionnaires distributed 130 response sheets were taken for the study. The self-administered questionnaire consists of general characteristics of respondent and questions to know the attitude and practices of general dental surgeons in providing dental care for child dental patients. The study showed that attitude and practice of providing preventive dental care were lacking.

Keywords: Attitude, General dentist, Pediatric dental patient.

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Introduction

Pediatric patients are one of the patient groups which are undeserved on oral health all over the world. While the prevalence of caries among children in developing countries has decreased over the years, the rate of early childhood caries is still surprisingly high.^[1]

In addition, certain groups of children, especially children from lower socioeconomic background and children with special needs are vulnerable to poor oral health and access to dental care.^[2]

Children with unmet dental health care needs were more likely to experience problems with their physical developmental loss of school days, and increased days with restricted activity

and they may have a diminished ability to learn. Making sure that children receive the oral health care services they need is therefore crucial to ensure that they have good general health and a positive quality of life and can live up to their academic potential.^[2]

The American Dental Association recommends that dental visits begin no later than a child's first birthday to establish a "dental home." Dentists can provide guidance to children and parents, deliver preventive oral health services, and diagnose and treat dental disease in its earliest stages. This ongoing dental care will help both children and adults maintain optimal oral health throughout their lifetimes.^[3-5] This

model of providing dental care for children in our country is in the infancy, but can be an effective one as the ratio of dental surgeons to patients is narrowing. Since general dentists constitute approximately 80% of the dentist workforce, they should be utilized to the maximum extent possible to provide dental care, especially since there is a shortage of pediatric dentists.

Considering the situation, a study was planned to know the attitude and practices of general dentists towards child oral health treatment.

Materials and method

The present study was conducted among the registered dental surgeons attending State Dental Conference meeting at Kannur, Kerala, India. The subjects for the study were practicing general dental surgeons. Specialist dental surgeons were excluded from the study. 250 questionnaires were distributed to the dental practitioners. 185 practitioners returned the filled questionnaires. 27 filled questionnaires by specialist dental surgeons and 28 incomplete responses of questionnaires were excluded from the study. Therefore final number of practitioners who took part in study was 130. All the participants were requested to fill an objective questionnaire pertaining to their attitude and practices regarding pediatric cases. The questionnaire included their personal details and number of years in practice. The collected data was tabulated and percent frequency distribution was used to calculate the frequency of their responses.

Results

130 general dental surgeons took part in the study. Male dental surgeons constituted about 60% and females 40%. The majority of the dentists who took part in the study are in the practice for less than 15 year (Table 1). The main chief complaint of the child patients attending general dentists clinics was pulpitis 52% (68/130) followed by preshedding mobility 30% (39/130) (figure 1). 62% (80/130) of dentists feel that first dental visits should be at age of 1 year and 32% (50/130) of dentists feel that first dental visit should be at age of 2 years (figure 2). 63% (82/130) of dentists encourage child dental patients in their clinic (figure 3). 80% (104/130) of dental surgeons refer patients to pedodontists in acute conditions. Even though 66% (86/130) dentists provide oral hygiene instructions in dental clinics, only 15% (20/130) does any preventive dental treatment (figure 4).

Discussion

Oral disease, especially dental caries, is complicated and multifactorial, and it often begins to develop during infancy. Although certain risk factors are associated with the development of oral disease in children, it has been

difficult to consistently identify infants at greatest risk for oral disease later in life. Caries and its sequelae are among the most prevalent health problems facing infants, children. Carious lesions are cumulative and progressive in the primary dentition and are highly predictive of caries occurring in the permanent dentition. For this reason, contemporary guidelines on the management of oral disease recommend that more emphasis be placed on primary prevention.^[1,2]

The majority of dental surgeons in this survey were aware of the first visit of a child to dental clinic. Dentists can provide guidance to children and parents, deliver preventive oral health services, and diagnose and treat dental disease in its earliest stages. This ongoing dental care will help both children and adults maintain optimal oral health throughout their lifetime. Establishing a "Dental Home" means your child's oral health care is delivered in a comprehensive, continuously accessible, coordinated and family-centered way by a dentist. Dental Home enhances the dental professional's ability to assist children and their parents in the quest for optimum oral health care, beginning with the age one dental visit for successful preventive care and treatment as part of an overall oral health care foundation. Additionally, the establishment of the Dental Home will include referral to other dental specialists when the general dentist cannot provide the needed care. The early establishment of a dental home provides many advantages, such as the child becoming familiar with the dental environment in a non threatening encounter, the provision of continuity of treatment, and a better understanding of the risk factors within a family.^[3-5]

Majority of general dental surgeons don't encourage child dental patients in their practice due to time consuming behavior management techniques in uncooperative

children. Studies show that Dentists who feel adequately trained in treating children during dental college training were more likely to care for children in their practices.^[6] Cotton et al^[7] found that "general dentists with hands-on training in infant oral health were comfortable in managing the behavior of children and enjoyed treating young children.

Professional dental care is necessary to maintain oral health, but many dentists are unwilling to give preventive dental care for children. It is imperative that young children should be able to obtain dental care.^[8] As the years of practice increase there is a diminishing interest for dentist towards preventive dental treatment. This may be due to the lack of updation of preventive dental treatment. In order for clinical practices to keep pace with dental science, practitioner's knowledge and attitude towards preventive care options need to improve.^[9] Re-evaluation and reinforcement of preventive activities contribute to improved instruction for the caregiver of the child, continuity of evaluation of the patient's health status, and

repetitive exposure to dental procedures will go a long way in successful preventive dentistry. Preventive plan by general dentists increases the probability of good oral health by imparting proper oral hygiene methods/techniques, and removing plaque, stain, calculus, and dietary modifications influence good oral health in children.^[9, 10]

Limitations:

This study has certain limitations. The number of respondents for this survey is less compared to the number of dental surgeons in the state. This study could not determine whether the reported practices reflect actual clinical practices. This study design did not allow investigation of the possible links between the levels of knowledge of the general dentists and their attitude to the level of their experience and best practice.

Conclusion:

General dentists have a great role to play in providing optimal and quality dental care for children. Even though they are knowledgeable in child oral health management, their involvement is lacking in providing primary preventive measures. More emphasis should be given in teaching the students about different behavior management techniques in the undergraduate level which will help in changing the outlook towards pediatric dental treatment.

Table 1: General Characteristics of respondents

Total No of respondents	:	130
Gender (Male)	:	78
Female	:	52
Years of practice		
Less than 5 years	:	35
6-15 Years	:	56
16-20 Years	:	24
Above 20 Years	:	15

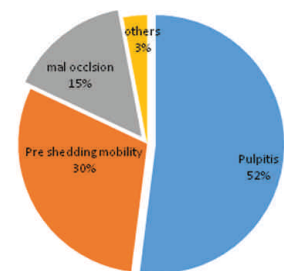


Figure 1: chief complaint of the patients attending general dentists clinic

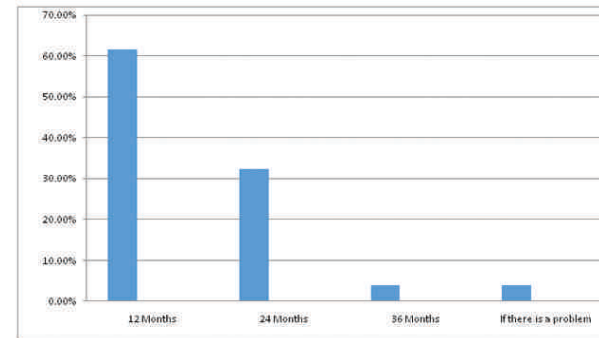


Figure 2: Opinion regarding first dental visit

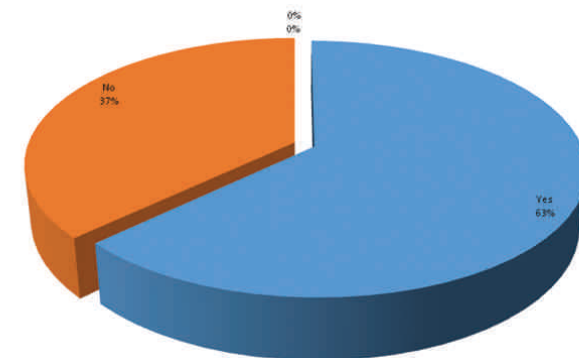


Figure 3 : Encourage child treatment in dental practice

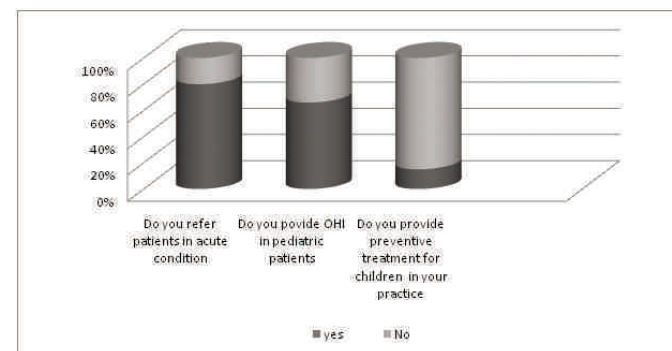


Figure 4: General dentists practices in child dental treatment

REFERENCES

- Gussy MG, Waters EG, Walsh O, Kilpatrick NM. (2006). Early childhood caries: Current evidence for aetiology and prevention. *J Paediatr Child Health*, 42, 37-43.
- American Academy of Pediatric Dentistry. Policy on early childhood caries: Classifications, consequences, and preventive strategies. *Pediatr Dent* 2012;34(special issue): 50-2. 23.
- American Academy of Pediatric Dentistry. Policy on the dental home. *Pediatr Dent* 2012;34(special issue):24-5. 20.
- American Academy of Pediatrics. Oral health risk assessment timing and establishment of the dental home. *Pediatr* 2003;111(5):1113-6.
- Mcquistan MR, Kuthy RA, Damiano PC, Ward MM. General dentists' referral of children younger than age 3 to pediatric dentists. *Pediatr Dent*. 2005;27(4):277-83
- Ammari JB, Baqain ZH, Ashley PF. (2007). Effects of programs for prevention of early childhood caries. A systematic review. *Med Princ Pract*, 16, 437-442.
- Cotton KT, Seale NS, Kanellis MJ, Damiano PC, Bidaut-Russell M, McWhorter AG. Are general dentists' practice patterns and attitudes about treating medicaid-enrolled preschool age children related to dental school training? *Pediatr Dent*. 2001;23(1):51-55.
- Bader JD, Shugars DA, Bonito AJ. A systematic review of selected caries prevention and management methods. *Community Dent Oral Epidemiol* 2001;29(6):399-411.
- Axelsson S, Söder B, Norderam G, et al. Effect of combined caries-preventive methods: A systematic review of controlled clinical trials. *Acta Odontol Scand* 2004;62(3):163-9.
- Calonge N., U.S. Preventive Services Task Force. Prevention of dental caries in preschool children: recommendations and rationale. *Am J Prev Med*. 2004;26(4):326-9.

Effectiveness of a Chlorhexidine tooth paste on Gingivitis : A pilot study

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ABSTRACT

Background : Dental plaque is one of the most important etiological factor in the onset of periodontal disease. Chronic periodontitis is always preceded by chronic gingivitis and chemicals that inhibit plaque may be expected to be of value in both the prevention and management of periodontal disease. The emphasis must be placed on effectiveness and efficacy of plaque removing devices to facilitate oral hygiene.

Aim of the study was to determine the efficacy of antiplaque tooth paste (chlorhexidine gluconate containing dentifrice) on gingivitis compared to colgate (monofluorophosphate dentifrice).

Materials and methods : The study population consisted of 30 female dental students with mild to moderate gingivitis . Plaque index,Gingival index and Bleeding index were recorded at baseline and on 15th day.

Results : Chlorhexidine tooth paste have better efficiency in reducing gingival inflammation.

(p value < 0.05)

Conclusion : Chlorhexidine tooth paste can be considered as an effective antigingivitis agent compared to the control paste .

Key words : Chlorhexidine , monofluorophosphate , gingivitis

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Conflict of Interest: None declared

Source of Support: Nil

INTRODUCTION

Good plaque control preserves oral health for a life time.^[1] So the emphasis must be placed on effectiveness and efficiency of plaque removing devices to facilitate oral health.^[2] Tooth brushing with tooth paste is arguably the most commonly used oral hygiene measure.^[3] Tooth paste provides potential vehicle

for compounds which could benefit oral and dental health of those individuals who regularly comply with its use.^[4] The incorporation of antiplaque compounds into tooth pastes exerted sufficient action against bacterial plaque to help control chronic gingivitis.^[5] These agents acts by several mechanisms including plaque dispersal or removal ,antibacterial activity or anti-adherence effects.^[6]

However most attention has been given to antimicrobial compounds mainly, a bisbiguanide antiseptic , chlorhexidine due to its effective antiplaque and antigingivitis action.^[7] Elgydium anti-plaque toothpaste contains the well-known and clinically proven antibacterial, chlorhexidine. A 0.12% of chlorhexidine with 1 parts per million of fluoride has antiplaque effects similar to chlorhexidine mouthwash.^[8] Chlorhexidine in dentifrices gained little attention due to its possible interaction with anionic ingredients contained in toothpaste and competition for oral retention sites.^[9]

Aim of our study was to evaluate the effectiveness of chlorhexidine (CHX) tooth paste on gingivitis compared to sodium monofluorophosphate (MFP)

MATERIALS AND METHODS

A total of 30 female dental students were recruited from Kannur Dental College,Anjarakkandy for the study. All subjects received verbal and written information concerning the study and themselves gave witnessed signed informed consent to participate in the study. The ethical clearance was obtained from the concerned head of the institution .

The inclusion criteria were subjects of 18-20 years (1st and 2nd year dental students) with mild to moderate gingivitis ,systemically healthy and had complete dentition till second molar in all the four quadrants.

The exclusion criteria were subjects with active dental caries ,signs of periodontal involvement,orthodontic and prosthetic appliances,allergic to chlorhexidine, use of antibiotics in the past 3 months and any other drugs that might alter normal gingival health .

This was a double blind study of 15 days duration to compare the effects of chlorhexidine tooth paste with a control paste ,and subjects were allocated by simple randomisation into two

groups(15 in each group). The tubes labelled as tube A and tube B were given to the examiner of the study. Subjects were instructed to brush teeth only with provided dentifrice and tooth brush (Oral B) twice daily using modified bass method. Plaque index (Silness and Loe),Gingival index(Loe and Silness), Bleeding index(Muhlemann's BI) were assessed at baseline. No other oral hygiene measures provided. All clinical parameters were assessed on 15th day.

STATISTICAL ANALYSIS

Time wise comparison of clinical parameters of each group was done using paired t test. Comparison of two groups were done using Mann Whitney U test. A statistical package SPSS vers 17.0 was used. p < 0.05 considered as significant.

RESULTS

The time wise comparison of clinical parameters was done on baseline and on 15th day in both groups (Table 1). Statistically significant difference was observed in all clinical parameters assessed at baseline and on 15th day (p < 0.05). Thus null hypothesis was rejected and concluded that there was significant difference in the effectiveness of both pastes.

For comparing the effectiveness of two groups Mann Whitney U test was done (Table 2).

Statistically significant results were obtained in comparing two groups. The mean rank of colgate was greater than that of elgydium and there was significant reduction in clinical parameters in subjects who were using Elgydium tooth paste. Hence it was concluded that elgydium tooth paste have better efficiency as antigingivitis agent than the control paste.

Graph shows significant reduction in all clinical parameters (PI, GI, BI) on comparing chlorhexidine tooth paste and the control paste (Table 3).

Table 1 : Comparison of clinical parameters on baseline and on 15th day

PASTE	MEAN	STD.DEVIATION	P value
COLGATE			
Pair 1 PI(baseline) – PI(15 th Day)	0.24000	0.10551	0.000
Pair 2 GI(baseline) – GI(15 th day)	0.08600	0.04949	0.000
Pair 3 BI(baseline) - BI(15 th day)	0.06000	0.02160	0.000
ELGIDIUM			
Pair 1 PI(baseline) – PI(15 th Day)	0.31500	0.15820	0.000
Pair 2 GI(baseline) – GI(15 th day)	0.12900	0.07838	0.001
Pair 3 BI(baseline) - BI(15 th day)	0.15400	0.16064	0.004

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DISCUSSION

All subjects participated in the study for 15 days. Plaque index, Gingival index and bleeding index scores were reduced in subjects who were using both pastes . Plaque inhibition of chlorhexidine was first investigated by Schroeder in 1969.^[10] In our study the plaque index were shown to be significantly reduced in 15 days in subjects who were using chlorhexidine tooth paste mainly exhibiting its antiplaque efficiency. Gingival index and bleeding index were also reduced markedly

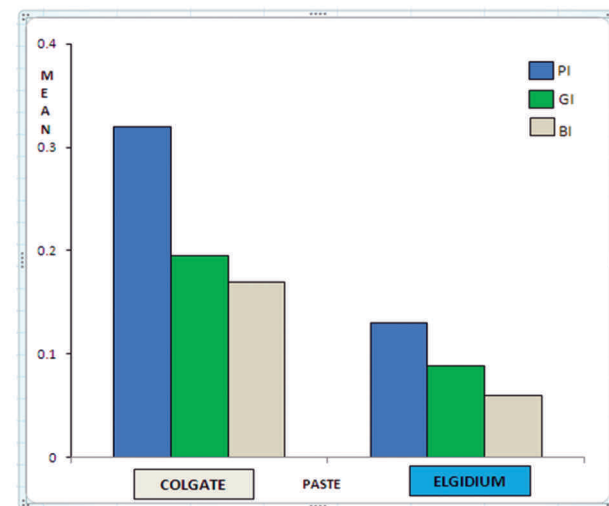
Table 2 : Comparison of test and control group

PASTE PI	MEAN RANK	P value
COLGATE	29.40	0.000*
ELGIDIUM	11.60	

PASTE GI	MEAN RANK	P value
COLGATE	27.00	0.000*
ELGIDIUM	14.00	

PASTE BI	MEAN RANK	P value
COLGATE	27.73	0.000*
ELGIDIUM	13.28	

Table 3 : Graph showing significant reduction in all clinical parameters on comparing elgidium and the control paste. There is a significant reduction in the PI,GI,BI in the elgidium group.



in subjects using chlorhexidine tooth paste showing its antigingivitis effect. Chlorhexidine was proven to be the most powerful chemical agent to reduce gingivitis.^[11]

A randomised controlled study to evaluate the efficacy of chlorhexidine tooth paste had also given similar results.^[12] Chlorhexidine tooth paste was rarely used , because prolonged use results in staining of teeth, altered taste sensation and mucosal irritation. Increased cost also resulted in poor patient acceptance.^[13,14] Our study did not showed any staining of the teeth on using CHX for 15 days and no one reported any adverse effect on using CHX . Limitations of our study mainly included small sample size and short time period.

CONCLUSION

Our study confirmed that the dentifrice containing chlorhexidine was effective as antiplaque and antigingivitis agent compared to the control paste. Within the limitations of our study it was proved that chlorhexidine containing tooth paste is beneficial in preventing gingivitis. Further studies including greater sample size and time period should be taken into consideration for obtaining more accurate results and also to provide chlorhexidine tooth paste for regular home usage .

REFERENCES

1. Loe H, Theilade E, Jensen SB. Experimental gingivitis in man. J Periodontol. 1965;36:177
2. Perry DA, Schmid MO. Plaque control. In : Carranza FA, Newman M. Clinical Periodontology, 8th ed. WB Saunders Co 1995: 493-508
3. Critchley P. Dental plaque, oral disease and plaque control. J Ind Dent Assoc. 1978;50:43-49
4. Murray J J. Fluorides in caries prevention. Bristol: John Wright and sons. Dental practitioners hand book no 20: pg 60-90
5. Addy M, Willis L, Moran J. Effect of tooth paste rinses compared with chlorhexidine on plaque formation during a 4 day period. J Clin Periodontol 1983;10:89-99
6. Loe H, Kleinmann DV. In: Dental plaque control measures and oral hygiene practices . Press Oxford and Washington DC. 1986: 121-314
7. Loe H, Schiott CR. The effect of mouth rinse and topical application of chlorhexidine on development of dental plaque and gingivitis in man . Journal of Periodontal Research 1970;5:79-83
8. Schroeder H E. Formation and Inhibition of Dental Calculus. Hans Huber, Berlin 1969; 145-172
9. Dolles, Gjermo. The effects of a chlorhexidine toothpaste on the development of plaque, gingivitis and tooth staining. J Clin Periodontol 1993; 20 :59-62

10. Schroeder H E. Formation and Inhibition of Dental Calculus. Hans Huber, Berlin 1969; 145-172
11. Chikte UM, Pochee E, Rudolph MJ, Reinach SG. Evaluation of stannous fluoride and chlorhexidine sprays on plaque and gingivitis in handicapped children. J Clin Periodontol 1991;18: 281-286
12. Jenkins S, Addy M, Newcombe R. The effects of a chlorhexidine toothpaste on the development of plaque, gingivitis and tooth staining. J Clin Periodontol 1993;20(1):59-62
13. Flotra L, Gjermo P, Rolla G, Waerhaug J: Side effects of chlorhexidine mouthwashes. Scand J Dent Res, 1971; 79: 119-125
14. De Rossi et al. Antimicrobial activity of toothpastes containing naturalextracts, Chlorhexidine or Triclosan. Brazilian Dental Journal 2014;25(3):186-190

Determination of the patterns in prescribing medications for periodontal disease among dentists: A pilot study

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ABSTRACT

Background: Dentists prescribe medications for the management of a number of oral conditions. Apart from the side effects, a great concern with injudicious use of antibiotics is the development of resistance.

Aim of the study: The aim of the study was to determine the pattern of prescribing medication for periodontal disease among dentists.

Materials and methods: It was a questionnaire based pilot study conducted among general dental practitioners, dental specialists, junior residents and faculty members in and around Muvattupuzha, Kerala. A questionnaire consisting of 12 questions were distributed.

Statistical analysis: In order to understand if the questions in this questionnaire reliably measure the same variable, a Cronbach's alpha (reliability test) is conducted. In the analysis significance level is taken to be 0.05.

Results: The questionnaire was distributed among 136 dentists, out of which 74.2% (101/136) had the opinion that there is overuse of antibiotics prescribed. 75% (102/136) of participants opined the use of medication with incision and drainage in treatment of periodontal abscess in patients with good general health. Only 41.9% (57/136) preferred to start with loading dose of medication in cases of periodontal abscess. Amoxicillin and metronidazole were the preferred choice of antibiotic for managing periodontal infection. 94.1% (128/136) of participants were reluctant to do culture and sensitivity tests before prescribing an antibiotic. 66.9% (91/136) of participants preferred to use trade name while prescribing antibiotics and 97% (132/136) of participants preferred to prescribe chlorhexidine mouthwashes after scaling.

Conclusion: The general dental population need to be more aware of the guidelines in prescribing medication in managing periodontal diseases.

Key words: Prescribing medication, Dentists, Periodontal disease

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INTRODUCTION

Dentists prescribe medications for the management of a number of oral conditions; mainly orofacial infection.^[1] Antimicrobials account for the vast majority of medicines prescribed by dentists.^[2] Periodontal disease is one of the most common microbial infections in adults which is an inflammatory disease of bacterial origin that affects the tooth-supporting tissues. Periodontal diseases can be broadly classified into gingivitis and periodontitis.

Gingivitis involves a limited inflammation of the gingiva, and is a relatively common and reversible condition. In contrast, periodontitis is characterized by general inflammation of the periodontal tissues, which leads to the apical migration of the junctional epithelium along the root surface and progressive destruction of the periodontal ligament and the alveolar bone.^[4] Periodontitis progresses in cyclical phases of exacerbation, remission and latency, a phenomenon that is closely linked to the effectiveness of the host immune response.^[3] The periodontal lesions which may require antibiotic use include periodontal abscess, acute necrotizing ulcerative gingivitis, and pericoronitis.^[5]

Inappropriate prescription of antimicrobials may be associated with unfavorable side effects ranging from gastrointestinal disturbances to fatal anaphylactic shock. A great concern with injudicious use of antibiotics is the development of resistance.^[6] It is the duty of every dentist to arrive at a correct diagnosis and prescribe medication based on scientific guidelines. The aim of the study was to determine the pattern of prescribing medication for periodontal disease among dentists.

MATERIALS AND METHODS

This study was a questionnaire-based survey undertaken among dental practitioners in and around Muvattupuzha, a suburban town in the state of Kerala in India, to assess the prescribing patterns of various drugs for periodontal disease. The dental practitioners who were willing to participate in the study were enrolled after obtaining verbal consent. A briefing was given about the nature of the study, and the procedure of completing the questionnaire was explained. A self-developed, pre-validated questionnaire consisting of twelve questions related to pattern of prescribing antimicrobial use for prophylaxis & treatment of acute & chronic periodontal conditions was distributed. After completion of the questionnaire, data was collected, reviewed, organized and expressed as counts and percentages.

STATISTICAL ANALYSIS

A questionnaire of 12 questions is developed for this study. In order to understand if the questions in this questionnaire reliably measure the same variable, a Cronbach's alpha

(reliability test) is conducted. In the analysis significance level is taken to be 0.05. The analysis was carried out using statistical package for social sciences (SPSS version 22.0.0.0).

RESULTS

In this study, a total of 136 questionnaires were distributed to dental practitioners. All of the questionnaires were completely filled and hence all 136 of them were included in the study. The twelve questions were –

1. Do you prescribe antibiotics routinely after scaling and root planing for periodontitis patients? - 75.7% (103/136) opted for No
2. If yes, do you prescribe a full course of the drug? – 45.4% (15/33) opted for Yes
3. How do you initially manage a case of periodontal abscess in patients with good general health? – 75% (102/136) opted for Medication with Incision and Drainage.
4. If medication is given for periodontal abscess do you start with a loading dose? – 52.9% (72/136) opted for No
5. Which is your choice of antibiotic in managing periodontal infection? – 82.4% (112/136) opted for Amoxicillin + Metronidazole combination
6. Do you routinely do culture & sensitivity tests before prescribing an antibiotic? - 94.1% (128/136) opted for No
7. While prescribing antibiotics which of the following do you use? – 66.2% (90/136) opted for Trade name
8. Do you routinely prescribe mouthwashes to patients after scaling? – 64.0% (87/136) opted for Yes
9. What is your choice when it comes to prescribing mouthwashes? – 97.1% (132/136) opted for Chlorhexidine
10. How do you routinely manage patients complaining of bleeding gums with poor oral hygiene? 93.4% (127/136) opted for Scaling
11. Have you noticed any antibiotic resistance with the commonly prescribed drugs? – 68.4% (93/136) opted for No
12. In your opinion - is there an overuse of antibiotics in dental practice today? – 74.3% (101/136) opted for Yes

DISCUSSION

Conscientious use of drugs is imperative for all practitioners, especially when considering the rapid development of antibacterial resistance and the alarming consequences that may result therefore.^[7] Data from a study done among dentists in England found unnecessary prescription of antibiotics for pulpitis and apical periodontitis which required only operative measures.^[8] The following periodontal disease states would justify the adjunctive use of antibiotics: (i) Severe cases of acute necrotizing ulcerative gingivitis and periodontitis with systemic involvement. (ii) Periodontal abscess which can spread within tissue planes to cause marked facial swelling and

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systemic involvement. (iii) Cases of periodontal disease, which, despite through non-surgical management and good plaque control, continue to show breakdown and loss of attachment and (iv) Cases of Aggressive periodontitis.^[3]

In this study 75% (102/136) of dentists opted for medication with incision and drainage in treatment of periodontal abscess. Only 41.9% (57/136) of the dentists preferred to start with loading dose of medication. Combination of Amoxicillin and Metronidazole were the preferred choice of antibiotic in managing periodontal infection. 94.1% (128/136) of dentists preferred not to do culture & sensitivity tests before prescribing an antibiotic. 97.1% (132/136) of the dentists preferred chlorhexidine while prescribing mouthwashes. 74.3% (101/136) of the dentists feel there is an overuse of antibiotics in dental practice today.

Systemic administration of a combination of metronidazole and amoxicillin with nonsurgical treatment have shown improved clinical results in the management of aggressive periodontitis.^[9] Antibiotic prescription guidelines for dentists usually recommend the use of amoxicillin or metronidazole as the first choice with alternatives including macrolides like erythromycin and clarithromycin.^{[11],[13],[14]} Twice daily rinses of 10ml of 0.2% aqueous solution of chlorhexidine digluconate almost completely inhibited the development of microbial plaque, calculus and gingivitis in the human model for experimental gingivitis.^[15]

Data reveals that antibiotic resistance has developed due to the overuse or misuse of broad spectrum agents.^[10] Research done in developing countries reports the habit of prescribing antibiotics as a prophylactic agent to prevent postoperative infection following surgical dental manipulations or to cover either a defect in aseptic clinical technique or improperly sterilized equipment; thus, a 'just in case' principle is practiced.^{[12],[5],[11]}

CONCLUSION

The results of this pilot study indicate that the scientific basis for prescribing antimicrobial agents was neglected by the majority of the practitioners. Most of those dental practitioners surveyed used antibiotics routinely for conditions where local treatment would be sufficient. Measures like audit and introduction of guidelines for clinical antibiotic prescribing in dentistry have reported the improvement in the general dental practitioners attitudes towards prescribing antimicrobials and has actually reduced the number of prescriptions.^{[16],[17],[18]} Therefore there is clear need for the development and enforcement of guidelines for prescribing medication for periodontal diseases among dentists.

REFERENCES

1. Dar-Odeh N, Ryalat S, Shayyab M, Abu-Hammad O. Analysis of clinical records of dental patients attending Jordan University Hospital: documentation of drug prescriptions and local anesthetic injections. *TherClin Risk Manag* 2008; 4:1111-7.
2. Lewis MA. Why we must reduce dental prescription of antibiotics: European Union Antibiotic Awareness Day. *Br Dent J* 2008; 205:537-8.
3. Ana Pejčić, Ljiljana Kesić, Radmila Obradović, Dimitrije Mirković. Antibiotics in the Management of Periodontal Disease. *Scientific Journal of the Faculty of Medicine in Niš* 2010; 27(2):85-92.
4. Pejčić A, Peševska S, Grigorov I, et al: Periodontitis as a Risk Factor for General Disorders. *Acta Facult Med Naiss* 2006; 23(1):59-65.
5. Salako N, Rotimi VO, Adib SM, Al-Mutawa S. Pattern of antibiotic prescription in the management of oral diseases among dentists in Kuwait. *J Dent* 2004; 32:503-9.
6. Najla Saeed Dar-Odeh, Osama Abdalla Abu-Hammad, Mahmoud Khaled Al-Omiri, Ameen Sameh Khraisat, and Asem Ata Shehabi. Antibiotic prescribing practices by dentists: a review. *TherClin Risk Manag* 2010; 6:301-6.
7. Epstein, J.B., Chong, S., Le, N.D., 2000. A survey of antibiotic use in dentistry. *J. Am. Dent. Assoc.* 131 (11), 1600–1609.
8. Palmer, N.O.A., Martin, M.V., Peeling, R., Ireland, R.S., 2000. An analysis of antibiotic prescriptions from general dental practitioners in England. *J. Antimicrob. Chemother.* 46 (6), 1033–1035.
9. Guerrero A, Griffiths GS, Nibali L, Suvan J, Moles DR, Laurell L, Tonetti MS. Adjunctive benefits of systemic amoxicillin and metronidazole in non-surgical treatment of generalized aggressive periodontitis: a randomized placebo-controlled clinical trial. *J Clin Periodontol.* 2005 Oct; 32(10):1096-107.
10. Oberoi SS, Dhingra C, Sharma G, Sardana D. Antibiotics in dental practice: How justified are we. *Int Dent J* 2015; 65:4-10.
11. Pushp R. Gour, Saurabh Kohli, Uma Advani, Shobha Kulshreshtha, Atul Jain, Rahul Parakh. Prescription pattern of antimicrobial agents by dental practitioners: a questionnaire based study. *International Journal of Basic & Clinical Pharmacology*; May-June 2013; Vol 2; Issue 3:311-314.
12. Al-Haroni M, Skaug N. Knowledge of prescribing antimicrobials among Yemeni general dentists. *Acta Odontol Scand* 2006; 64:274-80.
13. Ingham H R, Hood F J, Bradnum P, Tharagonnet D, Selkon J B. Metronidazole compared with penicillin in the

- treatment of acute dental infections. *Br J Oral Surg* 1977; 14: 264-269.
14. Fazakerley M W, McGowan P, Hardy P, Martin M V. A comparative study of cephadrine, amoxicillin and phenoxymethylpenicillin in the treatment of acute dentoalveolar infection. *Br Dent J* 1993; 174: 359-363.
 15. E. Grossman, G. Reiter, O. P. Sturzenberger, M. De La Rosa, T. D. Dickinson, G. A. Flrretti, G. E. Ludlam and A. H. Meckel. Six-month study of the effects of a chlorhexidine mouthrinse on gingivitis in adults. *Journal of Periodontal Research* November 1986 Volume 21, Issue Supplement s16, pages 33–43,
 16. Vessal G, Khabiri A, Mirkhani H, Cookson BD, Askarian M. Study of antibiotic prescribing among dental practitioners in Shiraz, Islamic Republic of Iran. *EMHJ* 2011; 17:763-9.
 17. Steed M, Gibson J. An audit of antibiotic prescribing in general dental practice. *Prim Dent Care* 1997; 4:66-70.
 18. Palmer NA, Daily YM, Martin MV. Can audit improve antibiotic prescribing in general dental practice? *Br Dent J* 2001; 191:253-5.

Etiological and predisposing factors associated with gingival recession in a hospital population: A cross sectional study

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ABSTRACT

Back ground and Objective

Gingival recession (GR), an intriguing condition with multiple etiology is a common manifestation in most populations. Identification of various etiological factors associated with the GR and its correction is necessary for the better treatment outcome. The present study is aimed at assessing the etiological and predisposing factors for GR in a hospital population of PMS Dental College, Vattappara Trivandrum.

Materials and Methods:

In this study, 374 patients were examined of which 100 subjects with GR, aged above 12 yrs were included. Data collected using a questionnaire, clinical and radiographic examination.

Results:

We could observe positive association between GR and age as well as female gender. The combined effect of periodontal diseases and trauma from occlusion (TFO) appeared to be the most important etiological factor (42%) and trauma from tooth brushing was found to be second common reason for recession (22%). Significant association was noted between GR and predisposing factors like smoking.

Conclusion:

The role of TFO in the pathogenesis of GR is not yet fully established. The present study reveals that TFO also plays a significant role along with periodontal disease in causing GR. So elimination of TFO is an essential component in the management of GR.

Keywords: Gingival Recession, Trauma from occlusion, periodontal disease

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INTRODUCTION

Gingival recession, the most common and undesirable condition of the gingiva is described as “the exposure of the root surface by an apical shift in the position of the gingiva”.^[1] Gingival recession increases in both prevalence and severity with age.^[2,3] For a patient, gingival recession usually creates an aesthetic concern and anxiety about tooth loss due to progressing destruction. It may also be associated with dentin hypersensitivity, and/or root caries, abrasion and/or cervical wear, erosion because of exposure of the root surface to the oral environment and an increase in accumulation of dental plaque.^[4]

Recessions represent a complex pathology, with multiple etiology, sometimes difficult to identify. The exact etiology of gingival recession is not fully understood. Several factors may play a role in gingival recession development which can be categorised into 4 groups.^[5]

Physiologic factors

- Aging

Pathologic factors

- Excessive or inadequate teeth brushing
- Plaque induced inflammatory periodontal disease
- Traumatic occlusion and deleterious habits

Anatomic factors

- Malocclusion
- Thin bony plates
- Aberrant frenal attachment
- Fenestration & dehiscence
- Inadequate width of attached gingival.^[6]

Iatrogenic factors

- Improper restorations
- Prolonged orthodontic treatment
- Clasps in prosthetic dentures.^[7]

Among the various factors, tissue trauma caused by vigorous tooth brushing is considered to be a dominating causative factor for the development of recessions.^[8] However, bacterial plaque initiated periodontal tissue destruction is of equal importance in the etiology of gingival recession.^[9] Studies have reported that gingival inflammation and a “thin gingival biotype” were significant predictors for gingival recession.^[10] In addition to above mentioned factors, various aggravating factors like smoking and diabetes mellitus can predispose individuals to gingival recession.

The role of trauma from occlusion (TFO) in the pathogenesis of gingival recession is a controversial area. Excessive functional stress may initiate inflammatory changes in the periodontium leading to periodontal destruction.^[11,12] There are reports

supporting contributory role of TFO in initiating and enhancing the inflammatory changes in the periodontium.^[13,14] In the epithelial and connective tissues deep to the receding margin, morphological changes were seen which apparently lead to cleft formation and recession. These appeared to be associated with mononuclear cell infiltration of the connective tissue. In case of gingival recession due to trauma from occlusion there will be thinning of the labial plate of alveolar process. Consequently thinning and breakdown of connective tissue occurs and leads to proliferation of the epithelium into the site of connective tissue destruction. Proliferation of the epithelial cells into the connective tissue brings about a subsidence of the epithelial surface, which is manifested clinically as recession. But at the same time many studies denies the role of TFO in recession pathology.^[15,16] Still higher prevalence of recession is noticed in patients with TFO in clinical scenario.

Management of GR requires thorough patient assessment, identification of etiological factors, and recording and monitoring of the extent and severity of the condition. Treatment should be directed at prevention of further progression and the control of symptoms of disease. Correction of etiological factors is one of the important factors in the management of gingival recession. The present study is aimed at assessing the etiological and predisposing risk factors of GR in patients from OP

Materials and Methods

Subjects

Study subjects were randomly selected from the outpatient clinic of PMS Dental College, Vattappara, Trivandrum, Kerala. Among 374 patients examined, 100 patients with gingival recession, aged above 12 year were included. All patients with gingival recession were selected irrespective of their systemic status and smoking.

Inclusion criteria

- Patients diagnosed with generalized or localized gingival recession irrespective of their systemic status and habits.
- Those willing to participate in the study.

Exclusion criteria

- Patients with previous history of periodontal surgery
- Psychiatric problems
- Presence of life threatening conditions like malignant tumor or radiotherapy either current or in previous 6 months
- Bleeding disorders
- Pregnant and lactating females

- Immunocompromised patient
- Patients undergoing orthodontic appliance therapy

Procedure

All participants were informed about the procedure and after obtaining informed consent, clinical examination was done. The clinical examination was based on a proforma and data taken include age, sex, medical status, habits, oral hygiene status, type of recession (isolated or multiple), extent of recession based on Millers classification, presence of cervical abrasion, attrition. Detailed gingival examination was done in isolated cases; bone level assessment was done by taking IOPA and bone sounding. During clinical examination gingival changes were noticed in patients with improper tooth brushing

Occlusal analysis was done to assess the trauma from occlusion. Occlusal interferences, tooth mobility and other clinical signs of TFO were noted. Radiographic assessment was done to appreciate the bony changes and widening of periodontal ligament.

Results and Observations

The present study evaluated the prevalence of various etiological and predisposing factors associated gingival recession among 100 patients examined.

The descriptive statistics of the patients selected for the study is shown in Table 1.

Table 1

No. of patients	100
Mean age	38.88 years
Male :Female	3:2

60% of the subjects with recession were males and 40% females

Medical status: Table 2

Sytemically healthy	56%
Diabetic	15%
Hypertensive	10%
Both hypertensive and diabetic	8%
Thyroid disorder	6%
Asthmatic	5%

Habits and Oral hygiene status: Table 3

Habits	
Smoking	52%
Pan chewing	30%
Oral hygiene Status	
Good oral hygiene	4%
Fair oral hygiene	40%
Poor oral hygiene	56%

56% of the patients were with poor oral hygiene status, 40% fair and 4% good. 52% of the patients with recession were smokers.

Type and extent of recession : Table 4

Multiple recession	92%
Isolated recession	8%
Class I	10%
Class II	18%
Class III	66%
Class IV	6%

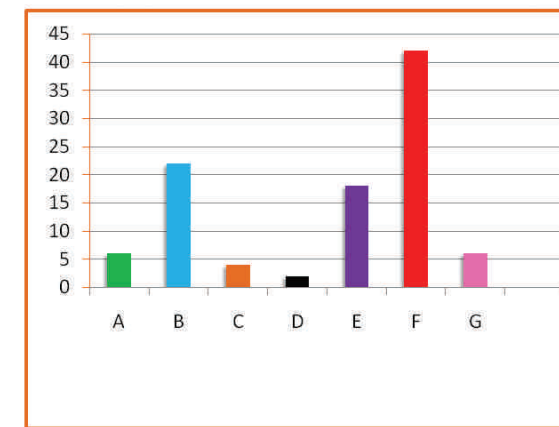
The study showed that 10% of participants had class I gingival recession, 18% had class II, 66% had class III and 6% class IV, according to the Miller's classification). 92 % of the subjects reported with multiple recession whereas isolated recession was seen in 8% of the cases.

Cervical abrasion was noticed in 56% of the patients and 52% had attrition

Etiological and predisposing factors: Table 5

Etiological factors	No. of patients
PERIODONTAL DISEASES	18%
TFO	6%
TFO + PERIODONTAL DISEASES	42%
TRAUMA FROM TOOTH BRUSHING	22%
TRAUMA FROM TOOTH BRUSHING+ PERIODONTAL DISEASES	6 %
FRENUM PULL	4%
INADEQUATE WIDTH OF ATTACHED GINGIVA	2%

Among the various etiological factors leading to recession, the combined effect of periodontal diseases and trauma from occlusion (TFO) appeared to be the most frequent precipitating etiological factors (42%). Interestingly, periodontal diseases and TFO alone causes gingival recession in 18% and 6% of the patients, respectively. However, second common reason for recession was trauma from tooth brushing (22%). 6% of the subjects shows trauma from tooth brushing and periodontal diseases as etiological factors. Other predisposing factors like frenal pull in 4%; and inadequate width of attached gingiva was noticed in 2%.



- A : trauma from occlusion(tfo)
- B : trauma from tooth brushing
- C : frenum pull
- D : inadequate width of attached gingival
- E : periodontal diseases
- F : tfo+periodontal diseases
- G : trauma from tooth brushing +periodontal diseases

Discussion

The current study evaluated various etiological factors of gingival recession and most interesting observation was the role of trauma from occlusion along with plaque induced inflammatory periodontal diseases in 42% of the patients. A harmonious relationship between occlusion and periodontium is currently considered mandatory to maintain a healthy dentition. Stillman in 1921 was the first to associate occlusal trauma in the development of gingival cleft which was known by his name as ‘Stillman’s cleft’.^[13] Surprisingly, the relationship between occlusal trauma and gingival cleft has remained unclear till the reports published by Solnit et al in 1983 which revealed that gingival clefts apparently underwent spontaneous repair following occlusal analysis and subsequent adjustment.^[14] According to Solnit, gingival clefts in the upper jaw are due to working side interferences and in the lower jaw due to the balancing side contacts.

Controversy exists regarding the association between GR and TFO. Glickman in 1965 introduced the novel concept of zone of irritation and zone of co-destruction in trauma from occlusion and explained that marginal gingiva or zone of irritation is unaffected by traumatic occlusion.^[15] Emslie found no evidence to support the role of occlusal trauma in the formation of gingival clefts.^[16] Trot and Love observed trauma from occlusion in only 10 % of the cases with recession while Gorman found recession in 20 % of the cases.^[17,18]

In this study we could observe that in conjunction with plaque induced inflammatory periodontal diseases; traumatic occlusion also plays an important role in the causation of gingival recession. Even though, the combined effect of TFO and plaque induced inflammatory periodontal diseases results in recession in majority of the study subjects, periodontal diseases and TFO alone causes gingival recession in 18% and 6% of the patients, respectively. 56% of the patients with recession show cervical abrasion (abfraction) which can be correlated with trauma from tooth brushing and trauma from occlusion and 52% attrition which again may indicate traumatic occlusion. This supports the fact that greater percentage of the patients who were included in this study was having occlusal problems. These finding is supported by various previous studies which have shown that recession often causes increased susceptibility for abfraction, attrition poor esthetics and dentin hypersensitivity.^[19,20]

Second dominating etiological factor which accounts for recession was trauma from vigorous tooth brushing which was observed in 22% of the subjects. This is in accordance with various previous studies.^[8] We could also observe increase in prevalence of gingival recession with increase in age as observed in various other studies.^[2,3]

As mentioned above male to female ratio among the randomly selected sample was 3:2 (60% males and 40% females). This finding is in agreement with various other study reports.^[21-28] Gender differences regarding the prevalence of gingival recession could be attributed to the facts that females are more concerned about oral hygiene and they visit their dentists more frequently than males.

The present study reveals that multiple recession is more common than isolated recession and establishes the strong association between dental plaque induced inflammatory diseases and gingival recession. Among the study subjects, 56% of the patients were with poor oral hygiene status, 40% fair and 4% good .Previous studies have reported that gingival recession is seen both in populations with high and poor standards of oral hygiene.^[29] Loe et al have emphasized the role of poor oral hygiene, dental plaque and calculus in gingival recession.^[9]

52% of the patients with recession were smokers. Cigarette smoking was another important predisposing factor in the studied population, which was significantly associated with gingival recession similar to periodontal disease. This finding is in line with several previous studies.^[22,30,31]

Frenum attachment have a less significant association with gingival recession in this study, contrary to the previous findings that show frenum attachment is an etiologic factor for gingival recession.^[32] The finding may be due to the small sample not yielding statistical significance. Gingival recession due to inadequate width of attached gingiva was observed in only 2% of the study subjects. Lang & Loe stated that 2 mm or more of keratinized gingiva (which corresponds to 1 mm or more of attached gingiva) is necessary to maintain gingival health.^[33] Contrary to this, studies have shown that periodontal health can be maintained even in absence of attached gingiva.^[34,35]

Along with careful surgical technique, correction of etiological factors like TFO plays an important role in the management of GR. Further studies are needed including more samples to identify the exact role of TFO in the etiopathogenesis of GR.

CONCLUSION

Recession represent a complex pathology, with multiple etiologies, sometimes difficult to identify. Identification of various etiological factors associated with the recession and its correction before surgical management is necessary for the better treatment outcome. The role of trauma from occlusion in the pathogenesis of gingival recession is not fully established yet. The present study reveals that trauma from occlusion also plays significant role along with inflammatory component in causing recession. So elimination of trauma from occlusion is essential in periodontal therapy in the management of gingival recession.

REFERENCES

- Glickman I, Carranza FA. Clinical periodontology. 5th ed. Philadelphia: W.B. Saunders; 1979. p. 100-101.
- Beck JD. Periodontal implications: older people. Ann Periodontol 1996;1:322-357.
- Albandar JM. Global risk factors and risk indicators for periodontal diseases. Periodontology 2000 2002;29:177-206.
- Tugnait A, Clerehugh V. Gingival recession- its significance and management. J Dent. 2001; 29(6): 381-94.
- Louis F. Rose, Brian Mealey, Robert Genco. Periodontics: Medicine, Surgery and Implants, 1st Edition
- Kundapur PP, Bhat KM, Bhat GS. Association of Trauma from Occlusion with Localized Gingival Recession in Mandibular Anterior Teeth. DRJ. 2009;6(2):71-4
- Greenwell H, Fiorellini J, Giannobile W, Offenbacher S, 100

Salkin L, Townsend C, et al. Oral reconstructive and corrective considerations in periodontal therapy. J Periodontol. 2005;76(9):1588-600.

- Radentz WH, Barnes GP, Cutright DE. A survey of factors possibly associated with cervical abrasion of tooth surfaces. J Periodontol 1976;47:148-154.
- Loe H, Anerud A, Boysen H. The natural history of periodontal disease in man: prevalence, severity, and extent of gingival recession. J Periodontol. 1992;63(6):489-95.
- Melsen B, Allais D. Factors of importance for the development of dehiscences during labial movement of mandibular incisors: A retrospective study of adult orthodontic patients. Am J Orthod Dentofacial Orthop. 2005; 127:552-61.
- Geiger AM. Malocclusion as an etiologic factor in periodontal disease: A retrospective assay. Am J Orthod Dentofacial Orthop 2001;120:112-115.
- Solberg WC. The role of morphofunctional occlusal factors in periodontal disease. In: Carranza FA, editor. Glickman's Clinical Periodontology, 7th ed. Philadelphia: W. B. Saunders; 1990. P.422-431
- Harrel SK (2004) The effect of occlusal discrepancies on gingival width. J Periodontol 75(1):98-105
- Solnit A, Stambaugh RV (1983) Treatment of gingival clefts by occlusal therapy. Int J Periodontics Restor Dent 3(3):38-55
- Glickman I. Inflammation and Trauma from Occlusion, Co-Destructive Factors in Chronic Periodontal Disease. Journal of periodontology, 1963 - Am Acad Periodontology
- Bernimoulin J-P, Curilovic Z (1977) Gingival recession and tooth mobility. J Clin Periodontol 4(2):107-114
- Trott JR, Love B (1966) An analysis of localized gingival recession in 766 Winnipeg High School students. Dent Pract Dent Rec 16(6):209-213
- Gorman WJ (1967) Prevalence and etiology of gingival recession. J Periodontol 38:316-322
- Tillis TSI, Keating JG. Understanding and managing dentine hypersensitivity. J Dent Hyg 2002;76:296-309.
- Drisko CH. Dentine hypersensitivity-dental hygiene and periodontal considerations. Int Dent J 2002;52suppl1:385
- Toker H, Ozdemir H. Gingival recession: epidemiology and risk indicators in a university dental hospital in Turkey. Int J Dent Hyg. 2009;7(2):115-20.
- Susin C, Haas AN, Oppermann RV, Haugejorden O, Albandar JM. Gingival recession: epidemiology and risk indicators in a representative urban Brazilian population. J Periodontol. 2004;75(10):1377-86.

- Vehkalahti M. Occurrence of gingival recession in adults. J Periodontol. 1989;60(11):599-603.
- Hosanguan C, Ungchusak C, Leelasithorn S, Prasertsom P. The extent and correlates of gingival recession in non-institutionalised Thai elderly. J Int Acad Periodontol. 2002;4(4):143-8.
- Lafzi A, Eskandari A, Abolfazli N. The Evaluation of Prevalence and Severity of Gingival Recession in Anterior and Premolar Teeth in Referring Patients to Tabriz Dental Faculty during 2004-2005. Med Jour Tabriz Univ. 2007;29(1):73-6.
- Khocht A, Simon G, Person P, Denepitiya JL. Gingival recession in relation to history of hard toothbrush use. J Periodontol. 1993;64(9):900-5
- Albandar JM, Kingman A. Gingival recession, gingival bleeding, and dental calculus in adults 30 years of age and older in the United States, 1988-1994. J Periodontol. 1999;70(1):30-43.
- Drisko C. Oral hygiene and periodontal considerations in preventing and managing dentine hypersensitivity. International Dental Journal. 2007;57(S6):399-410.
- Wennstrom JL, Pini Prato G. Mucogingival therapy periodontal plastic surgery in: Lindhe J, Karring T, Lang NP. Periodontology and Implant Dentistry. 4th edition, Oxford Blackwell Munksgaard; 2003. p. 579.
- Gunsolley JC, Quinn SM, Tew J, Gooss CM, Brooks CN, Schenkein HA. The effect of smoking on individuals with minimal periodontal destruction. J Periodontol. 1998;69:165-70.
- Al-wahadni A, Linden GJ. The effects of cigarette smoking on the periodontal condition of young Jordanian adults. J Clin Periodontol. 2003; 30:132-7.
- Trott JR, Love B. An analysis of localized gingival recession in 766 winnipeg high school students. Dent Pract Dent Rec. 1966;16:209-13.
- Niklaus P. Lang, and Harald Loe. The Relationship Between the Width of Keratinized Gingiva and Gingival Health. October 1972, Vol. 43, No. 10, Pages 623-627
- Kennedy JE, Bird WC, Palcanis KG, Dorfman HS. A longitudinal evaluation of varying widths of attached gingiva. J Clin Periodontol. 1985;12:667-75.
- Freedman AL, Salkin LM, Stein MD, Green K. A 10-year longitudinal study of untreated mucogingival defects. J Periodontol. 1992;63:71-2.

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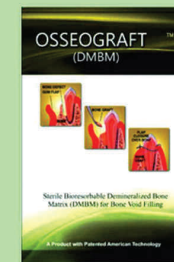
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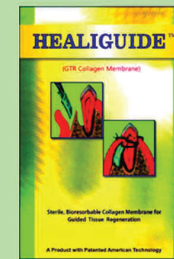
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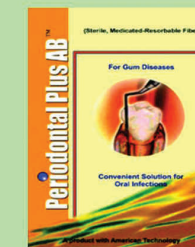
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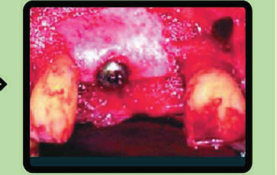
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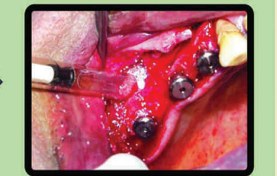
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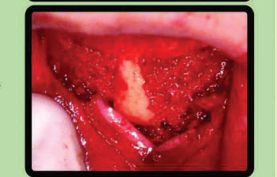
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