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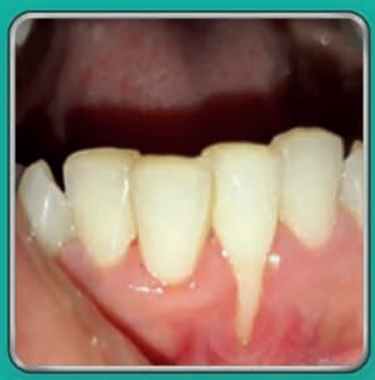
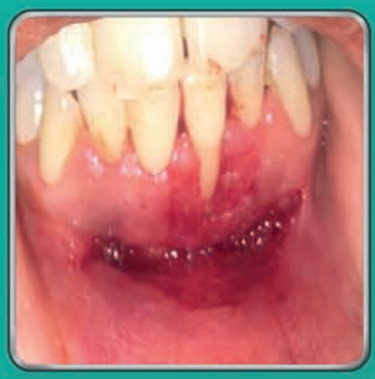
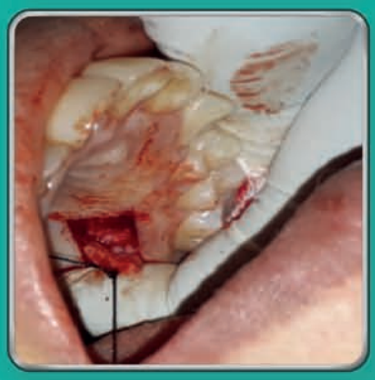
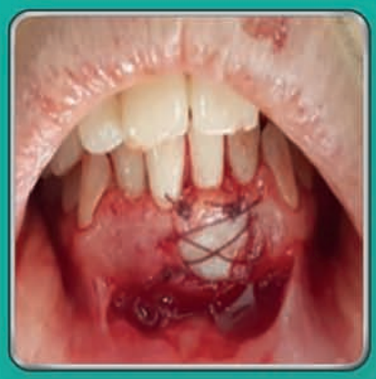
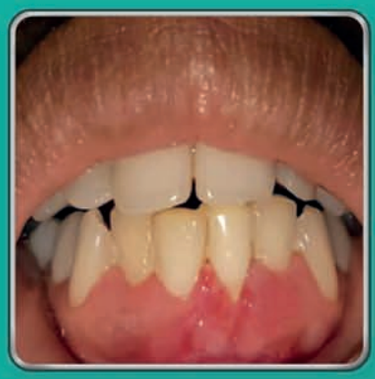

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A PROFESSIONAL SOCIETY JOURNAL
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COCHIN PERIODONTISTS SOCIETY (COPS)

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.

Journal of Cochin Periodontists Society (Jcops) is the official publication of Cochin Periodontists Society. It is a semi-annual peer-reviewed national journal publishing high quality articles in the field of Dentistry. The journal's full text is available online at jcops.copsonweb.org. The journal allows free access to its contents and permits authors to self-archive final accepted version of the articles.

Scope of the journal: Journal of Cochin Periodontists Society is completely devoted to advancing the knowledge and practice in the subject of Periodontology and interrelated specialities in the field of dental and medical sciences. Its goal is to publish the latest information in the field of contemporary dentistry. The Journal publishes original contributions of high scientific merit in every aspect of dentistry and related sciences, with special affinity to the subject of Periodontology under the broad categories of reviews, original researches, case reports, case series with discussions, short communications & basic science short research reports.

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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.

Every clinical procedures and research works in the subject of Periodontology serve confidence to other specialities also. This is the basis of having its unique interrelationship with other specialities of dentistry. Jcops helps the clinical practitioners of every dental specialities to publish their extra ordinary case reports , research works and reviews here to share its benefit to promote the scope of interdisciplinary dental practice. The diagnostic and therapeutic fields of oral diseases like Oral medicine and Oral pathology and Interdisciplinary fields like restorative dentistry &Implantology has a special place in the practice of Periodontology, hence articles pertaining to these specialities are also given equal importance in the journal. In short, Jcops understands that knowledge and skills of each specialists shared through such journals serves as cogs that deliver harmony and perfection in dental treatment.

Scientific journals are considered important primary source of variety of information provided through publishing research works and case reports more frequently than text books. They help in rapid dissemination of scientific research work and clinical innovations, giving due credit to the researcher and/or clinician. The editorial board members of Jcops are pledged to provide its readers articles of highest standards. This journal is a dream venture of Cochin Periodontists Society to publish and bring into light, the exceptional research works that go unnoticed and also clinical cases that often left unpublished due to lack of such regional society journals.

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.

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JOURNAL OF COCHIN PERIODONTISTS SOCIETY

CONTENTS

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JOURNAL
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SOCIETY

Editorial

Hello my fellow dentists!

It is with great honor and immense pleasure I present to you the thirdvolume of Journal of the Cochin Society of Periodontists. Let me first invite your attention to the importance of quality research in the field of periodontics. As an ever emerging field with limitless possibilities, it is our responsibility topersevere to create rational, objective and contemporary research in a never ending pursuit of excellence. The inferences we arrive from our studies have far reaching applications in modern dentistry and a relentless energy to derive the results from repetitive analysis of facts is indeed the need of the hour. Valuable research is not merely an intrigue for the pedagogy but should ideally trickle down to the person forced to lie down on the dentist's chair. In this era of fast internet and even faster conclusions, it is our responsibility to ensure that the studies remain true, devoid of any form of plagiarism making them stand the test of time and act as the petridish for future research. I would like to thank my fellow doctors who submitted their studies for this journal and also the entire editorial team for their invaluable support in helping me piecing together this journal.

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ORIGINAL RESEARCH

Empathy among dental students and dentists towards patients- an institutional cross- sectional survey

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Aims and objectives: To assess the empathy levels among dental undergraduate, postgraduate students of the dental program (BDS, MDS) and teachers to review the changes in levels of empathy with experience, age, and gender.

Methods: A cross-sectional study that employed a validated, self-reported questionnaire (Jefferson Empathy Scale- students' version) on empathy among dentist population in a dental institute in Kerala. Descriptive analysis was done followed by Chi square test. Tukey's Post Hoc Test was done to those values which were statistically significant (P value<0.05)

Results: Out of a total of 212 individuals, female students exhibited higher dispositional empathic concern than their male counterparts ($p<0.05$). There were minor differences in the empathic dispositions of students in different stages of their dental training and age ($p<0.05$). Students in their final years of dental college had slightly higher scores for empathic concern than first years and teachers.

Conclusion: Higher empathic concern among female students can be attributed to the increased innate empathy levels among woman and the differences in the empathy scores of students in different stages of dental college were small which reinforce the need of accelerating empathetic skill along with dental skill training.

Key words: Empathy, Dental students,Jefferson Scale of Physician Empathy

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Introduction

Doctor- patient relationship is the basis of any treatment and empathy plays a pivotal role in the dental practice. Empathy is the ability of the individual to be in the senses of another person and understand the response that an individual can produce during a particular situation, event or happening. According to Alfred Adler, empathy is to see with the eyes of other, to hear with the ears of another, and to feel with the heart of another. The word 'empathy' was derived from two Greek terms, "em" and "pathos," meaning "feeling into". A common or vernacular definition describes empathy as "the vicarious experience

of the thoughts, feelings, and attitudes of another."[1] In the health care setting, empathy is further defined as "perceiving the internal frame of reference of another with accuracy as if one were the other person without ever losing the 'as if' condition" so as to give an appropriate response.[2] For a better understanding of empathy, it can be divided into two main definitions or types: vicarious and imaginative. Vicarious empathy is defined as "an individual's vicarious emotional response to perceived emotional experiences of others" and imaginative empathy is "an individual's ability to imaginatively take the role of another so as to understand and accurately predict that person's thoughts, feelings and actions. The first definition reflects an innate emotional response, that is, a "gut reaction," and is equivalent to the "empathic concern" or "detached self". The second definition refers to "cognitive" empathy and reflects a learned ability to imagine and intellectualize which can be developed during study period.[4] Together, these emotive and cognitive processes reflect a person's overall willingness to suppress his or her own emotions and thoughts in order to feel and imagine what it is like to be "in another person's shoes." Competence, respect and empathy are the key factors for having better dentist patient relationship.[5] Dentist- patient relationship can be enhanced by raising the standard and level of recognizing and understanding patient's emotions, feelings and concerns. Sir William Osler[6] stated, "The physician needs a clear head and a kind heart; his work is arduous and complex, requiring the exercise of the very highest faculties of the mind, while constantly appealing to the emotions and finer feelings." The American Dental Education Association found out the inevitable link of empathy with healthy dentist and patient relationship and always emphasized on including empathy as a part of the dental curriculum.[7] According to Levinson et al, empathy is one of the most desirable professional traits that medical education should promote, because empathic communication skills promote patient satisfaction and adherence to treatment plans while decreasing the likelihood of malpractice suits.[8] An empathetic way of approach can tackle the dental fear among patients, which is a major concern in dentist population.[9]

Although empathy and sympathy seems similar, empathy has an intellectual understanding[10, 11] rather than just sharing sentiments as seen in sympathy.[12] The distinction between personal and professional empathy is important because the isolation of changes within a professional framework suggests that there are one or more mechanisms occurring during the health care training experience that mediate empathic orientation towards patients, and this may have implications for the content or delivery of dental training programs.[13] Patients view dentists who possess the quality of emotional empathy as being better caregivers. A physician may possess competent diagnostic skills, yet be considered by patients as "ineffective" because the dentist misses the link between patient satisfaction, adherence to medical instructions, and dentist empathy. Higher emotional intelligence enable an individual to accurately read and respond to the moods of others, remain calm in stressful situations, remain optimistic in the face of setbacks, adapt to changing circumstances, seek out opportunities, and work effectively in groups.[14] The awareness and education of empathy plays a vital role not only in improving patient-doctor practice but also in the interpersonal relationship.

Methodology and results

A cross-sectional institutional and self-reported questionnaire based study was conducted among dental fraternity in a dental institution located in the Southern part of the country, Kerala, India. The curriculum in India pertaining dental education offers 5 years course during graduation and 3 years of course during postgraduation. The present study was cleared by the Ethical Committee of the Annoor Dental College and Hospital, Muvatupuzha. This research has been conducted in full accordance with the World Medical Association Declaration of Helsinki. Data were obtained from the 1st to final (4th) year students, interns and postgraduate students enrolled in Bachelor Dental Surgery and Master of Dental Surgery Program, and teachers respectively, in the institution from April to May 2017. The majority of the students was females, and out-numbered male students by 4:1. All the individuals were briefly explained about the nature of the study, and their informed consent was taken. They were assured of keeping the contents confidential. All questionnaires were coded to avoid bias. The inclusion criterion for the present study was that students must have completed 6 months following admission to the college. Those students who were unable to provide the required information and whose questionnaire form were incomplete were excluded from the study. The initial sample consisted of 231 subjects but after applying the inclusion and exclusion criteria, the final

sample comprised 212 students. Jefferson Scale of Physician Empathy- Health Profession Students (JSPE-HPS) version questionnaire (already validated) (Chart: 1) was administered to assess the empathy level. The questionnaire consists of twenty components using 7-point Likert scale (for every single component) and score ranges from 20 to 140 with upper values representing greater empathy. Among the components, half had a positive response and half had a negative response. Data so collected were tabulated in an excel sheet under the guidance of statistician and analyzed using the IBM SPSS. Statistics Windows, Version 22.0 (Armonk, NY: IBM Corp) for generation of descriptive, as well as inferential statistics. Tukey's posthoc test was done to statistically significant values.

Empathy among dental students and dentist towards patients-an institutional cross- sectional survey

Jefferson Empathy Scale

Age:		Gender:
<20 years	25- 35 years	Male
20- 25 years	>35 years	Female

Level of Training

1st year	3rd year	Interns	Teacher
2nd year	Final year	PG	

Please rate the following questions on a 7 point scale with 1 = strongly disagree and 7 = strongly agree.

1. An important component of the relationship with my patients is my understanding of the emotional status of the patients and their families.
2. I try to understand what is going on in my patients' minds by paying attention to their nonverbal cues and body language.
3. I believe that empathy is an important therapeutic factor in medical treatment.
4. Empathy is a therapeutic skill without which my success as a physician would be limited.
5. My understanding of my patients' feelings gives them a sense of validation that is therapeutic in its own right.
6. My patients feel better when I understand their feelings.
7. I consider understanding my patients' body language as important as verbal communication in physician-patient relationships.
8. I try to imagine myself in my patients' shoes when providing care to them.
9. I have a good sense of humor, which I think contributes to a better clinical outcome.
10. I try to think like my patients in order to render better care.
11. Patients' illnesses can be cured only by medical treatment; therefore, affectional ties to my patients cannot have a significant place in this endeavor.
12. Attentiveness to my patients' personal experiences is irrelevant to treatment effectiveness.
13. I try not to pay attention to my patients' emotions in interviewing and history taking.
14. I believe that emotion has no place in the treatment of medical illness.
15. I do not allow myself to be touched by intense emotional relationships among my patients and their family members.
16. My understanding of how my patients and their families feel is an irrelevant factor in medical treatment.
17. I do not enjoy reading nonmedical literature or experiencing the arts.
18. I consider asking patients about what is happening in their lives an unimportant factor in understanding their physical complaints.
19. It is difficult for me to view things from my patients' perspectives.
20. Because people are different, it is almost impossible for me to see things from my patients' perspectives.

Chart 1: Jefferson Scale of Physician Empathy- Health Profession Students (JSPE-HPS) version questionnaire.

When age, gender and level of training was compared to each question in the Jefferson empathy scale, the statement "Patients' illnesses can be cured only by medical treatment; therefore, affectional ties to my patients cannot have a significant place in this endeavor" was strongly disagreed by the individuals of age group 20-35 years. When gender was compared to each question in the Jefferson empathy scale, "An important component of the relationship with my patients is my understanding of the emotional status of the patients and their families" found to be statistically significant. Females strongly agreed on the statement and males reacted neutrally to the question. Teacher group strongly disagreed on the statement. With advanced level of training, empathic levels were found to be reduced but not statistically significant and females had higher empathy levels than males. When the statement "I do not enjoy reading nonmedical literature or experiencing the arts" was given, female strongly agreed and males strongly disagreed and both were statistically significant. When "Empathy is a therapeutic skill without which my success as a physician would be limited" was given, first year students strongly disagreed the statement and interns strongly agreed. Teacher had a neutral opinion. To the statement "My patients feel better when I understand their feelings", third year students and teachers strongly agreed. A statistically significant disagreement by final year students were noticed for the statement "I have a good sense of humor, which I think contributes to a better clinical outcome" and strong agreement with the statements "I try to think like my patients in order to render better care" and "Patients' illnesses can be cured only by medical treatment; therefore, affectional ties to my patients cannot have a significant place in this endeavor." First years and teachers strongly disagreed and second years strongly agreed to the statements. "I believe that emotion has no place in the treatment of medical illness" was strongly disagreed by first years and teachers. The statement "I consider asking patients about what is happening in their lives an unimportant factor in understanding their physical complaints" was given, first year students had a mixed opinion which can be attributed to the lack of awareness and understanding on empathy.

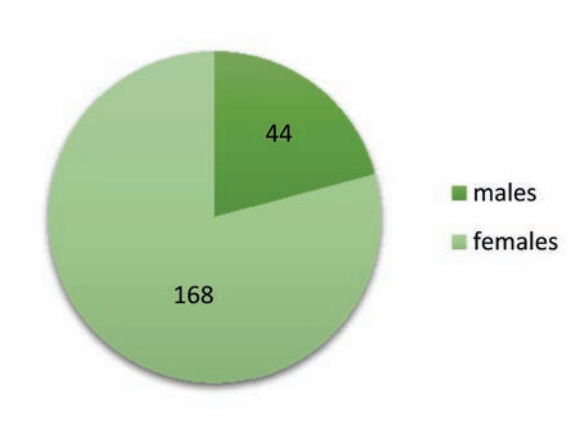

Fig 1: Gender wise distribution of the participants. Number of individuals is marked in the pie diagram.

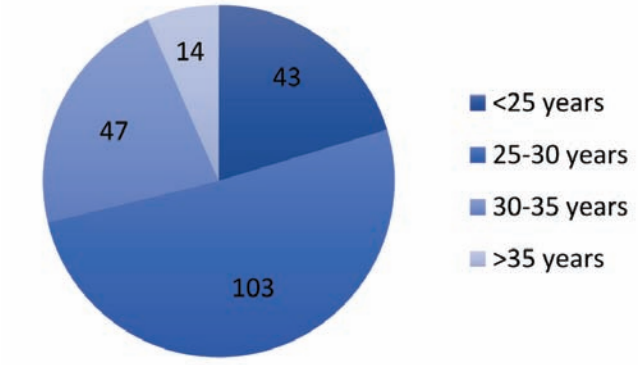

Fig 2: Age wise distribution of the participants.Number of individuals is marked in the pie diagram.

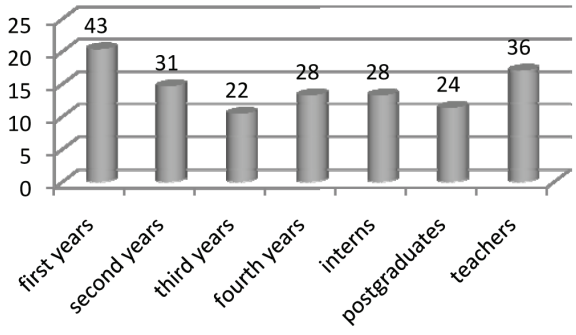

Fig 3: Distribution of the participants according to level of training. Number of individuals is marked above the column.

Discussion

Gender was a significant predictor of empathy, with women having higher empathy scores than men. Female students were found to be more empathetic as compared to the male students and similar results were reported by Kulkarni and Pathak[24] and Fields et al.[15] Hojat et al[16] clearly states that students with higher empathy scores

have more aptitude towards clinical branches and increased competence in core clinical subjects and females would obtain higher empathy scores than men as proved in our study. The higher empathic level of women can be attributed to the increased innate empathy among women and the decreased empathy among males can be explained with the hypothesis that lower empathy can be localized to the emotive dimension. The neutral opinion of teachers may be linked to "detached concern,"[17] "emotional distance," "emotional detachment" and "objective compassion"[19] where the health care worker can detach themselves from the emotional reactivity so as to render duties in an effective manner. The process of administering local anesthesia in an apprehensive patient is a classic example of detached concern among dental professionals. If a professional too strongly identify and bound with the emotions of a patient, the chances of external manifestation of such emotions can inhibit the reassuring and comforting nature and in long run, it can result in hardening of the heart, ultimately leading to unprofessionalism. It is important to acquire a professional persona, as part of a specific acculturalization process that occurs as students are socialized into the health care community.[20]

The increase in empathy during dental education is consistent with previous studies[21] and in contrast to the studies by Sherman and Cramer[22] and Shariat and Habibi.[23] There is no consistent decline or increase in the mean empathy scores among various years as were noted in certain other studies.[24,25,26] Empathetic approach of students among preclinical years were higher than among clinical years in the developed countries may be described based on the use of haptic technology during study period reduces the patient exposure and may lead to decreased cognitive empathy development in individuals as they start practicing in patients. According to Chen et al, students preferring technology-oriented specialties had lower empathy scores.[27] Even though age was considered to be a major factor for empathy, our study did not show any statistically significant changes in empathy in contrast to the studies by Chen et al where older students outscored younger classmates. This can be due to the fact that innate empathy is less influenced by age where as cognitive empathy should be enhanced during study period so as to have higher empathic concern among dentists.

In a study Thomas et al[28] suggests that both distress and well-being are related to medical student empathy. Efforts must be put to reduce student distress during study period so as to enhance well-being which inevitably promote professionalism.[29] For certain relevant questions preclinical students gave contradicting opinion suggesting a lack of awareness of students thus points out that enhancing empathic engagement in patient management should be considered as one of the important tasks of dental education. Professional training grounds for enhancing empathy along with other skills among dental students is mandatory and various studies suggest a positive outcome from emotional skill training.[30,31,32]

There are several limitations to the study design that must be considered when interpreting the results. The study was designed as cross-sectional which did not allow tracking the progression of empathy during the course on an individual basis. The sample size for a cross sectional study was limited due to the institutional design and the male female ratio was not balanced as well. A multicenter study design may have provided better standardization. Our assessment of empathy level was based on self-report measures of a validated instrument, and not based on the actual behaviors. Biased opinions due to lack of awareness of the empathy among students was also noted. The nature of the accuracy of self-report evaluations in the context of empathy can also be debated. It remains unclear how responder bias could have systematically affected the core pattern of empathy changes across years of training. Empathy is a complex process involving a series of events including internal processes such as capacity (emotive and cognitive processes) and motivation, as well as external behavioral processes such as communication skills, to create an accurate rapport that can be perceived by the patient as "empathic." Self-report indices of clinical performance may overestimate or underestimate based on student characteristics and other factors like married participants, participants with children, etc. So the results of this study are subject to any erroneous perceptions of students regarding their own orientations towards empathy. The addition of behavioral observations and patient report is a potential goal for further assessment of clinical empathy as a humanistic attribute of dental students.

Conclusion

The empathy level of students who participated in this study was found to be increasing over the years of study.

Overall female students were more empathic than males. Fourth-year students were more empathic than dental students in other undergraduate years with the lowest levels measured among students in their first year. Given the importance of empathy in maintaining and improving the dentist-patient relationship, continued research in more diverse dental student populations could have important implications in the education and training of dental students. Future studies, preferably longitudinal in design should explore changes in empathy level in dental students are needed.

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CASE REPORT

Lip repositioning technique - a beneficial addition to the periodontist's repertoire

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Excessive gingival display (EGD) or Gummy smile, is a condition of esthetic as well as periodontal concern. Correction of EGD shows a synergistic effect with periodontal therapy which can be achieved with minimal risk or side effects and relatively safe. This case report describes the successful management of chronic periodontitis with EGD using conventional periodontal therapy and modified lip repositioning technique.

Keywords: Chronic periodontitis, Excessive gingival display, Lip repositioning.

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Introduction

Periodontal treatment aims at the long term retention of the teeth and associated structures in aesthetics and function. 'Gummy smile' or excessive gingival display (EGD) is a rather common finding, which, in periodontally healthy individuals is usually dealt with by orthognathic surgery, orthodontic treatment or esthetic crown lengthening. Lip repositioning surgery, originally introduced in the field of plastic surgery in the 1970's, has been introduced into periodontal practice with modifications off late.[1] This procedure offers the periodontist a valuable option for managing EGD in periodontally compromised teeth. This report aims to document comprehensive management of chronic periodontitis and EGD utilizing conventional periodontal therapy together with lip repositioning to enhance oral health, function and esthetics. The results showed improvement in periodontal health together with esthetic satisfaction of the patient

Case report

A 45 year old systemically healthy female patient reported to the department of Periodontology and Implantology, with the chief complaint of bleeding gums. On extra-oral examination, incompetent lips with high lip line were noticed during

smiling. [Figure1] On intraoral examination, the oral hygiene was poor. There was generalized gingival inflammation, with 5-7 mm periodontal pockets in relation to posterior teeth. Excessive gingival display of about 4-5 mm was noticed during smiling extending from maxillary right first molar to maxillary left first molar. Panoramic radiograph [Figure 2] showed moderate horizontal bone loss with respect to the posterior sextants. A diagnosis of chronic periodontitis with EGD Subclass IIwas made.[2] After completion of Phase I therapy and review, it was decided to treat the residual pockets surgically. Accordingly, the patient underwent full mouth flap surgery in four sittings. She was then put under maintenance phase. At three months post-operative review, the patient expressed her desire for correction of the gummy smile. After explaining the nature of procedure, possible complications and expected results, a lip repositioning procedure was planned with the patient's consent.

Infiltration anesthesia was administered at the vestibular mucosa and lip from the maxillary right to left first molar. The surgical area to be operated was outlined with the help of a marker pen.[Figure 3] Two nearly parallel lines were drawn horizontally with the inferior line slightly coronal to the mucogingival junction and the superior one on the labial mucosa nearly 10 mm apical (double the width of gingival display) to the inferior line. The two lines were joined anteriorly on both sides of the maxillary labial frenum and posteriorly at the molar region (most posterior extent of gingival display). A trial suturing was done with 4-0 black silk approximating the two lines to evaluate the expected outcome of the procedure, which was approved by the patient. [Figure 3] Partial thickness incisions were given along the outline and a layer of mucosa including epithelium and connective tissue was removed from both quadrants, leaving the frenum intact. [Figure 4] The incision margins were approximated using 4-0 black silk. [Figure4] Post-operatively, appropriate antibiotics and

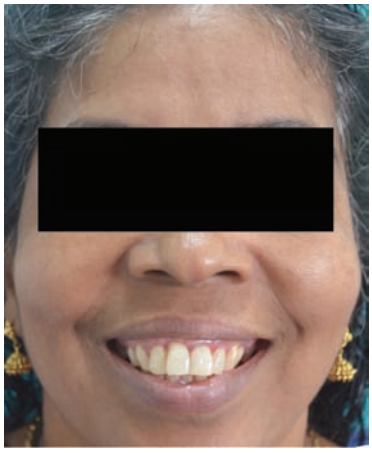

Figure 1: pre operative view

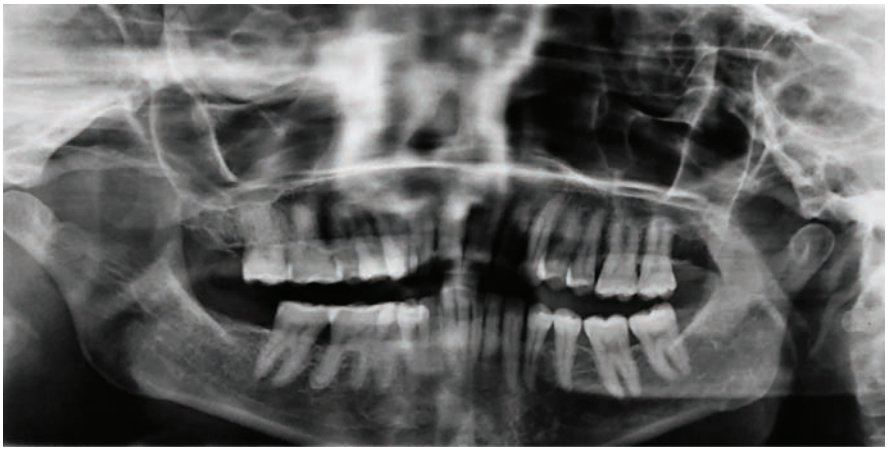

Figure 2: panoramic radiograph showing generalised moderate horizontal bone loss.

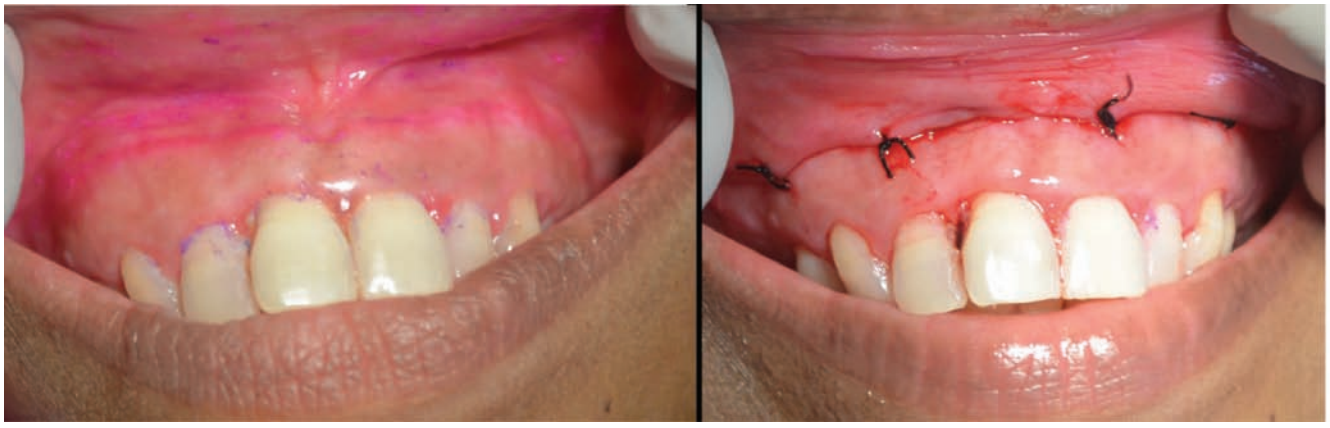

Figure 3: surgical site outlined using marker pen and trial suturing done.

analgesics were prescribed. The patient was instructed to use intermittent ice packs externally and was asked to restrain lip movements for two weeks. The post-operative period was uneventful other than slight pain and feeling of tension on lips for a few days. The sutures were removed on the 14th post-operative day, wherein normal pattern of healing was observed. The patient was reviewed at three and six months postoperatively. EGD showed near-complete correction and the periodontal status had also improved considerably. [Figure 5]

Discussion

Excessive gingival display (EGD) during smile is esthetic concern for many individuals which has got a prevalence of 10.5%[3] to 29%[4] among the general population and more prevalent among females. Complication of EGD is not limited to esthetics; it also has many implications in periodontal health like xerostomia, gingival color changes and gingival inflammation. There are multiple etiological factors for EGD namely altered passive eruption, bony maxillary excess, conditions causing gingival enlargement, deficient maxillary lip length, and excessive mobility of maxillary lip.[5,6,7] Different treatment modalities have been developed to treat EGD such as esthetic crown lengthening to increase the crown length thereby decreasing the gingival display,[8] injecting botulinum toxin to prevent the contraction of muscles responsible for gingival display,[9,10,11] myotomy procedure[12] etc. Modified lip repositioning was introduced by Rosenblatt and Simon[13] wherein, mucosal strips are removed bilaterally to the midline, preserving the maxillary labial frenum, and apically suturing the mucosa there by limiting the retraction of lips by perioral muscles such as zygomaticus minor, orbicularis oris, levator anguli oris and levator labi oris. The results of the present case showed that the modified lip repositioning surgical procedure successfully reduced the gingival display with low morbidity. The procedure is safe and has minimum side effects and post-operative discomfort to patient.

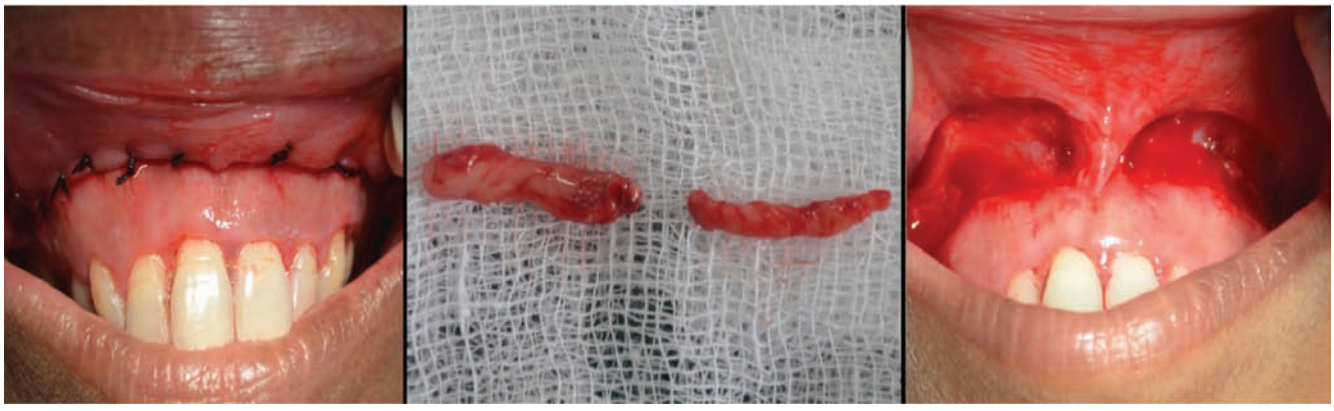

Figure 4: excision of marked tissue and final suturing

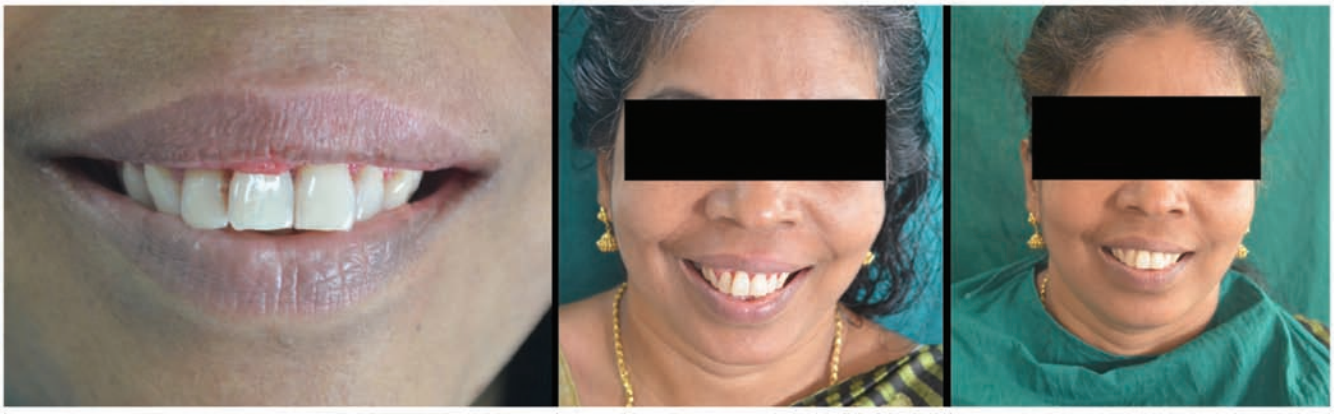

Figure 5: post-operative smile at baseline, 3months and 6 months

Conclusion

Enhancement of esthetics has now become an important aspect of periodontal treatment. EGD, a condition with significant esthetic and periodontal ramifications, can be effectively managed by modified lip repositioning surgery. The procedure is relatively simple, fast, non-invasive and well accepted by most patients.

Acknowledgments

The authors report no conflicts of interest related to this study.

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CASE REPORT

Free gingival autograft- a case report

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Gingival recession is defined as exposure of the root surface due to apical migration of marginal gingiva. The esthetic demand along with reduction of root sensitivity and management of root caries or cervical abrasion are the main indications for root coverage. The free gingival graft is a reliable mucogingival surgical procedure for increasing the zone of attached gingiva of a single tooth, or groups of teeth, or for covering areas of gingival recession. In this article, free gingival grafts is used for treating localized gingival recession.

Keywords: Free gingival Autograft, Gingival Recession, Gingiva

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Introduction:

The Gingival recession is defined as exposure of the root surface due to apical migration of gingival tissue margins. Major causes of gingival recession are genetically determined morphologic peculiarity, improper oral hygiene and periodontal disease.[1] Many factors are responsible for this condition, which includes plaque induced periodontal disease, faulty tooth brushing, iatrogenic factors like orthodontic movement, faulty restorations and anatomic factors such as malpositioned tooth, frenum pull, etc.[2] In clinical practice, the most common mucogingival problems leading to gingival recession are lack of attached gingiva and inadequate vestibular depth. Furthermore, these mucogingival problems can also lead to difficulty in plaque control, thus predisposing the area to gingival inflammation. Aberrant frenulum or muscle attachment may also make plaque control difficult and cause gingival recession.[3,4] Various clinical studies have evaluated many surgical techniques for root coverage: rotational flaps, advanced flaps, free gingival grafts, connective tissue grafts, guided tissue regeneration and combination of these procedures.[5]

Case report:

A 34 year old female patient reported to the department of Periodontics, Amrita School of

Dentistry, (AIMS) Kochi with a chief complaint of sensitivity and bleeding from the lower front gum region since1 month. Patient does not have any relevant family and medical history. On intra oral examination, patients oral hygiene status was good (assessed using simplified oral hygiene index), with minimal probing depth of 3 mm, there was adequate width of attached gingiva in relation to adjacent tooth with thick gingival biotype, Millers class II recession with bleeding on probing in relation to 31 and inadequate vestibular depth(Fig-1). Non surgical periodontal therapy which consisted of scaling and root planning was done and oral hygiene instructions were given and patient was recalled after 3 weeks.

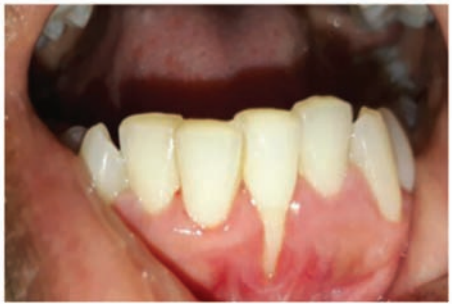
Preparation of surgical site:

1) Recipient site –

After adequate local anesthesia, conventional vestibuloplasty[2] was done to relieve the frenal pull in relation to 31. After that, the exposed root was planed with Gracey curette no. 1- 2 and root bio modification was done with 0.5% solution of tetracycline solution at a pH of 3.2 for 5 minutes.[12] A horizontal incision with number 15 c blade was made in realtion to 31 at the level of CEJ extending to the line angle of adjacent tooth on both sides (41 and 32) of the recession and vertical incision was given, extending to the level of the alveolar mucosa. A partial thickness flap was raised in order to de-epithelize the area.(Fig-2)

2) Donor site:

Preparation of donor site - after adequate local anesthesia, a foil template was made to determine the size of the donor tissue by adapting it to the recipient site. The area between the left first premolar and second molar with the greatest thickness was selected as the donor site. The incision was outlined with the help of the foil template with a 15 c scalpel blade. The incision was made parallel to the tissue to get an even thickness of the tissue, continuing apically, and lifting the graft with connective tissue. The thickness of the graft was checked to ensure a uniform thickness all over.(Fig-3) Then the donor site was sutured with anAbgel of the same measurement as the foil template. The graft was placed on the recipient bed and sutured with 4-0 vicrly sutures (resorable sutures.) (Fig-4) After suturing, periodontal pack was placed on the recipient site to protect the surgical area



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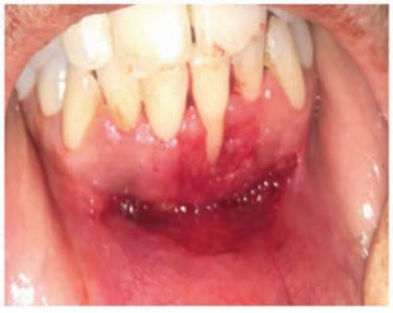

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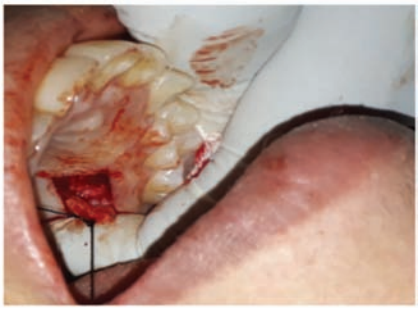

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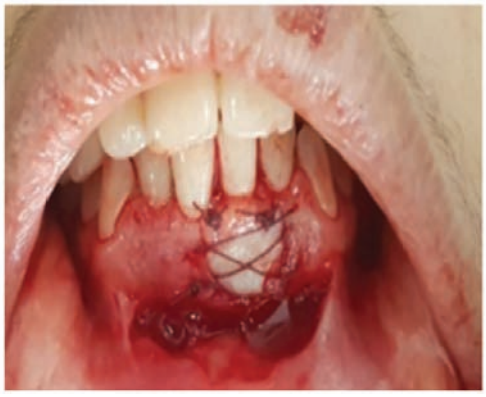

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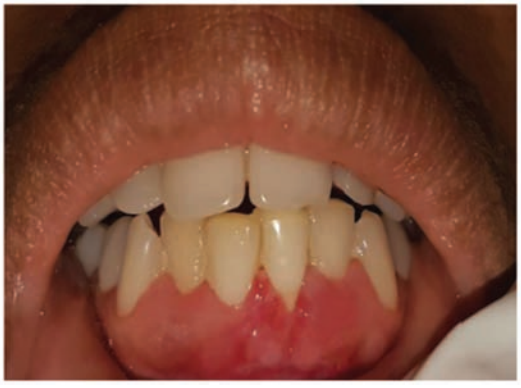

Figure 5

3) Post surgical instructions:

Patient was advised not to brush that area for 1 week or pull the lower lips. 0.2% CHX mouth wash was advised twice daily and antibiotics were prescribed for 1 week. Periodontal pack was removed after 1 week.Patient was recalled every month for maintenance. Figure-5 shows post operative view after 1 month.

Discussion:

Miller's criteria for successful root coverage include: the soft tissue margin must be at the cemento-enamel junction, clinical attachment to the root, with sulcus depth of 2mm, and no bleeding on probing.[6] Using these criteria, this case has been a success. Miller treated 100 cases of marginal tissue recession and he found out that 100% success was noted only on narrow and deep recession sites.[6] There were many classifications for gingival recession in which P D Millers is the most acceptable one.[6]

The thick (2 mm or more) free mucosal graft for root coverage as described by Miller demonstrated improved root coverage, especially when applied to Millers Class I and II lesions, irrespective of their width and depth.[8] It has been demonstrated that the success of free gingival grafts in root coverage is lower compared to other surgical procedure like sub epithelial connective tissue graft.[9,10]

Conclusion:

The free gingival graft appears to be the best treatment alternative to increase the amount of attached gingiva, for the treatment of gingival recession combined with lack of adequate vestibular depth and for teeth requiring root coverage prior to receiving a restoration with subgingival margins. With appropriate case selection, this technique has predictable prognosis in achieving complete root coverage.

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CASE REPORT

Lateral pedicle flap: a promising to approach to treat localized gingival recession-a case report

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Gingival recession is a common clinical condition which brings about aesthetic discomfort, sensitivity, etc. Several techniques have been proposed to cover the denuded root looking for satisfactory outcomes both aesthetically and functionally. The laterally positioned flap is one such procedure used to cover isolated, denuded roots that have adequate donor tissue laterally and vestibular depth. This case report highlights the use of the laterally positioned pedicle flap technique along with doxycycline as a root surface biomodification agent, for the management of localized Millers class-II gingival recession.

Keywords: Gingival Recession, Lateral pedicle flap (LPS)

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Introduction

Gingival recession is characterized by apical displacement of the gingival margin with relation to the cemento-enamel junction.[1] Several factors contributes to this condition. Traumatic brushing[2], and inflammation caused by the presence of bacterial plaque[4,5] have been considered primary or triggering factors in gingival recession. Furthermore, tooth position in the arch,[6] bone dehiscences[7] and fenestrations, high insertion of the frenum,[8] thickness of the marginal gingiva, and iatrogenic factors (improper restorations[9,10] and uncontrolled orthodontic movement[11,12] are considered predisposing and may act as isolation factors. Overall, the indications to cover the root surface exposed by gingival recession include aesthetics, root sensitivity, prevention and management of root caries, and prevention of periodontal disease progression in areas where oral hygiene cannot be maintained properly.[14]

Several surgical techniques have been used to achieve root coverage such as pedicle soft tissue graft[15,16] (flap positioned coronally, flap positioned laterally, and double-papillae flap), free gingival graft,[17,18] sub epithelial connective tissue graft(SCTG),[18-22] acellular dermal matrix allograft (ADM)[23] guided tissue regeneration[22-25]

or a combination of these techniques. Among these procedures, one of the most predictable methods used most frequently is the laterally positioned flap which has been introduced by Grupe and Warren.[25]

Success of the technique depends on the surgical design and presence of adequate width of attached gingiva adjacent to the recession site. Lateral pedicle flap is one of the most predictable procedure on teeth with localized labial recession.[26] Also, as the second surgical site is not involved (as in case of free gingival graft or connective tissue graft), the postoperative course is less troublesome.[27] The objective of this case report was to describe a case where root coverage was achieved with a LPF and doxycycline was used as a root biomodification agent.

Case report

A 27-year-old male patient, was referred to the department of Periodontology, Amrita school of Dentistry, by his dentist for evaluation and treatment of gingival recession in his lower anterior tooth region. He was non-smoker, presented good systemic health and had no history of abnormal habits.

Intraoral clinical examination revealed slight crowding and rotation of lower anterior teeth. Gingival recession was evident on 41. It was diagnosed as Class II recession according to Miller's classification with 6mm in depth and 2 mm in width.

The patient underwent complete root planing and scaling, teeth polishing, and the use of a soft-bristle toothbrush was recommended to eliminate habits related to the etiology of the recession. After 1 month, on recall, gingival recession measuring 5 mm apicocoronally and 2 mm mesiodistally with 41 was seen (Fig. 1). An IOPA radiograph of the lower anterior region showed no evidence of interdental bone loss. Accordingly after the patient's consent, it was decided to treat the site by lateral pedicle flap to achieve root coverage.

Surgical procedure

STEP 1 - Preparation of Recipient Bed

Initially the intra oral asepsis was carried out by asking the patient to rinse with 10 ml of 0.12% chlorhexidine for 30 seconds, following which local anaesthesia was administered. After adequate, local anaesthesia had been achieved, the exposed root was thoroughly planned to reduce the convexity. Root conditioning was achieved by burnishing the root using a cotton pellet saturated with doxycycline for about 3 minutes. A no. 15 scalpel was used to make a "V" shaped incision resecting the gingival margin around the exposed root leaving behind the connective tissue to act as recipient site for the laterally displaced flap. (Fig. 2).

STEP 2 - Preparation of Donor Site

The donor site should have a satisfactory width of attached gingiva and minimal loss of bone, without dehiscence or fenestration. A partial thickness flap was raised with a no 15 blade. A vertical incision was made from the gingival margin to outline flap adjacent to recipient site. The periosteum was incised and extended into the oral mucosa to the level of the base of the recipient site. The flap should be sufficiently wider than the recipient site to cover the root and provide a margin for attachment to the connective tissue border around the root. The interdental papilla at the distal end of the flap, or a major portion of it, should be included to secure the flap in the interproximal space between the donor and the recipient teeth.

A vertical incision was made along the gingival margin and interdental papilla to separate flap consisting of epithelium and a thin layer of connective tissue, leaving the periosteum on the bone. A short oblique incision was placed into the alveolar mucosa at the distal corner of the flap, in the direction of recipient site as a releasing incision to avoid tension on the base of the flap.

STEP 4- Transfer of the flap:

The flap was slided laterally onto the adjacent root, making sure that it lies flat and firm without excess tension on the base. (Fig. 3). Finger pressure was applied with a gauze piece until the graft was firmly seated. The flap was fixed to the adjacent gingiva and alveolar mucosa with interrupted sutures (4-0 vicryl sutures).

STEP 5: Protection of the flap and donor site:

After suturing, operative field was covered with aluminium foil and periodontal dressing was placed to protect the surgical site. Postoperative Instructions - A 0.12% chlorhexidine mouth rinsing was advised twice daily for 3 weeks and for postoperative pain control, patient was instructed to take analgesics and antibiotics prescribed, thrice daily for 3 days and was asked to discontinue the tooth brushing around the surgical site during the initial 15 days after surgery. The periodontal dressing along with sutures were removed and the area was thoroughly irrigated with normal saline after 2 weeks postoperatively (Fig 4). Healing was uneventful and was completed in about 6 weeks.

There was significant reduction in the recession size (Fig 5)

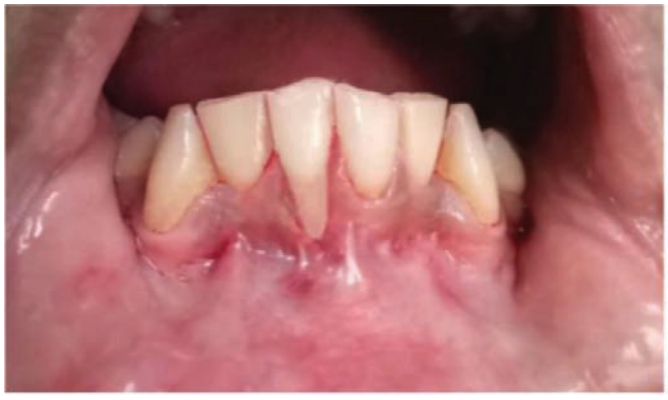
Discussion

Gingival recession coverage has become one of the most challenging procedures in periodontal mucogingival surgery. The success of these procedures depend upon several factors, such as the aetiology of gingival recession, evaluation of the interproximal bone level. Over the years, different techniques have been suggested for root coverage, of which the laterally positioned flap has been widely used .It was introduced by Grupe and Warren for the treatment of localized gingival recession[25]. In this method, the adjacent keratinized gingiva is positioned laterally, to cover the surface of the localized gingival recession. The disadvantage of this method is possible bone loss and gingival recession on the donor site but in order to prevent that we preserved the interdental papilla and had taken partial thickness flap to improve the likelihood of survival of bone covering the donor root.

The ultimate clinical goal of any surgical root coverage procedure is complete root coverage along with the aesthetic correction, resolution of hypersensitivity and prevention of root abrasion.[13]

In the present case, the patient had a Millers class II recession in 41. Laterally positioned flap procedure was performed in this case to provide several advantages to the recession site, such as aesthetic improvement in the region, greater protection against root abrasion, reduction of dentin hypersensitivity and also absence of the second surgical site or the donor site.

The results of the present case report indicate that the use of LPF, along with doxycycline, yielded significant root coverage. Studies have shown that the percentage of root coverage outcome can be improved with root surface biomodification agents.[3] Using a modified LPF technique in the management of Miller class I gingival recession defects, 95.5% mean root coverage and 83.4% complete root coverage was achieved in a recent randomized controlled clinical study.[24] Furthermore, another clinical study has revealed a statistically significant increase in the width of keratinized tissue (the distance between the gingival margin and the mucogingival junction) with the LPF compared to the CAF technique.[14]



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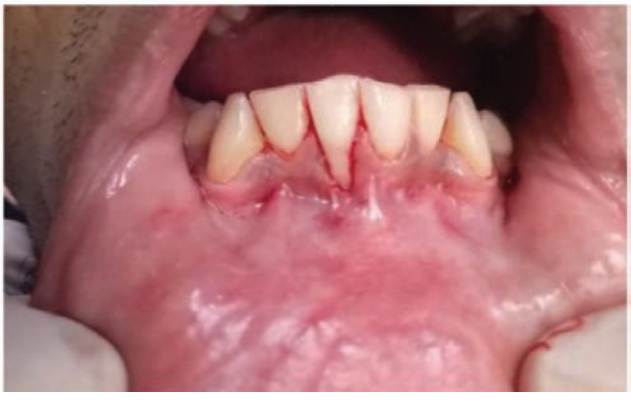

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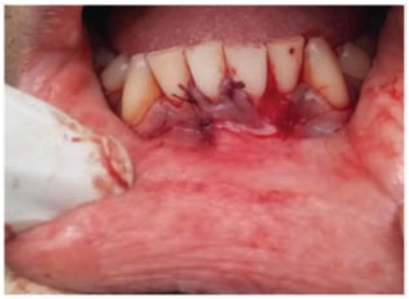

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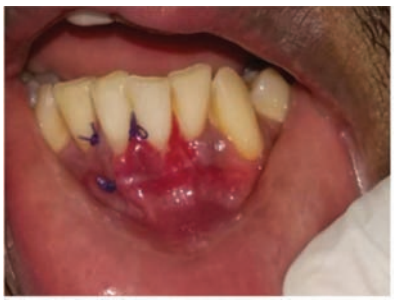

Figure 4

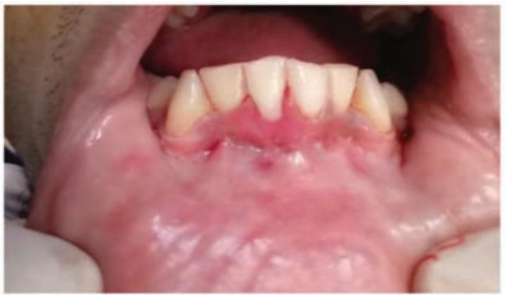

Figure 5

Conclusion

Gingival recession is a common clinical condition and the underlying etiology should be always addressed. This case report describes the management of Miller's class II gingival recession by lateral pedicle flap technique. Treatment resulted in complete root coverage, resolution from hypersensitivity, and satisfaction of the patient's aesthetic concerns. The findings from this study indicate that lateral pedicle flap techniquecan be successfully used to treat localized Class II gingival recession.

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REVIEW

Osseodensification - an emerging concept in implant dentistry

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ABSTRACT

The rehabilitation of the lost teeth can be restored by different prosthetic treatment modalities like removable partial and complete dentures, fixed partial dentures and dental implants. Implant primary stability is crucial for osseointegration. Maintaining bone bulk and density during the implant site preparation is essential for initial bone-implant contact and biomechanical stability. Different techniques like Summers osteotome technique, balloon sinus lifting, intralift piezosurgical technique as well as Meisinger's split control lateral bone expansion kit have been advocated for implant placement. The wish of the patients and dentists for minimal invasive methods to avoid trauma lead to the development of a novel concept named Osseodensification. The newer concept uses a bone preservation method that creates a layer of compacted bone along the surface of the osteotomy.

Keywords: Endosseous implant, drilling, osteotome, piezoelectric, bone expansion

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Background

Tooth loss can be restored by different prosthetic treatment modalities like removable partial and complete dentures, fixed partial dentures and dental implants. Endosseous dental implants are recently most opted advanced treatment for replacement of lost teeth. Successful dental implant placement requires fulfilling various factors like surgical technique, bone quantity and quality and implant design.[1] All these factors affect primary stability since bone-implant contact provides initial mechanical stability which is crucial for osseointegration.[2] Edentulous areas with various morphologies like knife edge residual alveolar bone or nonspace-maintaining defects of the alveolar bone limit or complicate the successful placement of dental implants. Bone grafting is one of the effective treatment options to manage such complicated ridge defect cases which would require a longer treatment time. Osseodensification is a newer concept for implant placement by preserving the remaining bone by not removing it. This review article will be discussing about the concept,

technique, advantages and limitations of Osseodensification.

Characteristics of bone

Bone is a highly specialized mineralized mesenchymal connective tissue that provide structural and metabolic support for variety of functions. Mechanical adaptation of bone is the basis of stomatognathic reconstruction with implant prostheses. The external and internal architecture of bone is a very important factor in the implant surgical procedure and a detailed knowledge about the dynamic nature of bone is needed for successful management of implant case.[3] As bone is inhomogeneous (not uniformed), anisotropic (directionally independent), and viscoelastic, bone is flexible enough to absorb energy and change shape (deform) without failing, yet it is able to widen in compression and able to lengthen with tension.[4] If load exceeds the bone's ability to deform elastically, it can deform further and change permanently by plastic deformation.[5] Misch has classified bone densities into four groups namely D1, D2, D3 and D4. D1 bone is dense cortical bone. D2 bone has dense-to-porous cortical bone on the crest and within the bone has coarse trabecular bone. D3 bones have a thinner porous cortical crest and fine trabecular bone. D4 constitute no crestal cortical bone and almost all of the total volume is fine trabecular bone. The most dense bone is usually seen in anterior mandible, then the anterior maxilla and posterior mandible followed by posterior maxilla which has the least amount of dense bone.3 These variations in pattern of bone morphology have an impact on the treatment planning, implant design ,the surgical approaches advocated and even in the duration of healing phase.

Surgical site preparation techniques in implant dentistry

Implant surgery is an elective surgical procedure which should be done in an aseptic condition. A detailed preplanning about the type of incision ,extent of flap elevation considering certain factors like attached keratinized tissue, ridge form, bone quantity and quality, need for grafting should be checked in detail. The different surgical armamentarium usually used to prepare bone implant sockets were either rotary instruments, osteotomes, screw expanders, balloon sinuslift and piezoelectric device.[6]

Osteotomy preparation technique [Figure: 1] using rotary instruments like burs involves the cutting and extraction of bone tissue to create a cylindrical osteotomy that will receive an implant body. Drills, which are also called drill bits or burs, consist of a specified length and diameter shank depending on the system which the dental professional follows. The removal of bone during drilling can compromise implant fixation stability.[7]

Bone expansion and compaction for the placement of endosseous dental implants, with or without adjunct bone grafting has been in use in implant dentistry. Vertical bone compaction and elevation using osteotomes [Figure :2] was proposed by Summers for sinus floor elevation to place

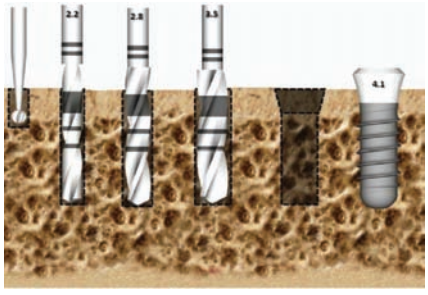

Figure: 1 Conventional implant placement technique

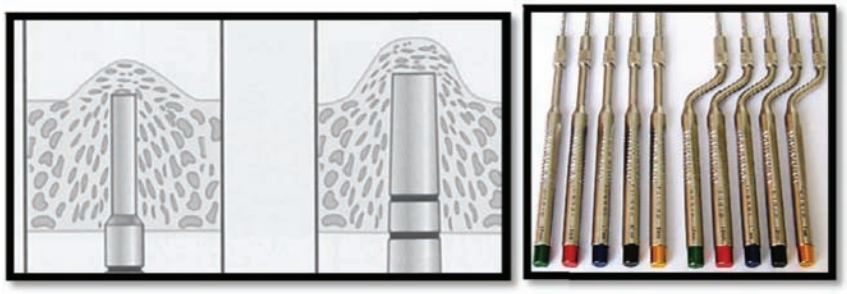

Figure: 2 Osteotome technique & set of straight & angulated osteotomes

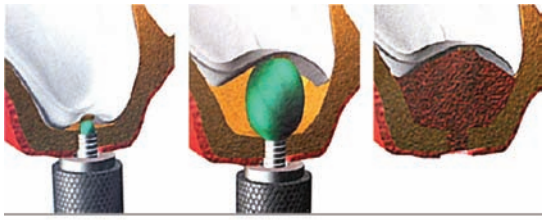

Figure: 3 Baloon sinuslift

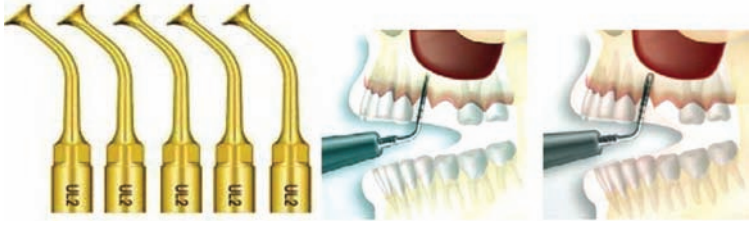

Figure: 4 Intralift piezosurgical instrument & technique

dental implants in the maxilla when soft or poor quality (Type III or Type IV) bone is encountered. The osteotome sinus-floor elevation (OSFE) requires an implant site with atleast 5mm to 6mm of bone between the alveolar crest and the maxillary sinus floor.Special precaution should be taken in their use due to the possibility of uncertain amount and direction of force being exerted towards the apex.[8]

Balloon sinuslifting [Figure:3] is another minimal invasive technique performed for implant placement especially in maxilla. The technique requires an elastic catheter and saline is forced into the catheter to swell the balloon and push out the membrane. The main disadvantage is the higher cost.[9]

The technique named hydropneumatic sinus lift [Figure:4] is a crestal access technique, introduced in 2008 by Troedhan, A. Kurrek, M. Wainwright. The technique is that after the osteotomy with the pilot bur, reaching 2 mm from the sinus cavity, the hole is expanded to the sinus floor using calibrated diamond tips. A tip called "Trumpet" with a diameter equal to the diameter of the last instrument is used to expand the hole and a cooling solution is inserted from the piezosurgery unit. The hydrodynamic pressure created pushes out the schneider membrane without rupturing the membrane. The grafting material is placed in the free space through the osteotome hole with the help of the "trumpet" and then the implant fixture is placed.[9]

Ridge expansion and spreading utilizing screw-type expanders are other reported techniques to expand bone and create an osteotomy without removing bone. The main drawback with this technique is the buccal plate fracture which may affect implant insertion primary stability and reduced bone support and thereby exposure of the implant threads.[1]

Concepts of osseodensification

Osseodensification is a novel biomechanical implant site preparation technique which was introduced by Salah Huwais in 2013. Almost all the usual implant site procedures involve bone removal for preparation for placement of implant whereas the concept behind osseodensification is based on producing low plastic deformation of bone by densification of the crust around the preparation site by compacting and auto-grafting bone along the depth of the hole. The drill design creates an environment which increases the primary stability by means of non-subtractive drilling.[4] Primary implant stability is key to successful implant therapy. It is critical for osseointegration. Maintaining bone during the osteotomy preserves bone density, leading to increased bone implant contact, increased primary mechanical stability, and accelerated healing.

The osseous densification preparation technique preserves bone bulk in two ways: compaction of cancellous bone by viscoelastic and plastic deformation, and compaction autografting of bone particles along the length and at the apex of the osteotomy. The technique is counter to bone drilling, that healthy bone should be maintained, especially in regions where the density is compromised. It utilizes a

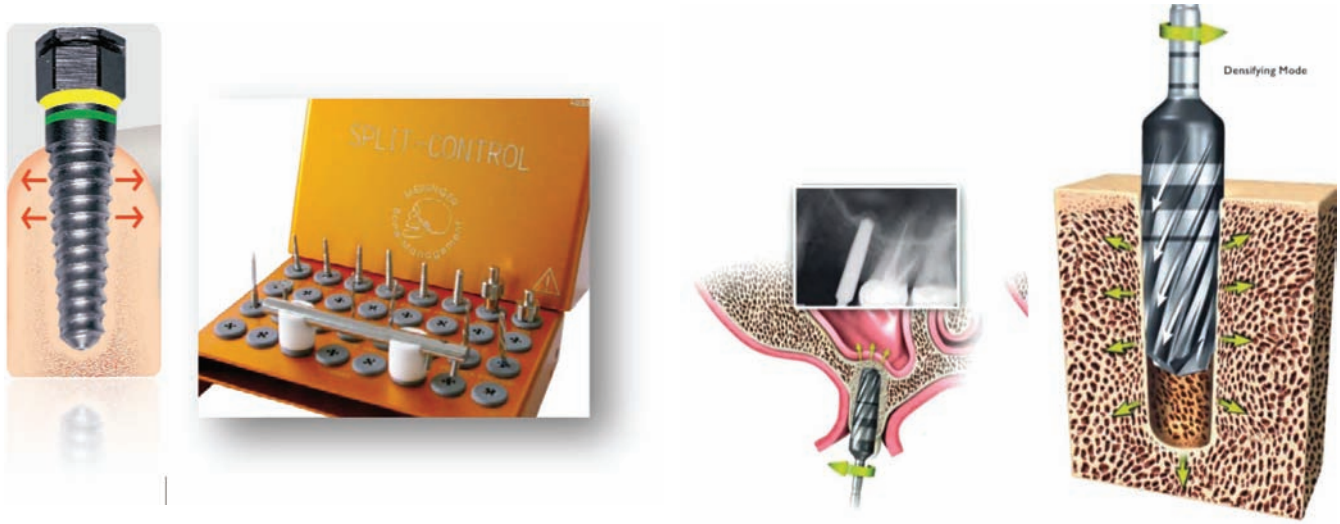

Figure :5 the meisinger split control lateral bone expansion kit.

multi-fluted Densifying Bur technology that creates and expands a pilot hole without excavating significant amounts of bone tissue. The taper design of the osseodensification bur allows the surgeon to modulate pressure and irrigation.[7] The rationale for the utilization of this technique is that densification of the bone in contact to the endosteal device will not only result in higher degrees of primary stability due to physical interlocking between the bone and the device, but also in faster new bone growth formation due to osteoblasts nucleating on instrumented bone that is in close proximity with the implant.[10]

Specialised Densifying burs are designed to have a cutting chisel edge and a tapered shank, so as they enter deeper into the osteotomy they have a progressively increasing diameter that controls the expansion process. These burs are used with a standard surgical engine and a series of osteotomy drills in sequence of increasing diameter depending on the implant being placed which can densify bone by rotating in the noncutting direction (counterclockwise at 800–1, 200 rpm) or drill bone by rotating in the cutting direction (clockwise at 800–1, 200 rpm) with a torque of about 5-50 Ncm in both direction.

When the densifying bur is rotated at 800-1500 rpm in the counterclockwise non-cutting direction (Densifying mode), downward surgical pressure coupled with steady external irrigation creates a gentle compression wave inside the osteotomy that works with the fluting to generate a densified layer through compaction and autografting the surrounding bone while plastically expanding the bony ridge at the same time. This dual use capability allows the implant surgeon to autograft the maxillary sinus and efficiently expands any type of ridge defect in either maxillary or mandibular jaw with enhanced implant stability.[4]

The main advantages of using the osseodensification concept is that it enables clinician to preserve the bulk of bone remaining in the implant site preparation. The other advantage is the dual use of osseodensification bur in both cutting and noncutting direction which result in compacted dense bone resulting in increased primary stability, high torque values which ultimately leads to faster wound healing. Hence the implant loading period is reduced. Using the concept it is possible to place an implant which is 1mm larger in diameter than the presurgical narrow ridge without augmentation. The main limitation is that the novel technique lacks high level of evidence even though in vitro studies, animal study[11,12] and case report[4] are available.

Conclusion

The osseodensification treatment technique preserves the bone and improves clinical findings like enhanced primary stability and efficient expansion of maxillary and mandibular ridge in either jaw. The treatment outcomes should be evaluated for better clinical applications. A more detailed longitudinal multi-center comparative studies and histological evaluation in higher animals are required for its use in implant procedures.

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REVIEW

Photodynamic therapy

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ABSTRACT

Photodynamic therapy is a new type of noninvasive phototherapy for bacterial elimination, which uses low-level laser light and selectively targets the bacteria without potentially damaging the host tissues. The mechanism of the action of a PDT is as follows: initially, a photosensitizer at ground state is activated to a highly energized triplet state by irradiation with light of a certain wavelength. PDT can be considered as an adjunctive to conventional mechanical therapy. Hence, antimicrobial photodynamic therapy may hold promise as a substitute for currently available chemotherapy in the treatment of periodontal and peri-implant diseases.

Keywords: photodynamic therapy, antimicrobial, periodontitis, peri-implantitis

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Introduction

"The goal for all dental treatment, including periodontal therapy, is to achieve and maintain optimal health, function and aesthetics of the dentition"[1,2]. The main objective of periodontal therapy is to eliminate deposits of bacteria and bacterial niches by removing the supragingival and subgingival biofilm[3]. Recent advances in technology have led to a constant drive to develop novel approaches for the treatment of periodontal diseases[4].

Photodynamic therapy is a new type of noninvasive phototherapy for bacterial elimination, which uses low-level laser light and selectively targets the bacteria without potentially damaging the host tissues[5].

Historical background

The concept of treatment with light and photoactive compounds can be traced back over 6000 years to the ancient Egyptians who used light-sensitive substances (psoralens) by crushing leaves of plants related to parsley with sunlight to treat sunburns. Ancient Indians also believed that vitiligo could be treated by the combination of extracts of *Psoraleacorylifolia* and Light[6,7] but it disappeared for many centuries, only being rediscovered by the Western civilization at the beginning of the 20th century[7,8], by an accident and then implemented in medicine at the early stages of neoplasm treatment[9].

The use of photodynamic therapy for inactivating microorganisms was

first demonstrated more than 100 years ago, in 1900 when Oscar Rabb reported the lethal effects of acridine hydrochloride and visible light on *Paramecia caudatum*[10,11]. PDT was introduced in medical therapy in 1904, as the light induced inactivation of cells, microorganisms or molecules[11,12]. In 1913, Friedrich Meyer Betz, the German physician performed the pioneering study called Photo-radiation Therapy with porphyrins on his own skin[11,13]. Thomas Dougherty formed international photodynamic association in 1986[11]. PDT was first approved by drug and food administration in 1999 to treat precancerous skin lesions on face and scalp[11,14].

Mechanism of action

The mechanism of the action of a PDT is as follows: initially, a photosensitizer at ground state is activated to a highly energized triplet state by irradiation with light of a certain wavelength[9]. The excited photosensitizer has a longer lifetime, which results in interactions with the surrounding molecules, and it is generally assumed that at the triplet state the generation of cytotoxic species occurs[9]. The triplet-state photosensitizer reacts with biomolecules using two different pathways[9,15].

Type I reaction involves the hydrogen atom abstraction or electron transfer reaction between the excited state of photosensitizer and an organic substrate molecule of the cells which produces free radical and radical ions[8,11,7]. These free radical species are generally highly reactive and interact with endogenous molecular oxygen to produce highly reactive oxygen species such as superoxide, hydroxyl radicals and hydrogen peroxide that harm cell membrane integrity causing irreparable biological damage.[8,11,7]

In type II reaction, the triplet state photosensitizer reacts with oxygen to produce an electronically excited singlet oxygen which can interact with a large number of biological substrate as a result of its high chemical reactivity inducing oxidative damage and damaging the cell membrane and cell wall[11,15,16]. Microorganisms that are killed by singlet oxygen includes viruses, bacteria, protozoa and fungi[11]. Sites of initial cell damage from PDT are closely related to the localization of photosensitizer. Thus, the reaction takes place in limited space, leading to a localized response and making it ideal for application at localized sites without affecting distant molecules, cells or organs[11,13].

The photodynamic activity to induce cell damage or death is determined by five important photophysical/photochemical properties including the following:

1. An overall lipophilicity and ionization of the photoreactive dyes.

2. The molecular extinction coefficient.

3. Quantum yield of the triplet state formation. components

4. Redox potentials of the excited states of the PSred or PSTred , if the reaction follows the type I mechanism

5. The quantum yield of the singlet oxygen generation, if the reaction occurs by a type II photosensitization.[6,7]

Components

Light source

PDT requires a source of light that activates the photosensitizer by exposure to low power visible light at a specific wavelength[7]. Most photosensitizers are activated by red light between 630 and 700 nm, corresponding to a light penetration depth from 0.5cm to 1.5 cm[8]. This limits the depth of necrosis. The total light dose, dose rates and depth of destruction vary with each tissue treaed and photosensitizer used[8].

There are three light systems for the photodynamic therapy:

1. Diode laser systems: They are easy to handle, portable, and cost-effective.

2. Noncoherent light sources: Preferred for treatment of larger areas and include tungsten filament, quartzchalogen, xenon arc, metal halide and phosphor-coated sodium lamps.

3. Nonlaser light sources include light emitting diodes (LED): They are economical, light weight, and highly Flexible[7, 17,18]

Sources used for light delivery in PDT vary, depending upon the location and morphology of the lesion, but are typically fiber-optic catheters terminated with cylindrical diffusers or lenses for flat-field applications[7,18,19,20].

Photosensitizer

PDT uses several photoactive components like tricyclic dyes, tetrapyrroles and fucocoumarins. An ideal photosensitizer should be:

1. chemically pure and of known specific composition.

2. It should have a strong absorption with high extinction coefficient (E) at longer wavelength (red) region preferably between 700 to 800 nm.

3. It must have an excellent photochemical reactivity and minimal dark toxicity.

4. It should be preferably retained by target tissues only and rapidly excreted out from the body system[21,22].

Photodynamic therapy in dentistry

Application of photodynamic therapy has led to significant advances in dentistry because the delivery of light is more accessible and topical application of the photosensitizer is more feasible in the oral cavity.[4] Depending on the type of agent, photosensitizers may be injected intravenously, ingested orally, or applied topically. PDT is widely used in the management of dental caries, oral and mucosal infection, endodontic infection, different types of oral solid tumors, periimplantitis and periodontitis.[21]

Applications in Periodontics

PDT can be considered as an adjunctive to conventional mechanical therapy. The technical simplicity and effective bacterial eradication are the two reasons why photodynamic therapy is extensively studied in periodontics.[21] A lot of studies have shown that periodontal bacteria demonstrate susceptibility to photodynamic therapy in the planktonic phase[9,23,24,25,] as well as in biofilms[9,26,27,28]. However, bacterial eradication from dental plaque-derived biofilms is still at a lower level compared to the planktonic condition[9].

In the studies by Fontana et al., the reduced susceptibility of biofilms was caused by reduced penetration of methylene blue into a biofilm and its retention in the outer layers of biofilm clusters as revealed by confocal scanning laser microscopy[9,29]. Similar findings were obtained by O'Neill et al., who studied toluidine blue- mediated PDT[9,30]. The role of photodynamic therapy in periodontitis treatment is growing[9]. However, the issue of the reduced susceptibility of complex oral biofilms to antimicrobial PDT requires the development of novel delivery and targeting approaches[9,31].

Apart from killing bacteria, antimicrobial PDT may aslo lead to the detoxification of endotoxins like lipopolysaccharides by decreasing their biological activity[21,32]. It has been demonstrated that bacteria associated with periodontal disease can be killed through photosensitization with toluidine blue O by irradiating with helium - neon soft laser[21,33]. In an animal study on periodontitis, it was found that PDT was useful in reducing the redness, bleeding on probing, and Porphyromonas gingivalis levels[21,34].

The management of peri-implantitis includes the mechanical removal of biofilm from the implants, the local application of antiseptics and antibiotics to kill bacteria in the surrounding periimplant tissues, and regenerative surgery help to re-establish the bone–implant interface35 photodynamic therapy, in combination with guided bone regeneration (GTR), produced bone defect fill and reosseintegration and greater bone gain than mechanical biofilm removal from the implants and guided bone regeneration in ligature-induced peri-implantitis in dogs.[21]

Advantages of PDT

Selective uptake of photosensitizers to particular tissue layers, precise directing of laser light using optical fibers, lack of scarring, and highly selective tissue necrosis, which is achieved by localizing the drug to the proliferating tissue, are the potential advantages of PDT. It can be performed in out-patient or day-case settings and repeated doses can be given without the need for total dose limitations. Resistance to treatment does not develop with repeated treatment.[36]

PDT is a non-invasive, painless, local therapy that has shown increased patient acceptance. PDT offers thorough elimination and eradication of pathogens in inaccessible areas of periodontal pockets. The risk of bacteremia after periodontal debridement can be minimized. There was no need to prescribe antibiotics after the therapy, there is no need to anaesthetize the area and the chances for the development of resistance to PDT are minimal. According to Korego et al. (2009), rapid elimination of periodontopathic bacteria in less than 60 s can be expected.[37]

Other advantages of PDT include the reduced need for flap procedures and shorter treatment time, with lack of microflora disturbance in other sites of the oral cavity. PDT is also beneficial during the maintenance of periodontal therapy because it may act on the biofilm and eliminate the need for the removal of additional root substance by mechanical retreatment. Thus, the patient may experience less dentin hypersensitivity. This therapy also serves as an adjunct to mechanical therapy in sites with difficult access.[38]

Development of resistance to the PDT is less as singlet oxygen and other free reactive oxygen species interact with several cell structures and different metabolic pathway. As PDT is non-invasive local therapy, following application of a sensitizer, a light source delivered into the target area precisely via a fibre optic cable, so disturbances of the microflora at other sites would not occur and damage to the adjacent host tissues can be avoided.[4]

Risks and side efects

The risk and side effects can be classified into two categories.

1. Effect of light energy.

2. Photosensitizer and the photo chemical reaction.

In photodynamic therapy, Laser power employed is very low. But during treatment procedures, irradiation of the patient's eyes must be avoided by wearing protective glasses. Most of the dyes adhere strongly to the soft tissue surface of the pocket, and retention of the dyes in the pocket, even for a short period of time, may affect periodontal tissue attachment during wound healing or may show photosensitivity towards the day light causing irritation in the area of application for the patients.[8,39]

Conclusion

The antimicrobial photodynamic therapy is an interesting therapeutic approach in the direction of the treatment of periodontitis and peri-implantitis[11]. PDT application has an additional benefit besides mechanical treatment at sites with difficult access.[40] Necessity for flap operations may be reduced and patient comfort be increased.[40] Antimicrobial photodynamic therapy may hold promise as a substitute for currently available chemotherapy in the treatment of periodontal and peri-implant diseases.[4]

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REVIEW

Reversal of unwanted soft tissue anesthesia

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ABSTRACT

Administration of local anaesthesia is an integral procedure prior to dental treatments to minimize the associated pain. It is learned that its effect stays more than the time required for the dental procedure to be completed. This prolonged soft tissue anesthesia (STA) can be detrimental, inconvenient, and unnecessary. Phentolamine mesylate (PM), a Food and Drug Administration-approved drug essentially serves the purpose of faster recovery from numbness at the site of local anesthesia. This article reviews the development of the drug phentolamine mesylate and its role in the reversal of prolonged soft tissue anesthesia which is perceived as both desirable and beneficial by many dental patients and clinicians.

Key words: local anesthesia reversal, phentolamine mesylate

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Introduction

Local anesthesia forms the backbone of pain-control techniques in dentistry.[1] The prevention and elimination of pain during dental treatment has benefited patients, their doctors, and dental hygienists, enabling the dental profession to make tremendous therapeutic advances that would otherwise have been impossible.1 This elimination of pain has been effective in performing the necessary dental procedures successfully.[2] With the indispensable use of local anesthetic agents, it is learned that its effect stays more than the time required for the dental procedure to be completed.[2] This prolonged soft tissue anesthesia (STA) can be detrimental, inconvenient and unnecessary. Local anesthesia reversal is the action of choice in cases where prolonged anesthesia after a dental procedure is not needed.[2]

Residual soft tissue anaesthesia

Anesthesia of the supporting tissues —both bone and soft tissue (lip, tongue, chin, nose, and cheek)— usually persists for several hours after pulpal anesthesia has been lost.[1] Though normally of minimal concern, residual soft tissue anesthesia (STA) may result in injury, which may be either self-inflicted (eg, biting) or secondary to thermal or chemical burns. This is of particular concern in pediatric patients who may chew a bitten lower lip because it is painless, causing ulceration of the oral mucosa.[1]

Moreover, residual STA is more of an inconvenience or annoyance to the patient and doctor than a risk. Patients feel that residual STA interferes with their normal daily activities in three areas: perceptual (perception of altered physical appearance), sensory (lack of sensation), and functional (diminished ability to speak, smile, drink, and control drooling).[1]

In some clinical situations, primary postsurgical, prolonged soft tissue anesthesia is desirable. The majority of dental procedures, however, are less invasive (eg, routine restorations, non-surgical periodontics which involves scaling and root planing) and have little to no associated postoperative pain.[1] Indeed many dental patients do complain to their doctors that they were unable to eat a meal or to talk normally for many hours after their dental visit because their lip and/or tongue were still numb.[1]

REVERSAL OF SOFT TISSUE ANESTHESIA[1]

Attempts have been made to minimize the duration of local anesthesia-induced numbness, transcutaneous electrical nerve stimulation (TENS) - a procedure used in the field of medicine to provide relief from chronic pain and edema with the delivery of a low-frequency electrical stimulus to an area, was employed. [2] TENS increases tissue perfusion produced by capillary and arteriolar dilation while stimulating the contraction of skeletal muscles to the area applied.[2] Thus, the local anesthetic drug would undergo a more rapid redistribution into the capillaries and venules in that area thereby reducing the duration of residual STA.[2] The application of intraoral TENS was not very well accepted because of its cumbersome apparatus and difficulty in placing and stabilizing the electrodes intraorally resulting in achievement of limited success.[2]

Phentolamine mesylate

The search for means to minimize the prolonged postoperative anesthesia and reduce the inadvertent injuries arising from it was led to the introduction of phentolamine mesylate.[2] Phentolamine is a nonselective α-adrenergic receptor antagonist that competitively inhibits the ability of sympathomimetic amines like norepinephrine and epinephrine to stimulate vascular contraction.[2] The smooth muscles of vascular beds, including those beneath the oral mucosa, contain α-receptors (predominantly α1), and the ultimate effect of α-receptor blockade is vasodilation.[2] The administration of phentolamine mesylate causes vasodilation at the site where the anesthetic agent is injected which leads to enhanced absorption of local anesthetic and thus shortens the duration of anesthesia.[2]

Originally, phentolamine has been in use for the diagnosis and treatment of patients with pheochromocytoma and for the treatment and the prevention of dermal necrosis following intravenous administration or extravasation of norepinephrine in the USA since 1952.[2] Phentolamine mesylate, marketed under the proprietary name OraVerse, was granted FDA approval on May 12, 2008 with an indication for the reversal of STA (lip and tongue numbness) and the associated functional deficits resulting from a local dental anesthetic containing a vasoconstrictor.[2]

Clinical applications of phentolamine mesylate

Phentolamine mesylate (OraVerse) will be packaged in cartridges identical, except for labeling, to traditional local anesthetic cartridges. It may be administered with any dental local anesthetic syringe and dental injection needle. Use of phentolamine mesylate as a reversal agent for dental intraoral local anesthesia would follow the pattern described below.[1]

The patient receives a traditional intraoral injection of local anesthetic, with or without a vasoconstrictor, at the onset of dental treatment. The choice of local anesthetic is determined by the expected duration of pulpal anesthesia required to complete the dental procedure .At the conclusion of the "traumatic" portion of the dental procedure phentolamine mesylate is administered.[1] It will be injected into the same site as the local anesthetic was previously deposited .For adults the proposed dosage is 1 to 2 cartridges of phentolamine mesylate (a dose of 0.4 mg to 0.8 mg),while for children the proposed dosage is 0.5 to 1 cartridge (0.2 mgto 0.4 mg). Phentolamine mesylate produces a localized vasodilation, increasing perfusion at the site of deposition and likely leads to a more rapid redistribution of the local anesthetic from the injection site into capillaries and venules and away from the oral cavity.[1]

Candidates for local anesthetic reversal

The use of phentolamine may be indicated in the management of pediatric, geriatric patients along with the medically compromised and differently-abled patients.[2] It can be administered when performing conservative dental procedures and nonsurgical periodontics. The FDA has not yet approved the use of phentolamine reversal for children below 6 years of age, and safety data only extend

1

down to children 4 years of age and 15 kg in weight.[2] It can be used in patients with special needs that are prone to self-inflected injury while tissues remain numb, fragile diabetic or elderly patient for whom adequate nutritional intake at fixed intervals is required and patients who must return to work and communicate effectively.[2]

A double-blind, randomized, multicenter, Phase 2 study done by M. Laviola et al, tested the hypothesis that local injection of the vasodilator phentolamine mesylate would shorten the duration of soft-tissue anesthesia following routine dental procedures. In this study 122 participants received one or two cartridges of local anesthetic/vasoconstrictor prior to dental treatment. Immediately after treatment, 1.8 mL of study drug (containing 0.4 mg phentolamine mesylate or placebo) was injected per cartridge of local anesthetic used. The phentolamine was well-tolerated and reduced the median duration of soft-tissue anesthesia in the lip from 155 to 70 min ($p < 0.0001$).[7]

Another study conducted by Mary Tavares et al, a total of 152 pediatric subjects received injections of local anesthetic with 2 percent lidocaine and 1:100,000 epinephrine before undergoing dental procedures. The authors then randomized subjects to receive a PM injection or a control injection (sham injection in which a needle does not penetrate the tissue) in the same sites as the local anesthetic was administered in a 1:1 cartridge ratio after the procedure was completed.[8] Over a two- to-four-hour period, they measured the duration of soft-tissue anesthesia and evaluated vital signs, pain and adverse events. The median recovery time to normal lip sensation was 60 minutes for the subjects in the PM group versus 135 minutes for subjects in the control group. They also noted no differences in adverse events, pain, analgesic use or vital signs, and no subjects failed to complete the study. This study concluded that phentolamine mesylate was well-tolerated and safe in children 4 to 11 years of age, and it accelerated the reversal of soft-tissue local anesthesia after a dental procedure in children 6 to 11 years of age.[8]

Conclusion

Prolonged facial and lingual anesthesia is an often unnecessary and unwanted consequence of intraoral local anesthesia. Many dental patients report that prolonged soft tissue anesthesia interferes with normal oral function. Self-inflicted injuries can occur. The results of clinical trials with phentolamine mesylate in anesthetized patients demonstrate that its administration after routine dental or periodontal maintenance procedures should yield a significant benefit.[1] Faster recoveries of normal sensation (lip and tongue), as well as a faster return to normal ability to smile, speak, and drink, and to refrain from drooling and inflicting self-injury are highly desirable. The prevention of self-injury resulting from lingering soft tissue anesthesia, particularly in pediatric patients, is an additional important clinical benefit.[1] Phentolamine mesylate is an important step in the progress of developing patient care by suggesting significant benefits and an aid to the dental clinician to shorten the post treatment duration and accelerate a safe return to normal oral soft tissue function.[2]

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CASE REPORT

Retrograde periimplantitis: etiology, clinical presentations, diagnosis & treatment modalities

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ABSTRACT

Implant therapy is a well-established treatment method for replacing missing teeth. Several studies have provided a high level of evidence supporting the favorable long-term survival and success rate of implant therapy in general populations. Although the success rate of dental implants is high, there are risks of developing infectious complications. Infectious dental implant failures can be divided into marginal periimplantitis and retrograde (or apical) periimplantitis. Periimplantitis has been characterized as an inflammatory process around an implant, which includes both soft tissue inflammation and progressive loss of supporting marginal bone beyond biological bone remodeling. Peri-Implantitis is defined as an inflammatory reaction with the loss of the supporting bone in the tissues which surround a functioning implant. The peri-implantitis lesions are often asymptomatic and they are usually detected during the routine recall appointments. The etiology of retrograde periimplantitis is most often infectious. A decision-making tree aimed at managing patients with retrograde periimplantitis according to the possible etiology and symptoms of the disease can be a useful tool in the treatment of the pathology

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Nowadays Dental Implant plays an important role in the field of dentistry as a permanent for a lost tooth. The society is getting more and more concerned and aware about the aesthetic aspect and the longevity of a successful implant treatment. Several studies have proven the high level of survival and success rate of implant therapy in general population[1]. Although the success rate of dental implant is high, there are risks of developing infectious complications[2].

Retrograde Periimplantitis (RPI) was first described by McAllister et all in 1992 'as a clinically symptomatic periapical lesion that develops within the first few months after implant insertion while the coronal portion of the implant sustains a normal bone to implant interface'[3]. Incidence of RPI based on handful of studies ranges from <1%[4] to 9.9%[5,6]. The major differences between a marginal periimplantitis (MPI) and retrograde periimplantitis is that the microbes associated with MPI are commonly the organisms associated with periodontal pathologies whereas those associated with RPI are organisms associated with endodontic pathologies.[3,7] MPI can be detected clinically by routine probing

whereas RPI detection depends on radiographic evaluation.

Etiology

The etiology of RPI may be attributed to several causes.

1) According to Ramanauskaite et all infection from adjacent teeth with periapical pathology and/or incomplete endodontic treatment[3,8,9] seems to be the main cause of RPI. If an implant is placed next to a tooth having periapical pathology or an endodontic problem, the infection can spread to the apex of the implant if the interdental bone thickness between the implant and the affect tooth is reduced.

2) Residual infection at the site of extraction/tooth removal due to periapical pathology[8,10,11]. This is commonly seen during the placement of immediate implants. After extraction the socket must be cleaned thoroughly using iodine solution before the placement of implant. Tooth extracted as a result of periapical pathology will harbor microorganism in the apex region. So inadequate disinfection of the periapex before implant placement can lead to the development of RPI.

3) Presence of retained root tip[8,12]. Root tips retained at the periapex region can act as a reservoir for microbes.

4) Iatrogenic factors such as bone overheating[13], excessive tightening during insertion[13,14], incomplete implant depth[13], and contaminated implant tip[14] can all lead to periapical contamination and thereby cause RPI.

5) In some of the cases RPI may occur without any questionable etiology[15,16].

Clinical presentation

Generally retrograde periimplantitis does not present with pain, but in few cases the patients experience tenderness in the affected area. The coronal portion of the implant is not affected much, so as a result there won't be implant mobility or probing depth around the sulcus. The lack of probing depth differentiates retrograde periimplantitis from marginal periimplantitis. Since the infection is sub clinical in the initial stages of disease progression, usually patients comes to the clinicians with a fistula or swelling over the gingiva of the infected implant. The swelling may or may not be accompanied by abscess formation. Intraoral periapical radiography can be done to conform RPI as there will be periapical bone loss and associated radiolucency over the apex of the implant[3, 8, 17]

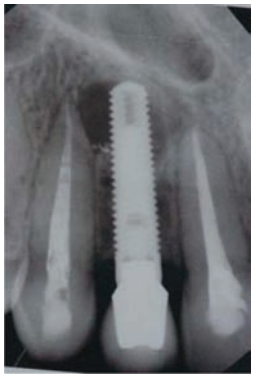
Diagnosis

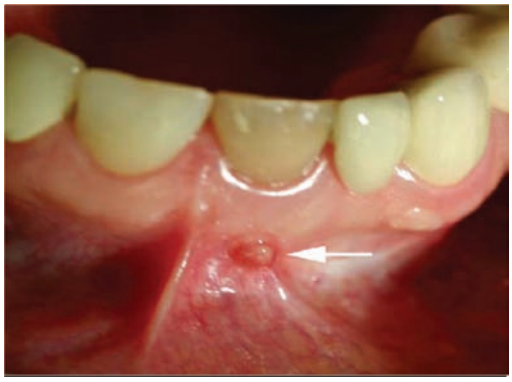
The subclinical nature of the infection makes the diagnosis difficult. The onset of the infection can start after 2-3 weeks after implant placement. It is either diagnosed during a routine follow-up after the implant placement or once the patient presents to the clinic after the infection becomes clinical. The area surrounding the implant may present with a fistula or an abscess or in rare cases even mobility. A periapical radiograph will reveal bone loss near the apex of the implant. The severity and extend of bone loss depends on the nature and duration of the infection. A significant amount of bone loss can cause implant mobility and subsequent loss of the implant. A Cone Beam Computed Tomography can be done to assess the extent of bone loss bucco-lingually/palataly and mesio-distally[18].

Treatment modalities

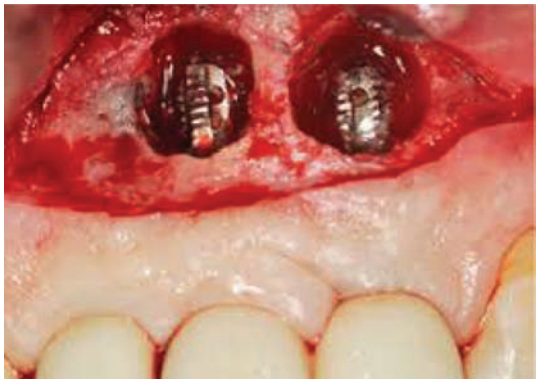
The treatment for Retrograde Periimplantitis depends of various factors such as the progression and severity of the infection, pattern of bone lose patient compliance etc.

- Non-surgical:- The non-surgical treatment refers to systemic antibiotic therapy for a specific number of days, to contain the infection. This is only possible if the infection





Abscess formed at the periapex region



Apicoectomy done to expose the infected site

is diagnosed early and the damage is minimal. According to Ramanauskaite et al, non-surgical treatment effective only to a very few number of patients who were diagnosed at the earliest[15]. The antibiotic kills the microbes present in the periapical region and arrests the disease progression. Once the infection subsides, new bone formation is initiated in the periapical region. The case of retrograde periimplantitis by Steiner et al was diagnosed only radiographically, without any clinical symptoms, and was caused by endodontic pathology involving teeth adjacent to an implant. Endodontic treatment resolved the lesion and retained both the implant and the tooth at the 14-month follow-up.[19]

- Open Flap Debridement and regenerative osseous surgery: - A full thickness flap is raised till the apex of the implant and surgical debridement is done and detoxification is carried out using Universal implant Deplaquer (Straumann USA). If the lesion is advanced there will be associated fenestration, which is enlarged using a round bur to gain access to the apex of the implant. Apicoectomy was done to gain entry otherwise to the periapical region for disinfection. In some cases the apical third of the affected implant was resected in order to prevent future recurrence.[20] But the efficacy of such a treatment is debatable as the length of the implant is reduced there by compromising the stability of the implant. After debridement and detoxification the defect is closed and filled using bone graft and membranes such as an allograft[16,21], Xenograft[22,24], Alloplast[23], Allograft + Alloplast[9,14], Bioabsorbable collagen membrane[9,14,16,22].

  Bone substitutes-Xenograft[25], Alloplast[9, 24], allograft[24, 26].

  Enamel matrix protein derivative[19]. etc.

- Implant removal: - Significant amount of bone loss will cause implant mobility. So in such cases if the prognosis is suspected to be poor even after regenerative therapy, the implant is removed.

Conclusion

In the current society aesthetic and implant dentistry plays a vital role. Retrograde periimplantitis is among the noted causes of implant failures. RPI causes inflammation in the periapical region resulting in bone loss, abscess and even leading to fistula formation and implant mobility. Studies of Ramanauskaite et al shows that the most common cause of RPI is an adjacent tooth having endodontic or periapical pathology. The infection can spread to the periapical region of the implant through the thin cortical plate if the distance between the implant and adjacent tooth is less. The second most common cause being the existence of periapical pathology in the socket prior to implant placement. After the extraction of the tooth if the socket is not cleaned properly, the pathogenic flora can cause RPI. RPI can also occur as an inflammatory reaction as a result of overheating, over tightening of the implant etc... It is usually diagnosed with the help of periapical radiographs and clinical symptoms if present. If the infection is detected early, it might resolve after a dose of antibiotic therapy but in majority of the cases surgical intervention is required. Open flap debridement with osseous graft can treat the defect to a large extend but if the bone loss is too severe, implant removal is the only treatment of choice.

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REVIEW

Health from hive – propolis: a review

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ABSTRACT

There is a great trend to use natural materials as a cure for many diseases. Alternative medicine has made a lot of contributions to modern medical practice. Propolis is a resinous yellow brown to dark brown substance that honey bees (Apis mellifera) collect from tree buds, sap flows, shrubs or other botanical sources to seal up their hives and use as draught-extruder for beehives. The main chemical classes present in Propolis are flavonoids, phenolics and other various aromatic compounds. Flavonoids are well known plant compounds that have antibacterial, antifungal, antiviral, antioxidant and anti-inflammatory proprieties. Propolis has been used in dentistry for various purposes and has a promising role in future medicine as well as in dentistry. This article is an attempt to review various applications of this compound in dentistry.

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Introduction

Propolis is a resinous mixture collected from trees by the Apis mellifera bee, which uses it as a building insulating material in the beehive as well as for keeping the hive in good health.[1] Honeybees collect the resin from the cracks in the bark of trees and leaf buds. This resin is masticated, salivary enzymes are added and the partially digested material is mixed with beeswax and used in the hive.[2]

Composition

The precise composition of raw Propolis varies with the source.[3] It is generally composed of resin and balsams (50-70%), essential oils and wax (30-50%), pollen (5-10%) and other constituents which are amino acids, minerals, vitamins A, B complex, E and the highly active bio-chemical substance known as bioflavonoid (Vitamin P), phenols and aromatic compounds.[4,5] Bioflavonols are the key contributors to Propolis' properties. Flavonoids are well known plant compounds that have antibacterial, antifungal, antiviral, antioxidant and anti-inflammatory properties.[6] It also contains a number of unidentified compounds that work together synergistically to create a balanced, nutritive substance.[7]

Properties

Propolis is a filler substance with the aroma of poplar honey and vanilla. In nature, or when in room temperature, it is a sticky substance, but becomes

hard and brittle at low temperature.[3] Flavonoids and caffeic acid present in Propolis are known to play an important role in reducing the inflammatory response by inhibiting Lipoxygenase pathway of Arachidonic acid. They also aid the immune system by promoting phagocytic activities and stimulate cellular immunity.[6] Anti-oxidant property of Propolis which is the protection against gamma radiation could be attributed to its radical scavenging ability[8] which was better than anti-oxidant property of vitamin C.[9] Anti-inflammatory property of Propolis is due to the presence of caffeic acid phenethyl ester (CAPE) in Propolis.[10]

Propolis is commercially available as Capsules, liquid, lozenges, tablets, creams, gels, toothpastes, mouth rinses, and cough syrups.

Metabolism

Although definitive studies of the metabolism of Propolis do not appear in the literature, the metabolism of many components of Propolis is well known. The biologically most active fraction of Propolis, the Flavonoids, are known to be metabolized with no residues accumulating in the body.[11]

Actions of propolis

Uses in medicine

1. Anti-bacterial effect - Propolis demonstrated an in vitro antibacterial effect on both isolated oral Streptococci and salivary bacterial counts in a clinical study.[12] Koo et al discovered antibacterial effect of Propolis on S. mutans, S. sanguis and A. naeslundaii in addition to the inhibition of glycosultransferase.[13]

2. Anti-viral effect - Serkedjieva conducted an in vitro study on the antiviral activity of six synthetic substances which were esters of substituted cinnamic acids, identical with or analogous to some of the constituent fractions of Propolis. One of them, isopentyl ferculate, inhibited significantly the infectious activity of influenza virus A/HongKong in vitro and the production of hemalutinins in vivo.[14]

3. Anti-fungal effect - Propolis and nine anti-fungal drugs were tested on four fungi that cause infections in humans. It was as effective as (or more effective than) some of the other preparations against three of the fungi.[15]

4. Anti-oxidant effect - Krol et al described the remarkable medical property of the ethanolic extract of Propolis (EEP) that is the protection against gamma radiation.[8]

5. Effect on cancer - Scheller demonstrated the significant and lasting anti-tumoral effect of Ethanolic extract of Propolis in mature mice bearing Ehrlich carcinoma.[16]

Potential uses of propolis in dentistry

Cariology

Duarte et al., 2006 explained cariostatic effects of Propolis by high quantity of fatty acids which slow down the production of acids by Streptococcus mutans and decreases the tolerance of microorganisms to acid pH.[17] Arslan et al concluded that poplar Propolis demonstrated antimicrobial activity against mutans streptococci, indicating that it may be used in caries prevention.[18] Hayacibara et al. (2005) evaluated the influence of propolis on mutans streptococci viability, glucosyltransferase activity and caries development in rats. The data suggested that Propolis is a potentially novel anti-caries agent.[3]

Periodontics

Bacterial flora of the mouth can cause not only caries but also periodontal diseases. Toker et al. (2008) carried out a study, which on the basis of a morphologic and histologic picture showed that systemic administration of Propolis prevents the loss of alveolar process in the case of periodontitis in rats. Santos et al indicated that antibacterial effects are conditioned by flavonoids, phenol acids, and their esters.[19] Research done by Coutinho allowed to conclude that additional subgingival irrigations with a Propolis extract during periodontal treatment allowed to obtain better results than scaling and root planing by themselves, which results from the assessment of both clinical and microbiological parameters.[4] Koo et al. (2002) evaluated the effect of a mouth rinse containing Propolis on 3-day dental plaque accumulation. The experimental mouth rinse reduced the insoluble polysaccharide concentration in dental plaque by 61.7% compared to placebo.[20] Hidaka et al. (2008) studied the effects of honeybee products on the in vitro formation of calcium phosphate precipitates and inhibitory effect on the rate of amorphous calcium phosphate transformation to hydroxyapatite and on the induction time. Propolis showed an inhibitory effect that was the same as or greater than 1hydroxyethylidene- 1,1-bisphosphonate. These results suggested that Propolis may have potential as anticalculus agents in toothpastes and mouthwashes.[3]

Oral surgery

Mouth rinse containing Propolis in aqueous alcohol solution aided repair of intra-buccal surgical wounds and

exerted a small pain killing and anti-inflammatory effect after vestibuloplasty by the modified Kazanjian technique.[21] Propolis decreases inflammation and speeds up creation of granulation tissue and epithelialization.[19] Martin and Pileggi (2004) conducted a study and compared various storage media and it appeared that Propolis may be a better alternative to HBSS, milk, or saline in terms of maintaining PDL cell viability after avulsion and storage. Ozan et al. (2007) determined the ability of propolis to serve as a temporary storage medium for the maintenance of periodontal ligament (PDL) cell viability of avulsed teeth.[22] Thus, Propolis can be recommended as a suitable transport medium for avulsed teeth.

Orthodontics

Altan et al (2013) in his research on rat confirmed the positive effect of propolis solution on bone forming process during the treatment with the device to expand the palatine suture. They found an increased quantity of osteoblasts and rapid remodeling within the palatine suture.[19]

Conservative dentistry

In restorative dentistry, Propolis can be utilized to decrease permeability of the dentin and to direct pulp capping in order to create restorative dentin.[19] According to Sabir et al (2005) direct pulp capping with Propolis flavonoids in rats may delay dental pulp inflammation and stimulate reparative dentin.[23] Sales-Peres et al (2011) found that Propolis can reduce dentin permeability by partially obliterating the dentin tubules. On this basis, it can be concluded that it can be a good option in the treatment of patients with dentin hypersensitivity.[19]

Endodontics

Al-Qathami and Al-Madi (2003) compared the antimicrobial efficacy of Propolis, sodium hypochlorite and saline as an intracanal irrigant and found that Propolis has antimicrobial activity equal to that of sodium hypochlorite. Verma MK et al (2014) confirmed Antimicrobial effectiveness of 25% water-soluble extract of Propolis in the root canals of primary teeth. Thus, Propolis can be effectively used as a product to disinfect the root canals.[19]

Prosthodontics

Capistrano HM et al (2013) observed that Brazilian green Propolis has a similar effect as Miconazole in the treatment of Candida-associated denture stomatitis and could be an alternative topical choice for the treatment of denture stomatitis.[19]

Safety

In general, Propolis is safe. However, like other honey bee products, there are people who are allergic to Propolis.[19] Allergic reaction due to this substance was first reported in beekeepers as an occupational effect but is now seen mainly in individuals who use Propolis in cosmetics and supplement to treat various health conditions.[3] It is believed that caffeic acids is one of the causes of allergies to Propolis. Therefore caution should be taken by people who are allergic to pollen; Asthma patients; Allergic to bee stings; Pregnant women.[24]

SIGNS AND SYMPTOMS OF ALLERGY - If allergic to Propolis, it may cause redness of skin, develop rashes, swelling, itching, fluid collection, fever and may even lead skin to crack (including a severe allergic reaction called anaphylaxis).[19] Apart from that, it may also irritate the skin area where it is applied on, cause eczema, lesions, psoriasis or mouth sores.

PRECAUTIONS - Propolis is best taken gradually, that is it should be taken in small amounts and slowly increased to full outlined dosage if there are no side effects so as to test the compatibility to Propolis as well as to avoid allergic reactions.[3]

DRUG INTERACTIONS - No studies have shown detrimental interaction between pure Propolis and other man-made drugs. Propolis that is commercially used in cosmetics or as dietary supplement is normally extracted using ethanol. This high alcohol content in some Propolis tinctures could lead to vomiting if taken along with disulfiram (Antabuse) or metronidazole (Flagyl).[3]

Conclusion

Propolis is a natural medication with a promising future in dentistry due to its antibacterial, antiviral, antifungal, anti-inflammatory and analgesic actions. However, caution should be exercised while using this substance as it can cause allergic reactions in some patients. Further studies should be conducted to investigate its merit and demerits in dentistry. [19]

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REVIEW

Guidelines in chin graft harvesting -a review

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ABSTRACT

Alveolar ridge resorption is a commonly seen after tooth extraction, thereby altering the size and shape of the host bone available for the dental implant placement. In the era of prosthetic driven implant dentistry, size and the ideal implant position is dictated by the type of final prosthesis and design.

The re-establishment of lost ridge height consistent with prosthetic design and with suitable load-bearing lamellar bone for implant placement and long-term stability is crucial. Even though there have been ample advances in bone grafts and bone-substitute technology, autogenous bone grafts are still considered as "gold standard" in implant site reconstructive surgery.

The mandibular symphysis is considered as a favorable donor site with an excellent risk-benefit ratio. Multiple reconstruction procedures using chin graft have been proposed to increase alveolar bone volume both vertically and horizontally to prepare the ridge for a correct placement of oral implants.

This article reviews the various aspects of chin grafts.

Key words: Autogenous graft, chin graft, ridge augmentation

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Introduction

In clinical practice, the deficiency of bone volume is one of the primary reason for avoiding implant treatment.[1] Therefore, reestablishing the ridge volume consistent with prosthetic design and with suitable load-bearing lamellar bone for long-term stability of the implant therapy must be done.[2]

Despite recent advances in bone grafts and bone substitute technology, intramembranous autogenous osseous transplants are considered as the gold standard for reconstruction of alveolar ridge defects.[4] If the amount of bone necessary for augmentation is modest, intramembranous autografts obtained from regional intraoral sites such as maxillary palate and tuberosity, mandibular symphysis, angle of the mandible, ramus and bony exostosis can be used.[4]

For large amounts of cortico-cancellous autograft, chin is an excellent site. The site is accessible and graft harvesting can easily be done in the office settings under local anesthesia on an out-patient basis. Proximity of the

donor and recipient sites can reduce operative time and cost. Convenient surgical access, low morbidity, elimination of hospital stay, minimal donor site discomfort and avoidance of cutaneous scars are the added advantages.

Indication

Bone block harvested from the chin can be used for predictable bone augmentation of up to 6 mm in horizontal and vertical dimensions. The cortico-cancellous graft ranges from 3 mm to 11 mm thickness. Most of the symphyseal sites provide 5-8 mm of bone. Up to three teeth edentulous site can be augmented. It provides D-1 or D-2 density bone for augmentation.[3]

The harvested bone can be used as a block bone[4] or in particulate form with titanium mesh[5] for GBR.

Presurgical considerations

Proper patient selection is important for the success of the osseous transplant procedures. Complete medical and dental evaluation should be done to prevent surgical complications.

The symphyseal site must be clinically evaluated for hard and soft-tissue deficiencies, ridge morphology, vestibular depth, width of the attached gingiva, periodontal and endodontic health of the lower anteriors and premolars; also, location of the neurovascular bundle. Diagnostic cast can be prepared to do ridge mapping. Wax-up of the reconstructed defect can be done to determine graft requirements and to prepare surgical template for precise placement of the transplant.[6]

Radiographic examination includes:

- Periapical radiograph - to check periapical pathology and to check the length of the roots of lower anterior tooth.
- Panoramic view - to trace the location of mental foramen and mandibular canal.
- Computed tomography (CT)/CBCT- is done for accurate treatment planning, to determine the quality and quantity of the graft at the donor site, also to see the neurovascular components to decide the surgical outline.

Anatomical considerations

Musculature of the chin is composed of three muscle groups: mentalis, orbicularis oris and depressors (anguli oris and labii inferiori).

A mentalis muscle is a short, paired muscle;separated by a small column of adipose tissue in the midline. It origins lie in the incisive fossa of the mandible at the level of the root of the lower lateral incisors, just apical to the attached gingiva and insert into the integument of the chin.[7] The marginal mandibular branch of the facial nerve innervates the mentalis muscle.[7,8]

Over-reflection of the mentalis muscle may lead to loss of facial contour by inversion of the lower lip and flattening of the labiomental fold (pseudoprognatism).[6] Mental nerve, foramen and anterior loop.

The inferior alveolar nerve usually divides into twoanterior terminal branches, the mental and incisalnerves.[9] In the molar-premolar region, mental nervecontinues upward in the mental canal and normally,three nerve branches come out of the mental foramen inconjunction with blood vessels. The mental foramen maybe oval or round in shape and is usually located apicalto the second mandibular premolar or between apicesof the premolars. However, its location can vary fromthe mandibular canine to the first molar with the meanheight of 3.47 mm (range: 2.5-5.5 mm) and the averagewidth of 3.59 mm (range: 2-5.5 mm).[10]

Harvesting

Rule of 5's

Misch in 1992, proposed a safe surgical technique to harvest a bone block graft from symphysis which help to prevent injury to neuro-vascular components of mandibular symphysis region. All the bone cuts should be perpendicular to the cortex in a right angle to the vestibular plain of the symphysis. The superior cut should be 5 mm below root apices to prevent injury to tooth roots and mandibular incisive canal. The inferior cut should be 5 mm above the lower border. Vertical cuts should be at least 5 mm away from the mental foramen. Depth of the cut should be at least through the outer cortex and to the opposite cortical plate to obtained monocortical graft. Lingual cortex should not be perforated.[11]

Armamentarium

- Reciprocating and oscillating saws for thin cuts and to prevent bone loss
- Fissure bur no. 702. Heat generation and additional bone loss of around 1 mm may be present. Use of coolant mandatory.
- Trephines can be when small cores of cortico-cancellous bone are needed. Core of 4-10 mm can be harvested depending on the diameter of the trephine.

- Disc are used for very thin cuts. A soft-tissue guard must be used to prevent damage to the surrounding tissues
- Piezo instruments can be used and are preferred over any other instruments as they allow for maximum intra-operative precision and minimal tissue damage.

Incisions

The best possible incision design is decided after assessment of the periodontal status of lower anteriors, amount of bone loss in the region, periodontal risk of root fenestration, amount of keratinized gingiva, subgingival margins of the restoration and local musculature.

Depending on anatomy, surgical access to symphysis area can be via

- *attached gingiva incision* - horizontal or parasulcular, scalloped incision should be given in the attached gingiva at least 1 mm above the mucogingival junction.
- *vestibular incision*- Horizontal incision should be made 1 cm beyond MGJ and extends to each distal region of the canines
- *sulcular approach*- incision begins in the sulcus from second bicuspid of one side to another side
- *Crestal incision*-it can be given when single or multiple lower anterior teeth are missing.

Harvesting pattern

Patterns such as J-graft, ring graft, rectangular blocks or cylindrical bone cores can be harvested from chin. Pikos[3] recommended 2 mm larger block outline than the target size to allow for contouring of the block after removal. Trephines can also be used for harvesting. Bone scrappers are used to harvest particulate graft.

Complications and post-operative morbidity

Intra-operative complications include bleeding, soft-tissue injury of cheeks, lips and tongue, incisive and mental nerve injury, potential bi-cortical harvest and block graft fracture.

- Intrabony bleeding episodes -cautery, local anesthesia and collagen plugs[3,12]
- Injury to the mental neurovascular bundle - avoidable with proper surgical technique, especially the use of the sulcular approach for bone harvesting
- Injury to incisive nerve -deep cancellous bone is harvested.It can be prevented by careful radiographic examination with CT.
- Block fracture and bicortical block harvest-prevented by following a good surgical technique
- Potential risk of damaging mandibular tooth roots during osteotomy, can be prevented by careful radiographic examination with panoramic/CT scan and by keeping minimum of 5 mm safety distance between the apex of the canine and the upper osteotomy cut.
- Post-operative complications include pain, swelling and bruising, ptosis of chin, infection, suture line opening and neurosensory deficits of the lower lip, chin and anterior mandibular dentition.[3,12]

Healing at the donor site

A block leaves behind a five-wall defect with good potential to self-repair.[13,14] Donor-site defects regenerate by a process similar to endosteal fracture healing. During bone wound healing, rapid vascularization of the defect site is paramount for successful neo-osteogenesis.

Repair of mandibular symphysis defects is multifactorial and dependent on time and size of the harvested graft.[15] Preservation of the periosteum and symphysial midline and use of platelet-rich plasma (PRP)/PRF may positively influence the defect fill and reduce the healing period.

Whenever short-term (<24 months) re-harvesting is expected, osteoconductive grafting of the donor site with/without PRP may benefit or accelerate the bone defect fill. Recently, a combination of bovine bone and PRP has shown such a rapid healing that it was possible to use the same site for graft re-harvesting after 5 months of the healing period.[16]

Studies by Hunt and Jovanovic, in 1999,[17] have reported minimal postoperative complications in harvesting block grafts, which is supported by studies by Cordero et al., in 2002,[18] who have achieved a mean lateral augmentation bone grafting of about 6.5±0.33 mm, with no major complications recorded at the donor or recipient sites

Conclusion

The intramembranous transplant like mandibular symphysis is a convenient source and provides a dense quality transplant. The thick cortical layer of the transplant prevents or reduces resorption and the cancellous part help to fasten the regeneration. It does not produce immune reactions and are incorporated by osteoclastic resorption with a shorter healing period compared with other methods of osseous repair. Proper case selection and accurate surgical planning is the prerequisite for successful graft harvesting. Applying the new safety recommendations and proper

patient selection in chin bone harvesting could reduce the risk of altered post-operative tooth sensitivity due to injury of the mandibular incisive nerve

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REVIEW

Biological width and aesthetics in implants

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Introduction

Nowadays, practitioners must satisfy an extremely aesthetically aware population. Unreasonable demands from patients and unrealistic promises by practitioners can lead to unsatisfactory experiences for all parties. An understanding of aesthetic possibilities and limitations of dental implants and the practitioner's own expertise will reduce the risk of unforeseen problems

Oral aesthetics

Fundamental aesthetic criteria

Aesthetic principles refer not only to tooth aesthetics but include gingival aesthetics and final aesthetic integration into the setting of smile, appearance and, more, the individual. To provide a smile with harmony and balance, both dental and gingival aesthetics act together.[1]

Gingival aesthetics

The fundamental criteria related to gingival aesthetics are well established and they include both gingival health as well as gingival morphology.[2] The elements which provide a good aesthetic at gingival level are: 1) Gingival health – the attached gingiva has a coral pink colour and firm texture, with an orange – peel appearance. 2) The gingival outlines in the anterior sextant - should be symmetrical to the opposite side, and should align the gingival architecture of the canines and central incisors in the same horizontal plane. 3) Balance of gingival levels: the marginal gingiva of lateral incisors should be more coronal compared to that of central incisors and canines. 4) The gingival zenith usually is present distal to the center of the tooth. 5) The presence, the level, and the shape of papillae: a pyramidal shape of papillae and a normal proportion of 25% - 35% of papillary coverage at the interproximal surface is appealing. Anything above or below this ratio is not.[3,4]

Dental aesthetics

In teeth, the physiological performance is the result of an intimate and balanced relationship between biologic, mechanical, functional and

aesthetic parameters. There are a number of criteria for dental aesthetics. One of them is the tooth profile, which includes the submergence and emergence profile of the teeth. The first is defined as the portion of the root and the gingival attachment that emerges from the bony structure and extends to the base of the periodontal sulcus. The dental root form and position have a direct influence on the aesthetics, shape and support of the soft tissues both facially and inter-proximally. The emergence profile is the dento-gingival complex that extends from the base of the sulcus to the free gingival margin. The dimensions vary greatly from 0.5 mm to 4 mm in a healthy periodontium. Other criteria include the form, dimension, and proportion of individual teeth and the inter-proximal contact areas, their characterization (opalescence, translucency and transparency), as well as their surface texture and colour, including fluorescence and brightness.

Aesthetics and biologic conditions

All the elements of oral structures present at the same time, both aesthetics and biological interconnectivity particulars. In clinical practice, the respectful restoration of healthy biological relational conditions should always take precedence over aesthetic relationships. As a matter of fact, a loss of control of biological relationships, whose fragility may lead to structural breakdown, will invariably generate disease.

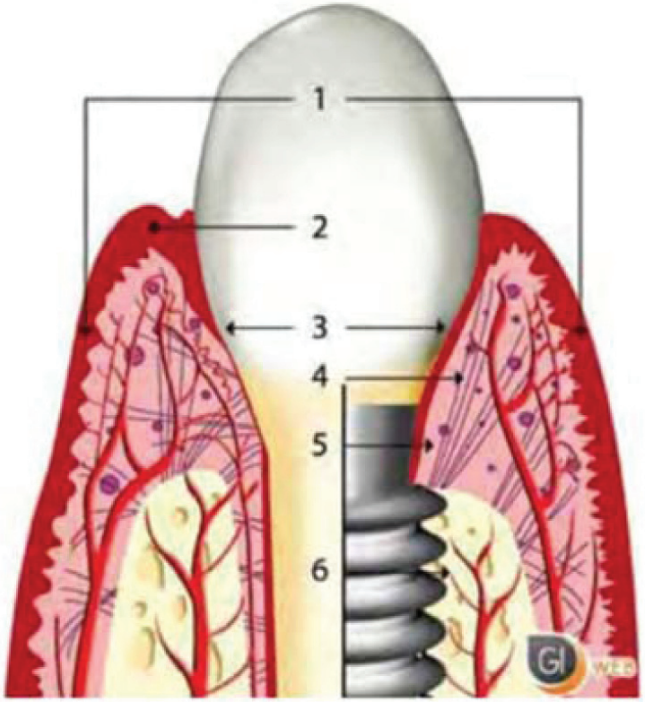

Figure 1: Buccal epithelium, 2: sulcular epithelium, 3: junctional epithelium, 4: connective tissue attachment, 5: avascular and hypocellular zone, 6: lack of periodontal ligament,(SclarAG,)

Differences and similarities between biologic width around implants and teeth

Despite many similarities to the periodontal tissues, peri-implant tissues forming the biologic width differ in certain points compared to the dental biologic width

Dental biologic width begins its apical limit at the alveolar bone height. The implant biologic width starts slightly subcrestal. It is observed in cases where the implant platform is located at bone level with a slight cratering around the implant.[5] The peri-implant biologic width also varies in its dimensions. It increases and measures 3mm in the vertical direction. .The epithelial attachment is very similar to that described around the tooth (Berglundh et al 1991). These cells have the capability to adhere bio-inert material such as titanium or ceramic using hemidesmosomes or basal lamina (Ikeda et al 2000)[6]. The implant surface state does not affect its adhesion. (Buser et al 1992).[7] The big difference in the peri-implant biologic width is the alignment of the collagen fibers of the connective tissue attachment. In normal periodontium, periodontal fibers run at right angles to the long axis of tooth whereas in peri-implant tissue, the fibers run parallel to the implant surface. An area of dense circular fibers was found near to implant surface (Schierano et al, 2002)[8] (Buser et al 1992)[7]. Finally, because of the absence of the desmodont, the implant vascularization is lesser (especially the connective tissue area adjacent to the implant which is avascular). The vascularization comes from the periosteum and cortical vessels (Moon et al, 1999)[9].

Factors influencing biological width around implants
Surface topography

Albrektsson and Wennerberg have grouped the surface topography of implants into three categories in accordance to the surface roughness (SA). The groups are:

- Minimally rough with SA values of 0.5-1 μm.
- Moderately rough implants have SA of 1-2μm
- Rough ones have SA greater than 2 μm.

Buser et al. explored the soft tissue dimensions around three implant surfaces, specifically a rough surface, a sandblasted surface and a polished surface. There have been no important variations in terms of gingival tissue responses among these three implant surfaces. Also, implant type and surface changes failed to have any impact on plaque accumulation or propagation of peri-implant mucositis after 18 months of loading. Radiographs after 12 months

showed that cylindrical implants with shorter high polish surface displayed less bone resorption.[10]

Implant and abutment materials

Numerous studies have acknowledged the link amongst soft tissue attachment and the composition of implant and abutment material. Many authors have concluded that the only material that showed reliable tissue biocompatibility was titanium.[10]

Surgical protocol

Many studies have investigated the probable role of surgical protocols on soft tissue healing around implants. The results of these studies indicate that both one stage and two stage procedures have relatively no difference in effect on the healing of the tissues around the implant.[10]

Loading time

There is ample literature by various authors on the influence of loading protocols on biological width. Cochran et al. evaluated biologic width dimensions around non-submerged loaded and non-loaded implants testing two different surfaces (SLA and TPS) in an animal (dog) model. Biologic width dimensions after the study showed minimal changes when comparing the loading times and also was similar to the biological width of natural dentition.[11,12,13,14,10]

Implant macro-design and microgap position

The difference in one or two-piece implant, and the location of the microgap on the end result or final dimension of biologic width have been explored in sufficient detail over the past years. The multitude of studies proves that the various dimensional values and constitution of the biologic width are not swayed by the nature of implant or the type of surgery carried out. Some of the evidence states that more deeply placed implants lead to a increaser in biologic width.[10]

Immediate implant placement following tooth extraction

Buccal versus lingual aspects

Immediate implant placement following tooth extraction is now an accepted treatment protocol. Although most studies examining peri-implant biologic width focus on delayed implant placement, a number of studies have examined the nature of the biologic width following immediate implant insertion post tooth removal.[10] Vignoletti et al (2009) did a study with four different implant systems immediately in fresh extraction sockets (3i, Astra Tech, Thommen, ITI Implant Systems). The biologic width, six weeks after immediate implant placement averaged between 3.5-4.1 mm and 2.8-3.2 mm at the buccal and lingual aspects, respectively. On the buccal aspect, the Junctional Epithelium and the Connective tissue attachment dimensions measured between 2.0 - 2.7 mm and 1.0 -1.8 mm, respectively. The corresponding lingual values were 1.6 – 2.0 mm and 0.9 - 1.4 mm respectively. There were no differences in soft tissue healing when comparing the four different implant systems. The JE length in all four systems was longer than the reported value for delayed implant sites.

Mucosal thickness

An important question is whether a minimum width of the peri-implant mucosa is required to maintain health and stability of peri-implant tissues. The influence of soft tissue thickness on peri-implant bone remodelling has been investigated by correlating the abutment cuff height, as a surrogate measure for mucosal thickness, with peri-implant marginal bone loss. Results demonstrated increased marginal bone loss around implants with shorter abutments, reflecting thin mucosa, possibly attributed to the need for re-establishing biologic width. Platform switching has been proposed as a macrodesign feature of implants to minimize peri-implant marginal bone loss. The adequate volume of the supracrestal periimplant keratinized tissue and the immobility of the implant-bone union are the main factors responsible for the peri-implant sulcus homeostasis and should be the ultimate goal to be achieved along with the stronger attachment of connective soft tissue fibers to the implant.[10]

Flap Vs. Flapless techniques

Recent studies on beagle dogs have come to the conclusion that there is no difference in the width of junctional epithelium and underlying connective tissue when either of the procedures were carried out. The following is the result of one such study by Blanco et al

1. Flapless surgery

1) Junctional epithelium: 2.54 mm buccal and 2.11 mm lingual;

2) Connective tissue: 0.68 mm buccal and 0.54 mm lingual;

2. Flapped surgery

1) Junctional epithelium: 2.59 mm buccal and 2.07 mm lingual;

2) Connective tissue: 1.09 mm buccal and 0.91 mm lingual.

There were no statistically significant differences.[10]

Conclusion

The knowledge of the amount and the pattern of bone loss determined by the biologic width formation correlated with the other known factors that modulate the bone response in implant treatment is a valuable tool in initial complex diagnosis, treatment planning and execution. The fact that the biologic width is still a topic of interest (still researched in the recent studies), underlines the importance of this structure in implant treatment. It is closely related to possibilities or limits in achieving aesthetic results with implant restorations.

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REVIEW

Tooth brushes and brushing techniques:-a review

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ABSTRACT

Despite the wide range of methods available, mechanical plaque removal with a manual toothbrush remains the primary method of maintaining good oral hygiene for a majority of the population. Several different tooth brushing methods with manual brushes exist. The popularity of various techniques has waxed and waned over the twentieth century. However, no one method of brushing has been found superior to the other. However, plaque control by tooth brushing alone is not sufficient to control gingival and periodontal diseases because periodonv tal lesions are predominantly interdental. For years dental authorities have instructed their patients on how to brush their teeth correctly. However, many people lack the patience and do not follow dental instructions for more than a brief period. Therefore, studies were initiated in the belief that the introduction of power brushing would help the average person brush his teeth with greater efficiency. The purpose of this article is to review on toothbrush designs and tooth brushing methods, and powered and ionic brushes.

Keyword: toothbrush, manual toothbrush, powered toothbrush, bristles, bass technique

Introduction

Despite the wide range of methods available, mechanical plaque removal with a manual toothbrush remains the primary method of maintaining good oral hygiene for a majority of the population.[1] When performed well, for an adequate duration of time, manual brushing is highly effective for most patients.

The bristle toothbrush appeared about the year 1600 in China, was first patented in America in 1857, and has undergone little change. Generally, toothbrushes vary in size and design as well as in length, hardness, and arrangement of the bristles.[2]

When recommending a particular toothbrush, ease of use by the patient as well as the perception that the brush works well are important considerations.[3] The effectiveness of and potential injury from different types of brushes depend to a great degree on how the brushes are used. The use of hard toothbrushes, vigorous horizontal brushing, and use

of extremely abrasive dentifrices may lead to cervical abrasions of teeth and recession of gingiva.[2]

There are 2 types of toothbrush:-

i. Manual toothbrush

ii. Powered toothbrush

Manual toothbrush

There are numerous manual toothbrush designs, and claims of superiority for plaque removal by individual brands have been made in the past. The manual toothbrush varies in size, shape, texture and design than any other dental products.

The part of tooth brush: - (fig.1)

1. Toothbrush handle
2. Toothbrush head
3. Toothbrush bristle

1. Toothbrush handle:-

The preference of handle characteristics is a nature of individual taste. The handle should fit comfortably in the palm of the hand; it may be straight or angled, thick or thin.

2.Toothbrush head:- The head of the toothbrush contains all the necessary parts for cleaning our teeth. Head sizes come in variety of sizes, depending on the age of the intended user.5 Smaller toothbrush heads are recommended for children or pre-adolescents who have not yet had their full set of permanent teeth. Medium-sized heads are intended for adolescents and adults, who have a larger set of teeth.

Length	1 to 1.25 inches
Width	5/16 to 3/8 inches
Surface area	2.54 to 3.2 sq.cm
No. of rows	2 to 4 rows of bristles
No. of tufts	5 to 12 per row
No. of bristles	80 to 85 per tuft

Table 1

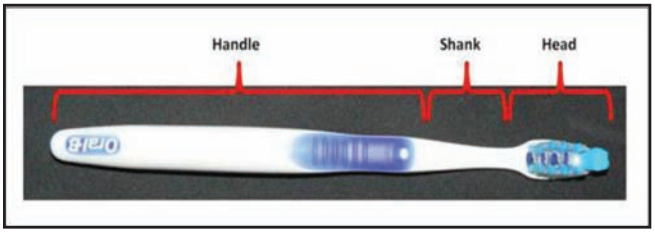

Fig.1 parts of toothbrush

3. Toothbrush bristle

Toothbrush bristles are grouped in tufts that are usually arranged in three or four rows. It is believed that the first toothbrush was made of hog's bristles.

Two kinds of bristle materials are used in toothbrushes:-

- Natural bristles from the hair of hog or wild boar.
- Artificial filaments made predominantly from Nylon (0.006 to 0.4 mm).

Both types remove plaque, but nylon bristle brushes vastly predominate in the market.[8]

Diameters of commonly used bristles range from[1]:-

♦0.007 inch (0.2 mm) for soft brushes

♦0.012 inch (0.3 mm) for medium brushes

♦0.014 inch (0.4 mm) for hard brushes

American Dental Association (ADA) has described the range of dimension of acceptable brushes as follows:-[10]

Powered toothbrush

Mechanical plaque removal with a manual toothbrush remains the primary method of maintaining good oral hygiene for a majority of the population.19When performed well for an adequate duration of time, manual brushing is highly effective. However, for most patients neither of these criteria is fulfilled. One possible way to overcome their limitations associated with manual brushing is to develop a mechanical brushing device.[1]

Fig.2 powered toothbrush

Electrically powered toothbrushes designed to mimic back-and-forth brushing techniques were invented in 1939. There were many reports of the effectiveness of such devices. However, an early authoritative report reviewed such research and stated that both manual and electric toothbrushes were equally effective in removing plaque.[2]

Indications for the use of powered toothbrushes: [3]

There is considerable evidence that powered toothbrushes are beneficial in achieving improved plaque control in specific patient groups.

- Patients with fixed orthodontic appliances
- For those patients whom there is also evidence that powered toothbrushes are more effective in reducing decalcifications
- Children and adolescents
- Handicapped and severely retarded children
- Institutionalized patients, including the elderly, who are dependent on others.

Patients sometimes are reluctant to purchase power toothbrushes because of the relatively high cost compared with manual toothbrushes. Less expensive models are now available, however, and have been shown to be as effective as the higher-priced models.[16]

Toothbrushing methods:

Method	Position and movement	Advantage/Disadvantage
Roll method (Fones)	large, sweeping, scrubbing circles in occluded teeth, with the toothbrush held at perpendicularly to the surfaces.	- easy to learn - no subgingival plaque removal - recommended for children
Horizontal "scrubbing" method	Bristles held perpendicularly to the surface in occluded teeth	- Easy to learn - Not efficient - Recommended for small children
Bass method	Vibrating movement of the bristles placed in the sulcus with light pressure, angled in 45° to the tooth surface	- Efficient supra- and subgingival plaque removal - May cause gingival injury - Recommended for people with healthy periodontium
Modified Bass method	Same as Bass method combined with a sweeping movement	- Same as Bass method - Sweeping increases efficiency of interproximal plaque removal
Stillman method	The bristles are placed on the gingival and the tooth surface in the same orientation as the Bass method	- Gingival stimulation - Effective subgingival plaque removal - Recommended for patients with advanced recession
Modified Stillman method	Same as Stilman's method combined with a sweeping movement	Same as Stilman's method - Sweeping increases efficiency of interproximal plaque removal
Charters method	Bristles held towards the occlusal in 45° angle. Activated with a back- and forth vibratory movement	- Effective interdental cleaning - Hard to achieve - for patient after periodontal surgery during healing

Fig.3 Different type of brushing technique

Many methods for brushing the teeth have been described and promoted as being efficient and effective. The popularity of various techniques have waxed and waned over the twentieth century. The scrub technique is probably the oldest. The Charters and Stillman techniques for gingival message were popular in the 1930s and 1960s. Bass described what is probably the most popular method taught today and his theories were popularized in the 1970s.[10]

Most toothbrushing methods can be classified into one of the eight groups based on the motion and position of the brush):-[14]

1. Sulcular: Bass
2. Roll: Rolling stroke, modified Stillman
3. Vibratory: Stillman, Charters, Bass
4. Circular: Fones
5. Vertical: Leonard
6. Horizontal
7. Physiological: Smith
8. Scrub-brush method

Bass technique:-[17]

This method emphasizes cleaning of the area directly beneath the gingival margin. Filament tips are directed into the sulcus at approximately 45degrees to the long axis of the tooth. The brush is moved in a back-and-forth direction using short strokes without disengaging the tips of the filaments from the sulci (figure 5). The Bass technique is widely accepted as an ffective method for removing plaque not only at the gingival margin, but also approximately 1 mm subgingivally.[17]

Stillman technique:-[17]

This method was designed for massage and stimulation of the gingiva as well as for cleaning the cervical areas of the teeth. The head of the brush is positioned in an oblique direction toward the apex, with the filaments placed partly in the gingival margin and partly on the tooth surface . Light pressure together with a vibratory (slight rotary) movement is then applied to the handle, while the filament tips are maintained in position on the tooth surface.

Charters technique:-[17]

This method was originally developed to increase cleansing effectiveness and gingival stimulation in the interproximal areas. The head of the brush is positioned in an oblique direction with the filament tips directed toward the occlusal or incisal surfaces. Light pressure is used to flex the filaments and gently force the tips into the interproximal embrassures. A vibratory (slight rotary) movement is then applied to the handle while the filament tips are maintained in position on the tooth surface. This method is particularly effective in cases with receded interdental papillae because the filament tips can easily penetrate the interdental space.

Modified Bass/Stillman technique: -[14]

Each of these methods can be modified to add a roll stroke. The brush is positioned similarly to the Bass/Stillman technique. After activation of the brush head in a back-and-forth direction, the head of the brush is rolled over the gingiva and tooth in the occlusal direction, making it possible for some of the filaments to reach interdentally.

Fones technique:-[15]

The Fones technique is for young children who cannot master all the complicated movements. The teeth are in occlusion and the brush is pressed rather vigorously against the teeth and gums and revolved in circles as large a diameter as possible. This technique is not used in periodontal pateint since it does not adequately engage interproximal area.

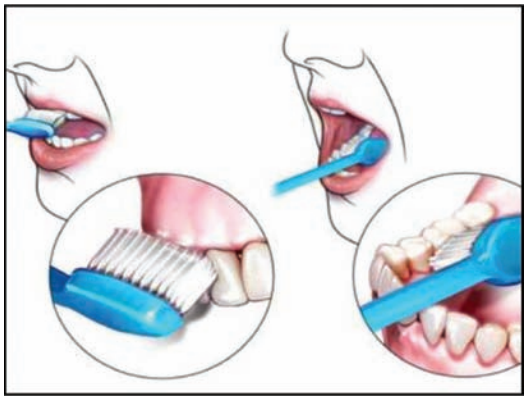

Fig.4 Bass method

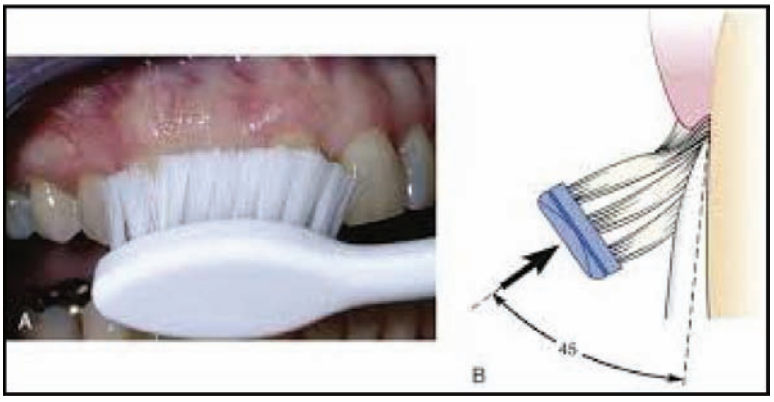

Fig.5 Stillman method

Roll technique:-[15]

The roll technique is performed when patient has normal oral health. The bristles are placed well up on the gingiva at 45 degree angle; the side of the bristle are pressed against the tissue and simultaneously rolled incisally or occlusally against the gingiva and teeth, similar to the turning of the latchkey.

Sonicare (sonic toothbrush)

A new toothbrush introduced in 1993, had a rectangular brush head with bristles arranged in a saw tooth design. The side to side movement of the sonicare was operated at a high frequency of 260 Hz. Wu Yuan et al. tested sonicare and found that 60% of the plaque on a titanium surface could be disrupted at a distance of 2 mm away from the object.[15]

The safety of this brush was demonstrated by Donly KJ who concluded that Sonicare had no potential for destruction of restoration, but was effective in stain removal.

Ultrasonic toothbrush

When a prototype of an ultrasonic brush was compared with a manual brush by Goldman, patients were not aware of any ultrasonic effect, but the ultrasonic brush produced slightly improved plaque removal.

Zimmer S, evaluated the efficacy of the Ultra Sonex Ultima (R) in comparison with a conventional manual and concluded that the Ultra Sonex Ultima may be more efficacious than manual toothbrushes in removing plaque and preventing gingivitis in patients without severe periodontal disease.1

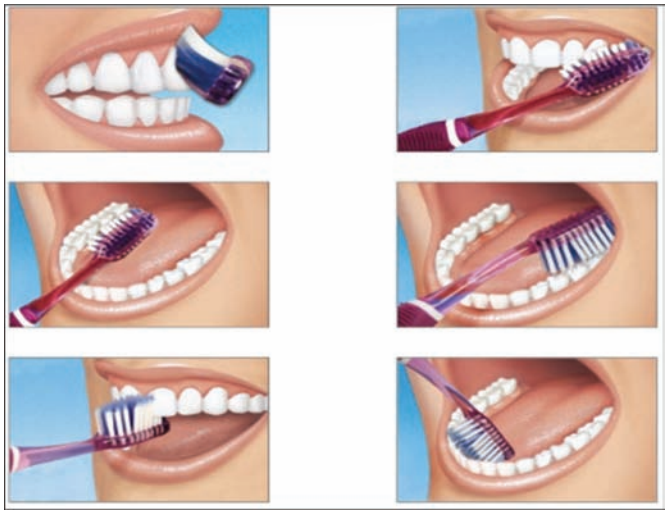

Fig.6Modified bass method

Conclusion

All patients require the regular use of a toothbrush, either manual or electric, at least once per day. The brushing method should emphasize access to the gingival margins of all accessible tooth surfaces and extension as far onto the proximal surfaces as possible.

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REVIEW

Laser hazard and safety in dental clinics

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ABSTRACT

Laser use in general dental practice has grown considerably over the past 20 years, Lasers are used in various disciplines in dentistry such as Restorative Dentistry, Endodontics, Periodontics, Pedodontics, And Oral And Maxillofacial Surgery. Despite many advantages of dental lasers, it has some adverse effects also. Laser radiation mainly endangers the eyes and skin. Therefore the aim of this review is to alert the dental professional to the extent, application, and responsibilities associated with safety when using lasers designed for use in dentistry.

Keywords – LASER, Safety, Hazards, LASER Safety Officer

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Introduction

The acronym "LASER stands for Light Amplification by Stimulated Emission of Radiation". It is a collimated, focused, monochromatic ray of light.[1] The energy beam reacts with a target material by being absorbed, reflected, or scattered. The first LASER designed for dental practice was marketed in 1989.[1] LASER is an innovative technology, which creates a bloodless operative field and has been of immense benefit to both the patient as well as the operator. This tool has reduced pain, procedural length, scarring and swelling.[2] However, like every coin has two sides, LASER also has potential hazards and hence, the clinician and assistant should ensure that LASER therapy is carried out in a safe environment.

Components of laser device

A LASER device has a laser medium, which can be a solid, liquid, or gas, an optical cavity or laser tube having two mirrors, one fully reflective and the other one partially transmissive, which are located at either end of the optical cavity and an external mechanical, chemical, or optical power source which excites or "pumps" the atoms in the laser medium to higher energy levels.[3] (figure 1)

Dental laser safety[4]

Safety is an integral part of

providing dental treatment with a LASER instrument. There are three aspects to LASER safety:

1. The manufacturing process of the instrument
2. Proper operation of the device
3. The personal protection of the surgical team and the patient.

The major organizations concerned with regulations regarding the safety of laser systems are: the American National Standards Institute (ANSI), the Food and Drug Administration (FDA) and its regulatory bureau, the center for Devices and Radiological Health (CDRH) and the Occupational Safety and Health Administration (OSHA).

Laser classifications

The International Electrotechnical Commission (IEC) classification for lasers.[2] (table1)

Risk analysis relative to tissue and laser class[5](figure 2)

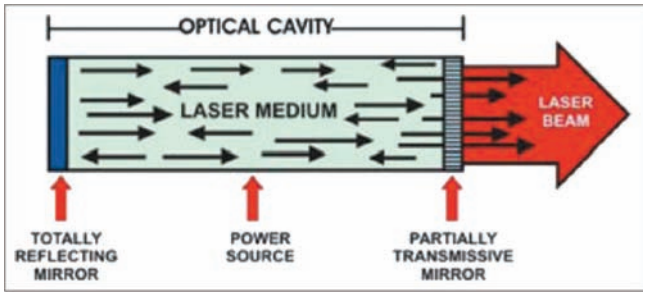
Laser hazards

Most common LASER hazards encountered include eye hazards, skin hazards, fire hazards and LASER plume

Eyehazards[6]

The eye is composed of pigmented and nonpigmented tissue that will absorb incident laser radiation relative to the wavelength being used. Damage from a laser beam may be due to direct exposure of the unprotected eye or diffuse reflection; it also depends on the type of laser being used. Free-running pulsed laser will cause more damage than a continuous laser of equal power. It is mandatory that all personnel (clinician, assistant, and patient) within the controlled area of Class IIIB, IIIR, and IV laser use should employ suitable eye protection during the procedures.

The manufacturer's mark must be imprinted on the eyewear. The wavelength or wavelengths that the protective eyewear is specific for must be stamped on the glass or side shields. If the eyewear is marked as 810 nm – 2890 nm, then this means that the eyes exposed to all wavelengths between these two outer limits are protected. If one line states 810 nm and then underneath 2890 nm is stamped, it means that eyes are protected only against these two wavelengths and no protection is provided for wavelengths in between. The protocol for use is "patient first on and last off." This means that as soon as the patient is seated in the dental chair, he or she is to put on the appropriate laser eyewear, which is not to be taken off until the patient is leaving the dental operatory at the end of the procedure. The dental operatory personnel must don the eyewear prior to the laser being turned on and not take them off until the laser is switched off or put into standby mode. Care must be taken when cleaning laser eyewear and side shields so that their protective coating is not destroyed. The eyewear should be washed with antibacterial soap and dried with a soft cotton cloth in between procedures and patients. Disinfecting solutions generally applied to dental surfaces are too caustic and should be avoided. The eyewear must be inspected frequently to determine whether there is any breakdown (lifting / cracking / flaking) of the protective material that would render the eyewear useless.



Laser plume[2]

The vapors, smoke, and particulate debris produced during these surgical procedures are called laser plumes. It may contain many bio hazardous products; therefore to protect the respiratory system, a surgical mask must be

Table 1 - The International Electrotechnical Commission (IEC) classification for lasers.2

Class	Description
I	Very low risk; under foreseeable use it is reasonably safe
I M	Between 302.5n and 4000nm wavelength: mostly safe except when used with optical device (eg binocular)
II	Exposure beyond the class 2 AEL (Accessible Emission Limit) human access is not permitted; between 400nm and 700nm wavelengths.
II M	Range from 400nm to 700nm wavelengths are hazardous when viewed with an optical aid.
III R	Between 302.nm and 106nm, risk is less as compared to class IIIB lasers.
III B	Normally safe while viewing diffuse reflections, but are hazardous when viewed under directly.
IV	Toxic under both diffuse and intra reflection and may also cause fire and skin hazards.

worn. To achieve optimal filtration of bacterial and viral components such as HIV, human papilloma virus and hepatitis B virus that may be found in the plume. Hence, the mask must have the capacity to filter particles as small as 0.1µm.

Fire hazard[6]

The high temperatures attained while using Class IV and certain Class IIIB lasers can cause ignition of material and gases or promote flash-point ignition. ANSI Z136.3 has allowed gaseous conscious sedation procedures, such as the use of a nosepiece to deliver oxygen and nitrous oxide mixtures to be used during laser operation. However, a closed-circuit delivery system must be used and a scavenging system must be connected to the high-volume evacuation to minimize gas leakage.6 Within the Nominal Hazard Zone (NHZ), use of aerosols, alcohol-soaked gauze, and alcohol-based anesthetics is to be avoided.[7]

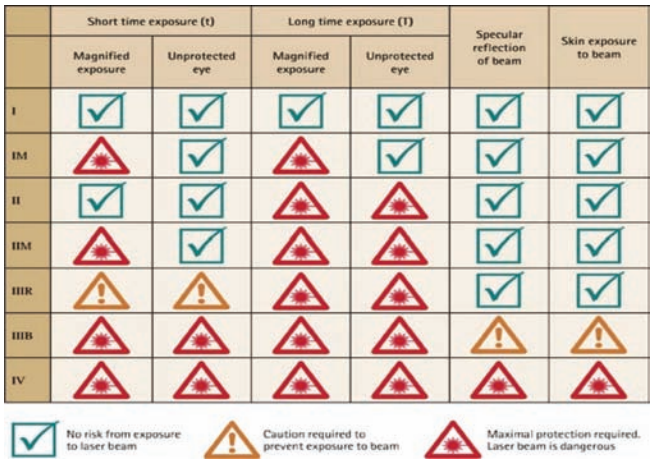
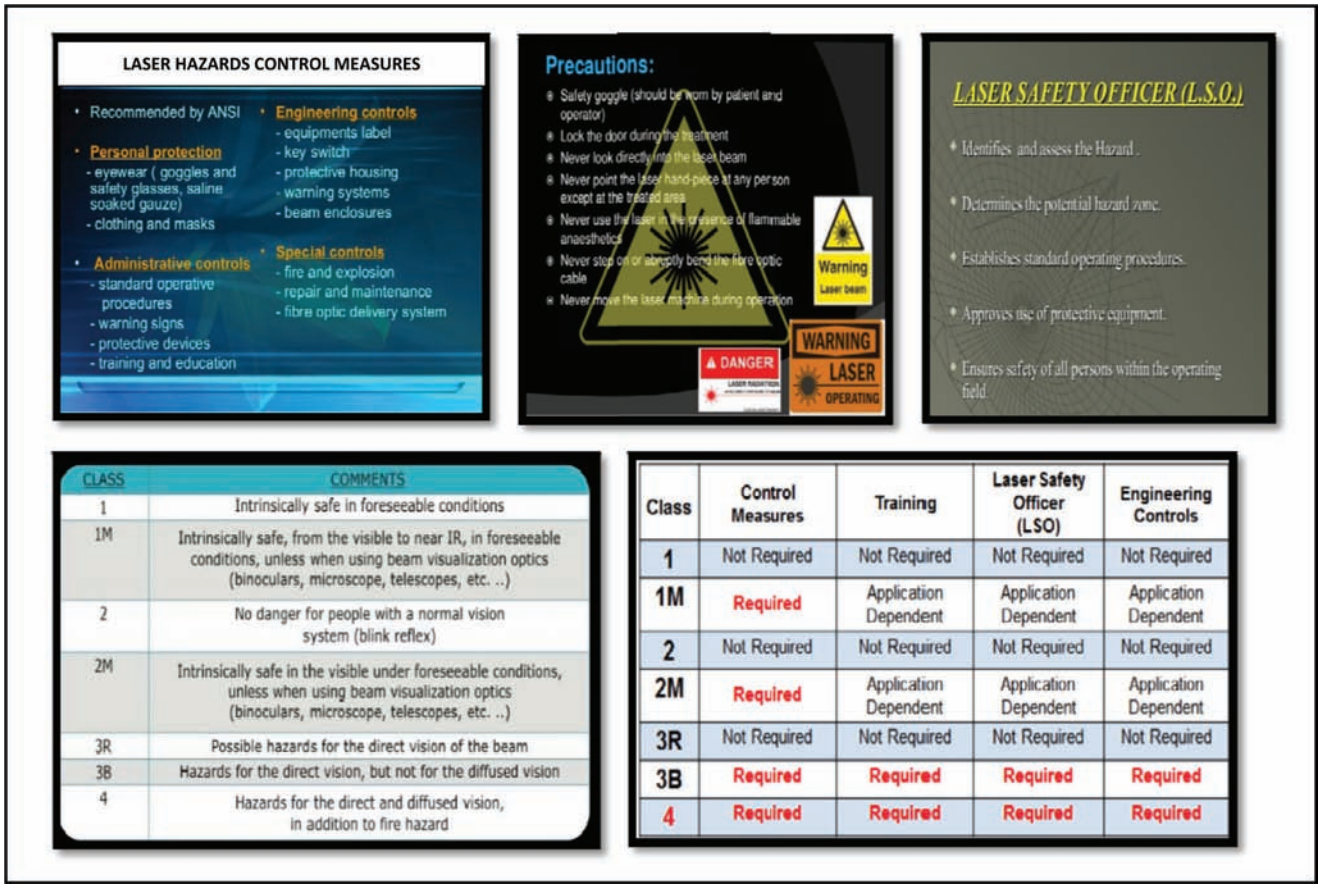


Figure 2 - LASER classes and their relative risk analysis

Skin hazards[6]

Any potential for damage to the skin through inadvertent exposure to Class III B and IV lasers will be relative to the ablation threshold of the skin structure and the incident laser energy. Visible and near-infrared wavelengths (400-1400 nm) have the potential to pass through the epidermis into the superficial and deeper structures respectively. Mid- to far-infrared wavelengths (1400-10,600 nm) will interact with surface structures. The governing factor in structural damage is the particular laser wavelength's absorptive potential relative to the tissue elements (chromophores) such as pigment (shorter wavelengths) and water (longer



CLASS	COMMENTS
1	Intrinsically safe in foreseeable conditions
1M	Intrinsically safe, from the visible to near IR, in foreseeable conditions, unless when using beam visualization optics (binoculars, microscope, telescopes, etc. ..)
2	No danger for people with a normal vision system (blink reflex)
2M	Intrinsically safe in the visible under foreseeable conditions, unless when using beam visualization optics (binoculars, microscope, telescopes, etc. ..)
3R	Possible hazards for the direct vision of the beam
3B	Hazards for the direct vision, but not for the diffused vision
4	Hazards for the direct and diffused vision, in addition to fire hazard

Class	Control Measures	Training	Laser Safety Officer (LSO)	Engineering Controls
1	Not Required	Not Required	Not Required	Not Required
1M	Required	Application Dependent	Application Dependent	Application Dependent
2	Not Required	Not Required	Not Required	Not Required
2M	Required	Application Dependent	Application Dependent	Application Dependent
3R	Not Required	Not Required	Not Required	Not Required
3B	Required	Required	Required	Required
4	Required	Required	Required	Required

TABLE 2- SUMMARY

wavelengths), together with the power density value of the laser beam, duration of laser exposure, and spot size. It is important that all those involved in the use of Class IIIB and IV lasers are adequately protected against inadvertent skin exposure

Laser safety officer[7,8]

An LSO is defined by worldwide standards as being a designated, trained person who directs laser safety practices and ensures a safe environment while a laser is in use. Each practitioner needs an LSO trained/educated through an accredited safety program. LSO must be present during any procedure using a class IIIb or class IV laser. If the safety practices are not being followed, then the LSO has the authority to shut down the laser operation. The officer must ensure that the "laser in use" sign is posted in a highly visible area to limit the access of others into the treatment room. The sign should include the danger logo, indicate visible or invisible laser light (i.e., specific wavelength and the classification. No one is allowed in the near proximity of the surgical field unless authorized and wearing the specific protective eyewear. The LSO should be familiar with the operator's manual and safety procedures including the manufacturer's recommendations for maintenance, documentation of that maintenance and the adverse-effects reporting mechanism. The LSO also oversees inventory and maintains laser supplies and accessories and is the person responsible for supervising staff education and training.

Three kinds of controls measures:[9]

1. Engineering controls, which are inbuilt safety features, supplied by the manufacturer in compliance with IEC and FDA (CDRH) standards. These include but are not limited to: guarded footswitch, audible and visible emission indicators, stand-by control, emergency off control, housing interlocks, and beam attenuators.

2. Procedural controls, which are policies and procedures in healthcare facilities. These are operational activities, specific to equipment and practice, and include but are not limited to: ocular protection, flammability hazard prevention, controlled access, management of plume, control of electrical hazards, and control of the delivery system and beam emissions.

3. Administrative controls are the infrastructure of the laser safety program. These must be in place before the laser can be used, and include: appointment of a Laser Safety Officer (LSO), organization of a safety committee (LSC), development of documentation tools, education and training of all personnel, compliance with Occupational Health and Safety rules, development of a formal audit and technical management plan. These are the control measures most often reviewed by outside inspection agencies such as OSHA, state health departments.

Conclusion

Laser use in dentistry is proven to be beneficial in treating a wide range of dental conditions. The dynamics of laser energy beams pose general risks to non-oral tissues and the immediate environment of such use must be deemed at risk from direct or scattered exposure. Safety measures have been devised to safeguard those personnel – staff and patients – who may be involved in dental treatment using lasers.

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CASE REPORT

Review on gingival recession classification

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ABSTRACT

This article is on various classification of gingival recession. Gingival recession is defined as the exposure of the root surface by an apical shift in the position of gingiva. It is prevalent world over affecting both developing as well as under developing countries. Miller's classification of gingival recession is most widely followed. With a wide array of cases in daily clinical practice, it is often difficult to classify numerous gingival recession cases according to defined criteria of the present classification systems. This article outlines the limitations of present classification systems and also the new classifications that have been proposed to classify gingival recession.

Key words: Cemento Enamel Junction, Gingival Recession, Mucogingival junction

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Gingival recession is defined as the exposure of the root surface by an apical shift in the position of gingiva. It is prevalent world over affecting both developing as well as under developing countries without any racial predisposition and is seen in all type of age groups. Gingival recession leads to different type of problems such as hypersensitivity, root caries as well as esthetic problems. There are various etiological issues related to recession. The main etiological factors are plaque accumulation, malposition of teeth, inadequate attached gingiva, abnormal frenum attachment, osseous dehiscence, vigorous brushing orthodontic tooth movement, smoking etc.

Several classifications have been proposed in literature to facilitate the diagnosis of gingival recessions[1]. They are:

- Sullivan and Atkins (1968)
- Mlinek (1973)
- Liu and Solt (1980)
- Bengue (1983)
- Miller (1985)
- Smith (1990)
- Nordland and Tarnow (1998)
- Mahajan (2010)
- Cairo et al. (2011)

- Rotundo et al. (2011)
- Ashish Kumar and Masamatti (2013)
- Prashant et al. (2014)

Sullivan and Atkins (1968)

The earliest classification dates back to 1968 when Sullivan and Atkins.[2] The basis of this classification system was the depth and width of the defect.

He proposed following four categories:

1. Deep wide
2. Shallow wide
3. Deep narrow
4. Shallow narrow[3] (Fig 1)

Mlinek et al. (1973)

- Shallow narrow: Recession <3 mm
- Deep wide: Recession >3 mm3

Liu and Solt (1980)

This classification is based on the marginal issue recession-

1. Visual: Measured from CEJ to soft tissue margin
2. Hidden: Loss of attachment within the pocket that is apical to tissue margin

Bengue et al. (1983)

classified the recessions based on their morphology and prognosis: "U" type recession has poor prognosis, "V" type recession has fair prognosis and "I" type recession has good prognosis.[4] (Fig 2)

PD Miller (1985)

Miller proposed a classification based on morphological evaluation of injured periodontal tissues, which could be useful in predicting final amount of root coverage following free gingival graft procedure.[5]

Class I Marginal tissue recession that does not extend to the mucogingival junction

Class II Marginal tissue recession that extends to or beyond the mucogingival junction, with no periodontal attachment loss (bone or soft tissue) in the interdental area

Class III Marginal tissue recession that extends to or beyond the mucogingival junction, with periodontal attachment loss in the interdental area or malpositioning of teeth

Class IV Marginal tissue recession that extends to or beyond the mucogingival junction, with severe bone or soft-tissue loss in the interdental area and/or severe malpositioning of teeth[1](Fig 3)

Smith 1990

The Index of recession was introduced by Smith in 19906.The index considered the involvement of facial and lingual surfaces, mucogingival junction (MGJ) and amount of horizontal and vertical component (in mm) The author proposed that in cases of extensive vertical component further horizontal component may be allotted at an intermediate distance between CEJ and base of the defect, which is not clearly specified. Also separate values can be assigned for multi-root-ed teeth, which make it more complex. It may lead to overestimation of the condition as it utilizes subjective awareness of sensitivity. It is also difficult to detect the midpoints of mesial and distal surfaces, in the presence of intact interdental papilla.[2]

The horizontal extent of recession

Score 0 No clinical evidence of root exposure

Score 1 No clinical exposure of root exposure plus a subjective awareness of dentinal hypersensitivity in response to a one-second air blast is reported, and/or there is clinically detectable exposure of the CEJ† for up to 10 percent of the estimated mid-mesial to mid-distal distance

Score 2 Horizontal exposure of the CEJ more than 10 percent but not exceeding 25 percent of the estimated mid-mesial to mid-distal distance

Score 3 Exposure of the CEJ more than 25 percent of the mid-mesial to mid-distal distance but not exceeding 50 percent

Score 4 Exposure of the CEJ more than 50 percent of the mid-mesial to mid-distal distance but not exceeding 75 percent

Score 5 Exposure of the CEJ more than 75 percent of the mid-mesial to mid-distal distance up to 100 percent[7]

The vertical extent of recession

Score O- No clinical evidence of root exposure

Score 1 No clinical root exposure plus a subjective awareness of dentinal hypersensitivity is reported and/or there is clinically detectable exposure of the CEJ not exceeding > 1mm vertical to the gingival margin.

Score 2 to 8 -Root exposure 2 to 8 mm extending vertically from the CEJ to the base of the soft tissue defect

Score 9- Root exposure > 8mm from the CEJ to the base of the soft tissue defect.[4]

Nordland wp and tarnow dp in 1998

The classification system for loss of papillary height. The system utilizes three identifiable landmarks: the interdental contact point, the facial apical extent of the CEJ, and the interproximal coronal extent of the CEJ. Normal: Interdental papilla fills embrasure space to the apical extent of the interdental contact point/area.

Class I: The tip of the interdental papilla lies between the interdental contact point and the most coronal extent of the interproximal CEJ

Class II: The tip of the interdental papilla lies at or apical to the interproximal CEJ but coronal to the apical extent of the facial CEJ

Class III: The tip of the papilla lies level with or apical to the facial CEJ.[3] (Fig 4)

Mahajan- 2010

Based on the modified classification system of millers:

Class I: GRD not extending to the MGJ

Class II: GRD extending to the MGJ/beyond it

Class III: GRD with bone or soft-tissue loss in the interdental area up to cervical 1/3 of the root surface and/or malpositioning of the teeth

Class IV: GRD with severe bone or soft-tissue loss in the interdental area greater than cervical 1/3rd of the root surface and/or severe malpositioning of the teeth[8]

The prognosis based on the following guidelines.

Prognosis

BEST: Class I and Class II with thick gingival profile le.

GOOD: Class I and Class II with thin gingival profile.

FAIR: Class III with thick gingival profile.

POOR: Class III and Class IV with thin gingival profile.[8] (Fig 5)

Rotundo et al. (2011)

Rotundo et al. (2011) classified gingival recession taking into consideration both soft and hard dental tissues. For classification, specific taxonomic variables have been considered, and in particular, the amount of keratinized tissue (KT = 2 mm); the presence/absence of non carious cervical lesion (NCCL), with a consequent unidentifiable CEJ; and the presence/absence of interproximal attachment loss.

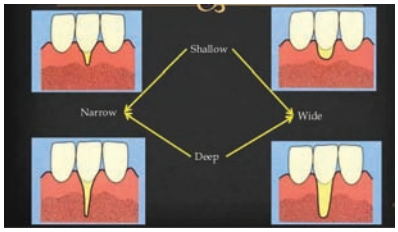

Fig1

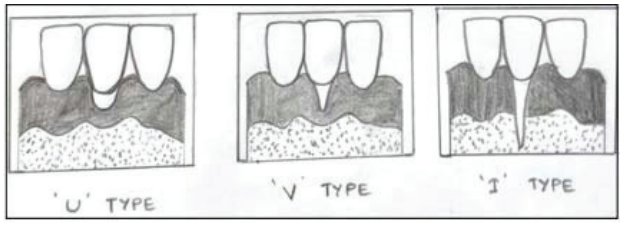

Fig2

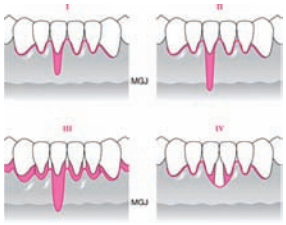

Fig3

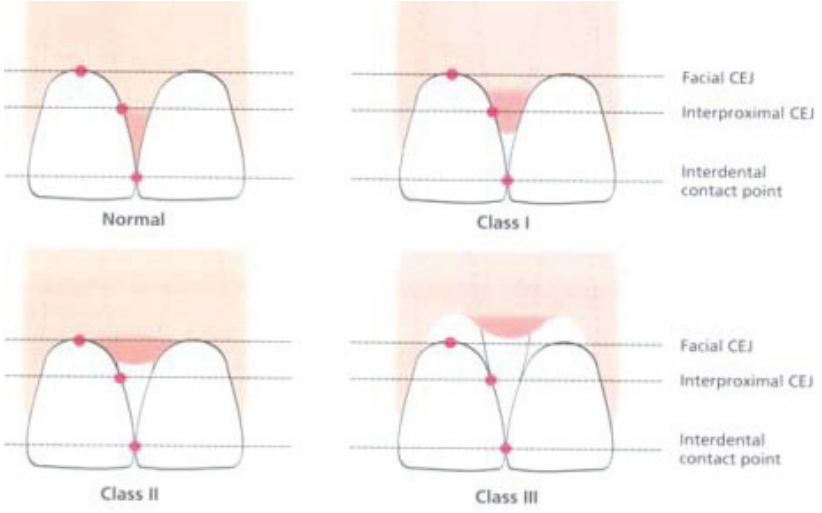

Fig4

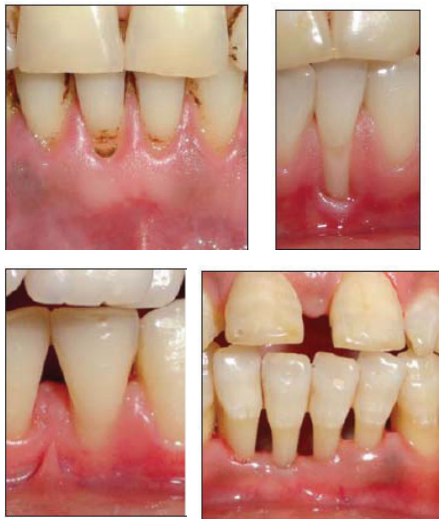

Fig5

Considering these variables, the following method of assessment is suggested:

A. KT ≥2 mm

• NCCL – absent

• Interproximal attachment loss – absent.

B. KT <2 mm

• NCCL – present

• Interproximal attachment loss – present.

As a consequence, the following classes may be identified within the population:

• KT ≥2 mm – no NCCL – no interproximal attachment loss (AAA)

• KT ≥2 mm – NCCL – no interproximal attachment loss (ABA)

• KT ≥2 mm – no NCCL – interproximal attachment loss (AAB)

• KT ≥2 mm – NCCL – interproximal attachment loss (ABB)

• KT <2 mm – no NCCL – no interproximal attachment loss (BAA)

• KT <2 mm – NCCL – no interproximal attachment loss (BBA)

• KT <2 mm – no NCCL – interproximal attachment loss (BAB)

• KT <2 mm – NCCL – interproximal attachment loss (BBB).9

Ashish Kumar and Masamatti (2013)

A new classification system was proposed by Kumar and Masamatti in 2013 based on amalgamation of certain criteria of Miller's classification with the certain features of Nordland and Tarnow's classification. It can be applied for facial surfaces of maxillary teeth and facial and lingual surfaces of mandibular teeth. Interdental papilla recession can also be classified according to this new classification.

• Class I: There is no loss of interdental bone or soft tissue.

This is sub classified into two categories

Class IA: Gingival margin on F/L aspect lies apical to CEJ, but coronal to MGJ with attached gingiva present between marginal gingiva and MGJ

Class IB: Gingival margin on F/L aspect lies at or apical to MGJ with an absence of attached gingiva between marginal gingiva and MGJ.

• Class II: The tip of the interdental papilla is located between the interdental contact point and the level of the CEJ midbuccally/midlingually. Interproximal bone loss is visible on the radiograph. This is subclassified into three categories:

Class IIA: There is no marginal tissue recession on F/L aspect

Class IIB: Gingival margin on F/L aspect lies apical to CEJ but coronal to MGJ with attached gingiva present between marginal gingiva and MGJ

Class IIC: Gingival margin on F/L aspect lies at or apical to MGJ with an absence of attached gingiva between marginal gingiva and MGJ.

• Class III: The tip of the interdental papilla is located at or apical to the level of the CEJ midbuccally/midlingually. Interproximal bone loss is visible on the radiograph. This is sub classified into two categories:

Class IIIA: Gingival margin on F/L aspect lies apical to CEJ, but coronal to MGJ with attached gingiva present between marginal gingiva and MGJ

Class IIIB: Gingival margin on F/L aspect lies at or apical to MGJ with an absence of attached gingiva between marginal gingiva and MGJ.[10]

Cairo 2011

a newer classification using the inter-dental clinical attachment level (ICAL) :

Recession Type 1 (RT1) - associated with no interdental attachment loss

Recession Type 2 (RT2) - the loss of ICAL is equal or smaller than the buccal attachment loss

Recession Type 3 (RT3) -the loss of ICAL is higher than the amount of buccal attachment loss.11

Prashant et al 2014

Classification that describes the dental surface defects that are of paramount importance in diagnosing gingival recession areas which might help in selecting definite treatment approach. The evaluation was performed on both frontal and lateral views using a ×4 magnification lens, a periodontal probe (PCP UNC15), and a dental explorer. Two variables were considered: CEJ and cervical discrepancies.

Two variables were identified: Class (+), presence of cervical step (>0.5 mm) involving the root or the crown and the root and Class (−), absence of cervical step

CEJ Class A - Step − CEJ visible, without step

CEJ Class A - Step + CEJ visible, with step

CEJ Class B - Step − CEJ not visible, without step

CEJ Class B - Step + CEJ not visible, with step

Classification of palatal gingival recession

The position of interdental papilla remains the basis of classifying gingival recession on palatal aspect. The criteria of sub classifications have been modified to compensate for the absence of MGJ

Palatal recession-I

There is no loss of interdental bone or soft tissue. This is subclassified into two categories:

• Palatal recession-IA (PR-IA): Marginal tissue recession ≤3 mm from CEJ

• PR-IB: Marginal tissue recession >3 mm from CEJ

Palatal recession-II

The tip of the interdental papilla is located between the interdental contact point and the level of the CEJ mid palatally. Interproximal bone loss is visible on the radiograph. This is subclassified into two categories:

PR-IIA: Marginal tissue recession ≤3 mm from CEJ

PR-IIB: Marginal tissue recession >3 mm from CEJ

Palatal recession-III

The tip of the interdental papilla is located at or apical to the level of the CEJ mid-palatally. Interproximal bone loss is visible on the radiograph. This is subclassified into two categories:

PR-IIIA: Marginal tissue recession ≤3 mm from CEJ

PR-IIIB: Marginal tissue recession >3 mm from CEJ[3]

Discussion

We acknowledge the contributions of various eminent researchers in this field, which has paved a pathway for the current endeavour. Diagnosis and classification form an important part of approach to any condition or disease. The already existing classifications have some shortcomings which have been discussed[3]. One of the first classification on gingival recession was given by Sullivan and Atkins in 1968. In a classical article, soft-tissue defects at mandibular incisors were divided into four classes: "Narrow," "wide," "shallow" and "deep."[10] Pini-Prato has critically evaluated the limitations of Miller's classification based on Murphy's criteria.8 Based on that this review tried to overcome that. Our proposed classification is useful and exhaustive as it accommodates all clinical conditions that could be encountered in our practice.[2] We understand that all the classifications have some inbuilt drawbacks and none of them can actually serve the whole purpose. Hence, we recommend that the classification system which is suitable for a particular case should be used.

Conclusion

Although various classification systems are in use and each system has an advantage of its own. No classification system can be complete and everlasting; with time and its continual use, one realizes the advantages and disadvantages of each system[3]. An attempt has been made to review almost all the systems so that more accurate and detailed clinical picture can be made out for wide variety of cases.

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REVIEW

Botox in dentistry-a review

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ABSTRACT

Every aspect of head and neck affect a person's aesthetics and self-confidence. In this era, various new technologies have emerged to enhance and improve one's physical appearance This lead to the introduction of minimally invasive procedures like botox . Botox is well known for its aesthetic results of giving smooth skin. Today botox is one of the hottest and happening names in cosmetic industry. Botulinum toxin, which is a neurotoxin, popularly known as Botox worldwide, which when used in therapeutic doses can produce wonders in cosmetic problems of the orofacial region. Apart from cosmetic therapy, botox has got wide array of uses in dentistry .This article reviews the various applications of Botox in dentistry.

Keywords: Botox, botulinum toxin, aesthetics, dentistry

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Introduction

Botulinum toxin (BT) is a neurotoxin produced by an anaerobic bacteria Clostridium botulinum which causes a serious disease called botulism. It is characterised by paralysis of the musculature in the body leading to death. This was first noticed by Emile van emengem in 1897. The first therapeutic use of botulinum toxin was conceived by Kerner and coined the name botulism (from latin botulus meaning sausage"). Botox has been approved by the food and drug administration (FDA) for therapeutic treatments of eye muscle problems (in 1989), neck problems (in 2000), and excessive sweating (in 2004). In 2002, the FDA approved Allergan's botox cosmetic for the purpose of temporarily erasing facial lines. Botulinum toxin can be differentiated serologically into eight kinds of toxins named from A to G (A, B, C1, C2, D, E, F, and G). Neurotoxin strains A and B are antigenically different, functionally similar and are commercially available for medical treatments[1]. Botox possess a significant and elaborate history in medical therapeutics. It is used in various conditions like cervical dystonia, hyperhidrosis, strabismus, blepharospasm etc[2]. In the recent years, botox has been increasingly used in dentistry due to its promising therapeutic effects.

History

An idea of possible therapeutic use for botulinum toxin was first developed by German physician, Justinus Kerner (1786-1862) who deduced that it acted by interrupting signal transmission within peripheral sympathetic nervous system, leaving sensory transmission intact[2]. In 1928, P. Tessmer Snipe and Hermann Sommer purified the toxin for the first time[3]. In 1949, Arnold Burgen's group discovered that botulinum toxin blocks neuromuscular transmission through decreased acetylcholine release[2]. At present, it is being investigated for treating other medical conditions. For many years, physicians also have used botox "off-label" (that is, without FDA approval) to treat other medical problems[3].

The injections clearly reduce the severity of motor contraction–induced abnormal head position and accompanying neck pain. In 2000, the FDA approved Botox B for the treatment of cervical dystonia in patients who developed Botox A resistance. Since then, Botox A has been approved for the treatment of primary axillary hyperhidrosis (excessive sweating) and for the reduction of deep glabellar lines in the face[3].

Dentistry and botox

Botox is a minimally invasive option for a number of dental conditions. It is commonly used to treat temporomandibular disorder (TMD), dental implants and surgery, masseteric hypertrophy, mandibular spasm, headache, migraine, trigeminal neuralgia, myofacial pain and neck pain, bruxism and clenching cases, angular cheilitis, gummy smile, orthodontic relapse and depressed orthodontic appearance, to reduce muscle hyperactivity for the retention of removable prosthodontics and many more conditions3.

Preparations

Botox is prepared by laboratory fermentation of Clostridium botulinum, which lyses and liberates the toxin into the culture. The toxin is then harvested, purified and crystallized with ammonium sulphate, diluted with human serum albumin, lyophilized, bottled in vials and sealed4.The human lethal dose is estimated to be approximately 3000 U. Botox dosages used for cosmetic purposes are typically less than 100 U. Optimal pH of the solution is between 4.2 and 6.8.The vials should be stored in a freezer at or below -5 degree Celsius. Preparations should be reconstituted with 1 to 5ml of saline without preservatives just before use. This is done because botox is easily denatured via agitation or bubbling. The diluent should be gently injected inside the wall of thevial. The reconstituted solution should be refrigerated at 2 to 8 degree Celsius and used within 4 hours[4]. The treatment dose varies for each brand and for different parts of the body.

Dosage

Each vial of Botulinum toxin (BT) contains-

1.100 Units (U) of Clostridium botulinum type A neurotoxin complex 2.0.5 milligrams of Human albumin and 0.9 milligrams of sodium chloride in a sterile, vaccum-dried form without a preservative. Adding 4 ml of 0.9% preservative-free normal saline solution makes injections and the preparation should be used within 4 hours1.

Mechanism of action

When overactive muscles are injected with minute quantities of botulinum toxin type-A , it showed decrease in muscle activity. The activity against SNARE proteins, which are 25-kd synaptosomal associated proteins that are required for the docking of the ACH vesicle to the presynaptic membrane. This effectively weakens the muscle for a period of three to four months and as the muscle initiates new acetylcholine receptors and the growth of branches from the neurons to form new synaptic contacts, slowly and steadily the muscle returns to its full function and with no side-effects1.

Periodontal applications of botox

1 GUMMY SMILE

2 BLACK TRIANGLE

3 DENTAL IMPLANTS

Gummy smile

Excessive display of maxillary gingival tissue upon smiling is often aesthetically displeasing. It is called gingival smile. The gingival smile is known by a variety of terms like gummy smile, high lip line, short upper lip, and full denture smile. It is due to skeletal, gingival and hyperactive lip elevator muscles. Surgical corrections of the hyper functional lip elevator muscles are not promising as it may end up in scar contraction and relapses. Hence, minimally invasive treatment modality like BT would be advantageous when the gummy smile is due to hyper functional upper lip elevator muscles. The smile itself and the aesthetics of the smile are influenced by 3 components: teeth, gums, and lips. An attractive smile depends on the proper proportion and arrangement of these 3 elements. The upper lip should symmetrically expose up to 3 mm of the gum and the

gum line must follow the contour of the upper lip. The exposure of more than 3 mm of the gum during the smile is known as gingival or gummy smile. Hulsey noted that the most attractive smiles were those in which the upper lip rested at the height of the gingival margin of the maxillary incisor. Tjan et al reported gender differences in the smile line. Low smile lines are predominantly seen in males with a male:female ratio of 2.5:1 and high smile lines are predominantly seen in females with a male:female ratio of 2:15.

Causes of gummy smile[5,6,7,8]

Musculature and lip incompetence

Altered passive eruption

Skeletal disharmonies

During orthodontic treatment

Unexpressed vertical growth

Extrusive forces

Antero-posterior position of the maxilla

Treatment:

Preparation of injection site

The preferred syringe is a calibrated 1ml tuberculin syringe and the needle selected for injection is usually between 26 and 30 gauge. Skin preparation involves alcohol wipes and dry sterile gauze sponges. Aspiration before injection is recommended. Usually, dosing is established after the diagnosis and reason for use of the toxin, size of the muscle, and medical conditions and medications. Botulinum toxin should be injected carefully in small titrated doses to limit muscular over-contraction of upper lip. This reduces the exposure of upper gums while smiling. Hwang at Yonsei University College of dentistry, Seoul, Korea have proposed an injection point for botulinum toxin and named it as Yonsei point. It is basically a point located at the centre of triangle formed by levator labii superioris, levator labii superioris aleqaue nasi and zygomaticus minor. A dose of 3U is recommended at each injection site.

In a small open-label trial, five patients with excessive gingival display due to hyper-functional upper-lip elevator muscles were treated with botox injections under electromyographic guidance. Patients received 0.25 U per muscle bilaterally into the levator labii superioris, levator labii superioris alaeque nasi, and at the overlap areas of the levator labii superioris and zygomaticus minor muscles[3]. All of the patients were pleased with the results and the effective increase in upper lip length upon smiling averaged 124.2%[3]. The duration of effect ranged from 3 to 6 months, and no adverse effects were reported or observed. However, the improvement is temporary and must be repeated every six months to one year[3].

Black triangle

Black triangles are seen following placement of crowns, bridges and especially implants or after periodontal surgery. It is one of the most challenging aesthetic concerns. By injecting BT into these areas, it literally plumps up papilla and is a minimally invasive way to create proper and more pleasing gingival contours1.

Dental implants

In patients with parafunctional habits excessive functional forces can hamper the process of osseointegration. Thus, the overloading of implant results in its failure. Forces from hyperactive masticatory muscles can also prevent or impede fracture callus formation after maxillofacial fracture fixation. Hence in both conditions muscular relaxation can be achieved with BT injections into the masticatory muscles allowing a more stable environment for implant integration and fracture healing1.

Contraindications of botox

The relative contraindications include pregnancy, lactation, neuromuscular diseases (myesthenia gravis, Eton-lambert syndrome), motor-neuron diseases, concurrent usage of amino glycosides and sensitivity to toxin.

The potential adverse effects of botulinum toxin are facial nerve palsy, pain at the injection site, flu-like symptoms, non-targeted muscle weakness, dysphagia, and hematoma. These complications are generally transient and resolve within a couple of weeks[1,3].

Disadvantages of botox

Treatment with botox is not a permanent option unlike other surgical alternatives. The effects of this treatment are only for short term usually for six months and after that the procedure has to be repeated. It is important to note that the injection of botox should not be given prematurely before the effect of earlier treatment has worn off completely as it can result in build-up of antibodies to botox that will dilute the effect of further treatments. Moreover, the treatment might sometimes produce asymmetrical results due to injection at wrong site. The therapeutic approach using botox inhibits masticatory function temporarily and the masticatory forces will eventually return to previous levels once the effect of the drug has subsided[3].

Conclusion

The Indian Academy of Facial Esthetics (IAOFE) in association with the American Academy of Physicians continues to develop successful proven techniques and trains dentists to integrate these procedures into dental aesthetic and therapeutic treatment plans. Botulinum toxin therapy is one of the most promising novel additions to the dentist's arsenal for the treatment of various orofacial and cosmetic corrections. BT provides a treatment that is reversible, conservative, quick and painless in comparison to other surgical alternatives. There are still many dental conditions which require FDA approval to be treated by botulinum toxin. BT offers an array of valuable solutions for dentist and will surely take dental profession to one step ahead in the field of progress.

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