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Contents

President's message

Coming together is beginning, being together is progress, and Working together is success

-Henry Ford

It is indeed an honour to adorn the apex post of our esteemed society. I thank each and every one of you for bestowing this privilege upon me. I strongly believe that I have a good team of office bearers who are competent enough to carry forward all our activities without losing its charm and flavour. SPIK is already having a strong platform where a series of unique events are hosted every year reaching out to all categories of our members. Our predecessors have done well enough to streamline all these activities in a good way.

This year, apart from conducting our regular calendar events, we are thinking of few programmes that will help to infuse principles of clinical periodontology into the general dental practitioners and other fellow specialists in dentistry. We are trying our best to chart out few programmes in that arena.

Science is the backbone of any professional organization. Writing science is a talent and our society has a good platform for its members to write the science they learned, the science they practice and the science they discover, in our prestigious JSPIK. I am sure JSPIK is in strong and safe hands and our editorial team will be able to take this journal to a different level in the future.

My humble appeal to all our fellow members and colleagues is to group together under the umbrella of Periodontology without any dividing lines in between so that TOGETHER we will be able to transform our speciality to one of the most "IN DEMAND" faculty among the dental disciplines.

On behalf of all in SPIK team 2019, I wish each and every one of you a very memorable and fruitful SPIK year ahead.

Yours in SPIK,

Dr. Harikumar Menon
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Guest Editorial

Dr. K. NANDAKUMAR MDS

Consultant Periodontist

Dean : Azeezia College of Dental Sciences and Research Kollam.

Executive Member : Kerala Dental Council

National Editorial Board : Journal of Indian Society of Periodontology

Positions Held

Dean, Faculty of Dentistry, Kerala University

Member- Dental Council of India

Member Board of Studies (PG), Dentistry, University of Kerala.

National Vice-President, Indian Dental Association.

National President Indian Society of Periodontology

Editor: Kerala Dental Journal (2009 – 2017)

Recognition Awards

Indian Dental Association – Kerala State " Association Appreciation Award"

Best Teaching Dental Faculty Member in the Directorate of Medical Education for the year 2000

Oral health-related quality of life

"Health is a complete state of physical, mental, social wellbeing and not just the absence of the disease". Moreover, individual oral health is an important part of the general health and a crucial factor that impacts an individual quality of life. Oral health was defined by WHO in 2013 as "a state of being free from chronic mouth and facial pain, oral and throat cancer, oral sores, birth defects such as cleft lip and palate, periodontal disease, tooth decay and tooth loss, and other diseases and disorders that affect the oral cavity.

Attainment of optimal oral health and wellness is a challenging and dynamic process that occurs along the aging continuum with a new model of health prevention for older adults, that emphases on ensuring safety, minimizing disease risks, maintaining function, and optimizing oral health quality of life. Oral health care professionals should learn how to individualize preventive strategies to improve desired health outcomes for their elderly patients.

Periodontal disease continues to be a significantly widespread oral health problem. Clinicians play a significant role in the management of this disease. Recent updates on categorizing periodontal disease provides a new framework to reexamine treatment planning and monitoring case management of periodontitis. Focuses on non-surgical treatment strategies using current advances and best practices to optimize treatment outcomes have showed an improved quality of life.

The Oral Health Impact Profile OHIP (Oral Health Impact Profile) is widely used to evaluate the OHRQOL. Epidemiological studies have shown that: in people with poor oral health, such as having low number of teeth and carious lesion, periodontal pocket and gingival recessions the OHIP scores are high; people who don't visit the dentist regularly and have low socio-economic status, OHIP are high.

Oral health-related quality of life (OHRQoL) has an important impact on the clinical practice of dentistry and dental research. OHRQoL is a multidimensional paradigm that involves a subjective assessment of the individual's oral health, functional well-being, emotional well-being, expectations and satisfaction with care, and sense of self. Further researches are needed in this domain to improve the quality of data that can enable researchers to draw solid conclusions.

Dr. K. Nandakumar

Secretary's Message

Dear SPIK members,

At the outset, let me express my sincere gratitude for giving an opportunity to serve the professional association of Periodontists in the State in the capacity of Secretary. It's a great privilege and honor and at the same time, a position of great responsibility that has been handled quite efficiently by my predecessors. I hope to do justice to the same with the support and cooperation of all of you.

The last SPIK year concluded with the first combined Annual Conference and Post-graduate Scientific Convention held at Kochi on February 23 and 24, which saw the representation of all post-graduate institutions in Kerala as well as from the neighboring states. On behalf of the organizing committee, I thank all the life members and post-graduate students who contributed to the success of the program.

SPIK is fortunate to have Dr Harikumar Menon as the President for 2019 – 20', who is a true academician, an excellent clinician and a passionate Periodontist. He has envisaged a number of varied programs to cater to the academicians, the practitioners, the post-graduate students and the undergraduates. The details of the same shall be communicated to all members well in advance. With his able leadership and the excellent team of office bearers, I am sure that our members will gain maximum benefit from these programs. At this juncture, I would like to inform all that as per the decision of the Annual General Body Meeting, henceforth; participation in all SPIK programs shall be limited to Periodontists/Post-graduate students who are SPIK members. Keeping this in mind, we are planning for a membership drive in the coming months. I request all members to actively encourage and motivate their fellow Periodontists to join the SPIK fraternity.

In the long run of any association or institution, maintaining consistency over time is the key. We can take pride in the fact that from its very inception, SPIK has been able to maintain the same through a number of flagship ventures like the PG Convention, the UG Scholarship Exam and JSPIK, the official publication of our society. Our journal is among the very few specialty regional journals in the country itself that is getting published on a regular basis, thanks to the earnest efforts of our past editors. I really appreciate the enthusiasm which Dr Sameera, our new Editor has exuded to continue this. I wish her all the very best and urge all members to make their valuable scientific contributions to our publication

Once again, I solicit the guidance, suggestions, cooperation and support of our dear members in all our activities. Together, we can take our specialty to greater heights.

Be proud to be a Periodontist

Dr. Jayan Jacob Mathew
Secretary, SPIK

Creeping attachment – enhancing root coverage naturally

Nithya Susan George[1], Majo Ambooken[2], Jayan Jacob Mathew[3], Aidha P Y,[4] Rasha P Razak[5]

ABSTRACT

Attaining optimal outcomes in the treatment of gingival recession is one of the goals of periodontal plastic surgery. The surgically achieved root coverage can show enhancement in the post-surgical period attributable to the phenomenon of creeping attachment, an occurrence less elucidated. A 44 year old systemically healthy female reported with the complaint of receding gums in relation to upper front tooth with a recently placed crown. A minimal recession of less than 1 mm was observed, which was treated with a semilunar flap. However, the recession aggravated due to flap necrosis. A lateral pedicle flap with chorion membrane was then performed after two weeks resulting in a residual recession of 2mm. At six months, complete coverage of the recession was noticed.

Key words: creeping attachment, chorion membrane, lateral pedicle graft, gingival recession

Introduction

Gingival recession is a major cause of aesthetic concern for patients. Numerous root coverage techniques like free gingival grafts, pedicle grafts, sub-epithelial connective tissue grafts and their modifications have been developed over the years to manage gingival recession.[1] The extent of root coverage achieved at the time of surgery are seldom maintained owing to the post-surgical retraction of the flap margin and hence, recessions are usually overcorrected. However, there exists a unique phenomenon termed 'creeping attachment' wherein the recession can improve during the course of the post-operative period. This was first described by Goldman et al and defined as the post-operative migration of the gingival margin in a coronal direction over a previously denuded root.[2] Here we report a case of retreatment of gingival recession that showed additional root coverage at the post-operative review, which was attributed to creeping attachment.

Case report

A 44 year old female reported to the Department of Periodontics and Implantology, Mar Baselios Dental College, Kothamangalam with a chief complaint of discolouration of the upper front teeth region. She had noticed it for the past one year. She gave a history of trauma during early adulthood following which she underwent endodontic treatment and crown placement in relation to the upper front teeth two years ago. The medical history was non-contributory. On clinical examination, the oral hygiene status was fair. There was a 1mm recession on the labial aspect of tooth 11 with a blackish discolouration of the exposed root [Figure 1]. Replacement of the crown was suggested as the treatment plan, but due to its recent placement, the patient was reluctant to change it. As an alternative, considering the minimal recession and presence of adequate amount of keratinized gingiva apically, a coronally advanced semilunar flap[3] was performed in

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relation to 11. To correct the possible discrepancy in the levels of gingival zenith post-operatively, 12 was also included in the procedure [Figure 2]. However, at 10 days post operative review, necrosis of the advanced tissue in relation to 11 was observed with an aggravated gingival recession of 3mm exposing the blackish discoloured root surface (figure not shown). A glass ionomer restoration was done on the exposed root surface to temporarily mask the defect [Figure 3]. Retreatment was done for the recession after two weeks with the patient's consent by means of a laterally positioned pedicle flap[4] in combination with a chorion membrane (Tissue Bank, Tata Memorial Hospital, Mumbai, India) [Figure 4]. The postoperative healing was uneventful with a residual recession of 2 mm noted two weeks post-operatively [Figure 5]. The patient was kept under regular review. At three months, the recession considerably reduced to 1mm [Figure 6] and at six months review, there was complete coverage [Figure 7]. The patient is presently under further review.

Fig 1: Preoperative view

Fig 2: Semilunar flap in relation to 11, 12

Fig 3: Aggravated recession restored with GIC

Fig 4: Lateral pedicle flap with chorion membrane performed in relation to 11

Fig 5: 10 days post operative

Fig 6: Three months review

Discussion

Semilunar flap, described by Tarnow, is ideal for minimal recessions particularly for the coverage of receding gingiva of recently placed crown margins in the maxilla. Considered to be the simplest root coverage procedure, this technique however has the inherent risk of aggravating the pre-existing recession in case of failure as noticed in this case. Semilunar flap can fail either when there is an underlying dehiscence or fenestration or due to avascular necrosis, the latter being the possible reason in the present case.[2]

Lateral pedicle graft is another relatively simple technique for root coverage primarily indicated for narrow single tooth recessions in mandibular incisors. It can, however be effectively employed in maxillary incisors also due to the normally wide zone of attached gingiva available there.

Recession coverage outcome can be improved by using various membranes, one of which is foetal membrane. It consists of amniotic and chorion tissues, wherein the chorion forms the outer layer of the sac that encloses the foetus and is composed of various types of collagen and cell adhesion bioactive factors.[5] The placement of chorion membrane aids in complementing the gingival biotype which allows the treated tissue to withstand trauma, promote creeping attachment and enhance the surgical result.[6] The reported use of chorion membrane in the management of gingival recession has been in combination with coronally advanced flap and to the best of our knowledge, this is the first instance where it is used along with a lateral pedicle graft.

Fig 7: Six months review

Creeping attachment, described by Goldman and Cohen, is the postoperative coronal migration of the gingival marginal tissue over a previously denuded root. It occurs within 1 to 12 months after surgery and may continue to progress beyond the first postoperative year. In a study conducted by Matter and Cimasoni[7], conditions that predisposed to creeping attachment were assessed and they concluded that factors which affected the amount of creeping attachment were width of recession, position of the graft in relation to the denuded root surface, position of the tooth in the arch, the level of interproximal bone height, and oral hygiene. The present case had a narrow recession with thick gingival biotype wherein the repositioning of the gingival margin in a coronal direction after the treatment was seen during each recall visit. This enhancement in the root coverage may be attributed to creeping attachment. Even though the extent of improvement was minimal (1 mm), it could improve the aesthetic component and patient satisfaction.

Conclusion

A case of post-surgical improvement of gingival recession attributed to creeping attachment following lateral pedicle graft and chorion membrane has been presented. This phenomenon is unpredictable regarding occurrence and extent, yet it offers a scope of improvement of the surgical results in root coverage procedures.

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JSPIK

Crown of smile - assessment of gingival display during smile and its effect on age, gender and facial profiles

V. R. Balaji[1], Manikandan[2], G. Abirami[3]

ABSTRACT

Aim : This study aimed to evaluate the amount of gingival display during natural smile and forced smile and its effect on age, gender and facial profiles.

Materials and methods: 1000 patients with healthy periodontium were recruited for this this study from the Department of Periodontology and Implantology, CSI College of Dental Sciences and Research, Madurai, Tamilnadu. Smile line evaluation was done by photograph using digital camera. The head rest was aligned to allow proper positioning of the head in Frankfort horizontal plane to assure optimal angulation during evaluation.

Results: Data revealed that class IV smile line was commonly seen in both age groups. During natural smile females showed 57.2% of class II. During forced smile class IV was the most frequent smile line seen among male and female. There was no statistical significant difference found in facial profile based smile analysis.

Conclusion: Based on the results of this study females have more gingival display than males. Excessive gingival display is an esthetic concern both to the patient and clinician. The knowledge about the factors influencing the smile can enhance the capability of a dental surgeon to do wonders in smile designing.

Keywords: gingival display, smile line, Frankfort horizontal plane, esthetics.

Introduction

Smile is a facial expression which has a strong influence on people's personal and professional life. It has a major impact in building relationships and in career development. According to Webster, "smile is a change of facial expression involving a brightening of eyes, an upward curving of the corners of the mouth with no sound and less muscular distortion of the features than in a laugh that may express amusement, pleasure, tender affection, approval, restrained mirth, irony, derision or any of various other emotions".

Facial attractiveness and an esthetic smile are important components of an individual's personality and psychological well-being.[1] An esthetic smile makes a person more attractive. There are 2 types of smile, which are forced smile and a natural smile.[2] A smile can be considered as an important determinant of the facial attractiveness of an individual. The components of the smile are the teeth and the gingiva. An esthetic smile is not only determined by the factors like tooth position, size, shape, and colour but also by the amount of gingiva revealed during the smile.

The amount of gingival exposure depends on the position of the smile line which is a curve that passes through the incisal margins of the maxillary incisors and canines making an arch.[3] The gingival visibility during smile improves the beauty of the smile. As smile designing is one of the day to day treatments done by

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the dentist, it is the duty of a treating dentist to have a proper knowledge about the smile analysis, gingival visibility and the variations in gingival visibility and its implications in periodontium.

Hence, the purpose of the present clinical study is to evaluate the amount of gingival display during natural and forced smile and also evaluate its variations associated with age, gender and facial profiles.

Fig 1: Head Rest aligned to allow proper positioning of the head in Frankfort Horizontal Plane

Fig 2: Nikon 2400D Camera

Fig 3: Class I -Very High Smile Line

Fig 4: Class II -High Smile Line

Fig 5: Class III -Average Smile Line

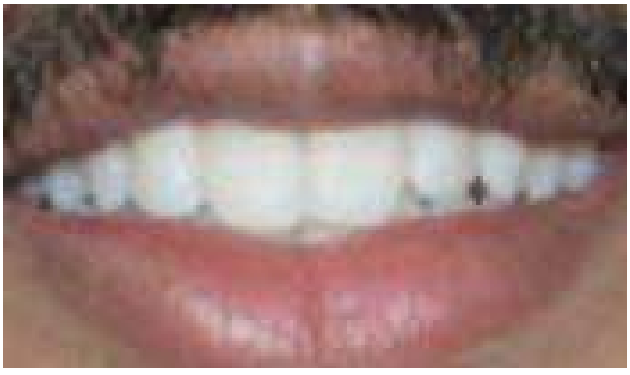


Fig 6: Class IV -Low Smile Line

Materials and Methods

A total of 1000 patients including both males and females within age group of 18 to 50 years were included in this study. Study was conducted among the patients reporting to Department of Periodontics and Implant Dentistry, CSI College of Dental Sciences and Research, Madurai, Tamilnadu. Institutional ethical committee acceptance was obtained (CSICDSR/IEC/0063/2018). All patients were informed about the study and written informed consent was obtained.

Participants were included in this study based on the following criteria:

- Subjects within 18-50yrs of age
- Subjects having atleast 8 continuous anterior teeth (14 to 24)
- Subjects with healthy periodontium

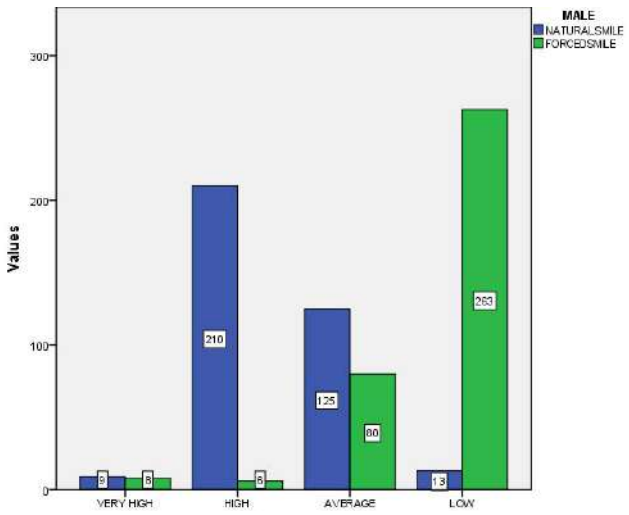
The following patients were excluded from the study:

- Subjects having fixed, removable prosthesis in maxillary anterior region
- Subjects with anterior crowding
- Subjects who have undergone orthodontic treatment

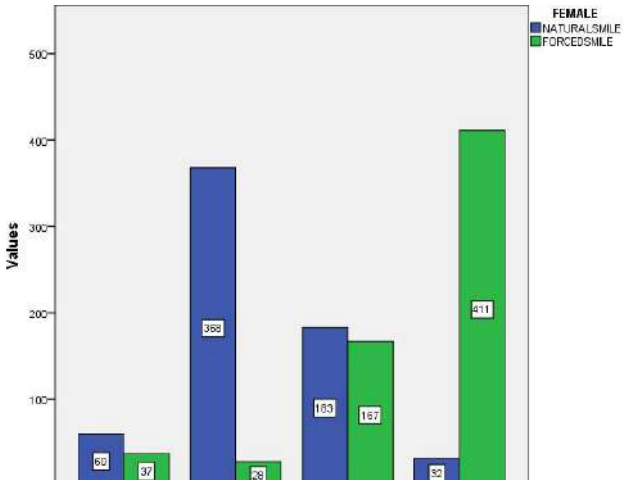
The criteria used to evaluate the smile line is based on the classification given by Liebert MF [4] in 2004

CLASS I -VERY HIGH SMILE LINE: More than 2 mm of marginal gingiva visible or more than 2 mm apical to the cementoenamel junction visible for the reduced but healthy periodontium.

CLASS II -HIGH SMILE LINE: Between 0 and 2 mm of marginal gingiva visible or between 0 and 2 mm apical to the cementoenamel junction visible for the reduced but healthy periodontium.



Graph I: Frequency Distribution of Males During Natural Smile and Forced Smile



Graph II: Frequency Distribution of Males During Natural Smile And Forced Smile

Table I: Frequency distribution of males during natural smile and forced smile

a	Very High	High	Average	Low
Natural Smile	9	210	125	13
Forced Smile	8	6	80	263

Table II: Frequency distribution of males during natural smile and forced smile

a	Very High	High	Average	Low
Natural smile	60	368	183	32
Forced smile	37	28	167	411

CLASS III -AVERAGE SMILE LINE: Gingival embrasures only visible.

CLASS IV -LOW SMILELINE: Gingival embrasures and cementoenamel junction not visible.

Smile line evaluation is done by photograph. The head rest aligned to allow proper positioning of the head in Frankfurt horizontal plane to assure optimal angulation. Examiner evaluates the position of the smile line during natural and forced smile from the pictures and evaluation done at the same time. Two photographs were taken of each patient: One during natural smile and another during forced smile. At the same time, the evaluation of smile line during natural and forced smile were done from the photographs.

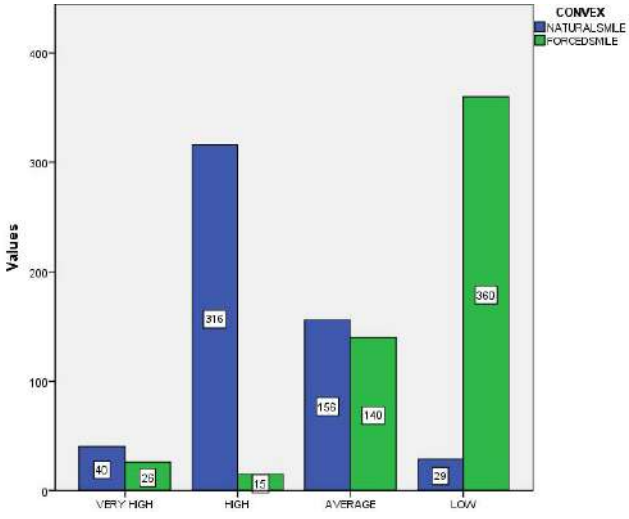
Statistical analysis

Data analysis was done by using chi-square test to assess the statistical significance of difference between groups.

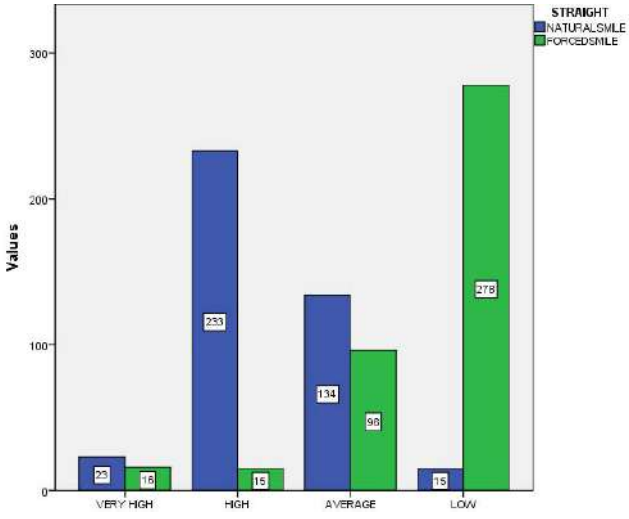
Results

Totally 1000 subjects with 357 males and 643 females within the age of 18-50 years were included in this study. Based on age analysis during natural smile class II smile line was most frequently seen in both older (57.6%) and in younger age group (58.4%). During forced smile class IV smile line was frequently seen in both groups (67.8% in younger & 65.9% in older age groups).There is no statistically significant differences between younger and older age groups.

When male and female were compared during natural smile, females showed 9.3% of class I, 57.2% of class II, 28.4% of class III and 4.9% of class IVsmile. During forced smile class IV was the most frequent smile line seen among male and female. There was a statistically significant difference between males and females during natural smile (p value - 0.000) and also in forced smile (p value -0.001)



Graph III: Frequency distribution of people with convex profile during natural smile and forced smile



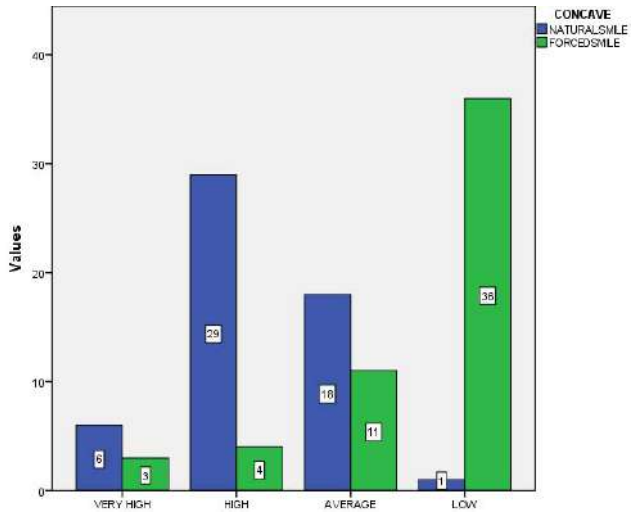
Graph IV: Frequency distribution of people with straight profile during natural smile and forced smile

Table III: Frequency distribution of people with convex profile during natural smile and forced smile

a	Very High	High	Average	Low
Natural smile	40	316	156	29
Forced smile	26	15	140	360

Table IV: Frequency distribution of people with straight profile during natural smile and forced smile

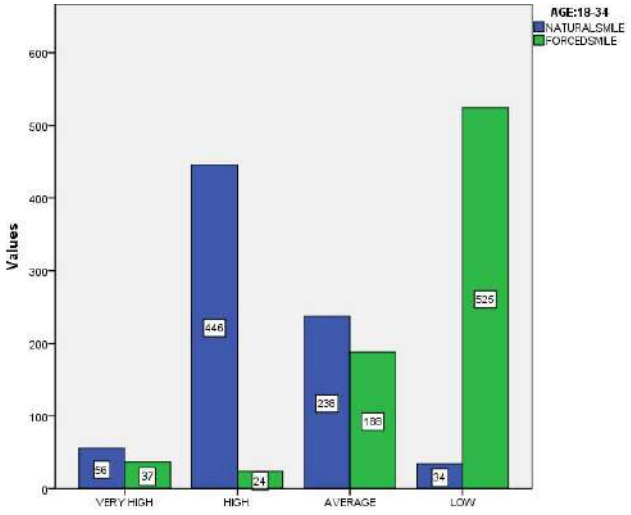
A	Very High	High	Average	Low
Natural smile	23	233	134	15
Forcedsmile	16	15	96	278



Graph V: Frequency distribution of people with straight profile during natural smile and forced smile

TABLE V: Frequency Distribution Of People With Straight Profile During Natural Smile And Forced Smile

a	Very High	High	Average	Low
Natural smile	6	29	18	1
Forced smile	3	4	11	36



Graph VI: Frequency distribution of 18-34 years age group people during natural smile and forced smile

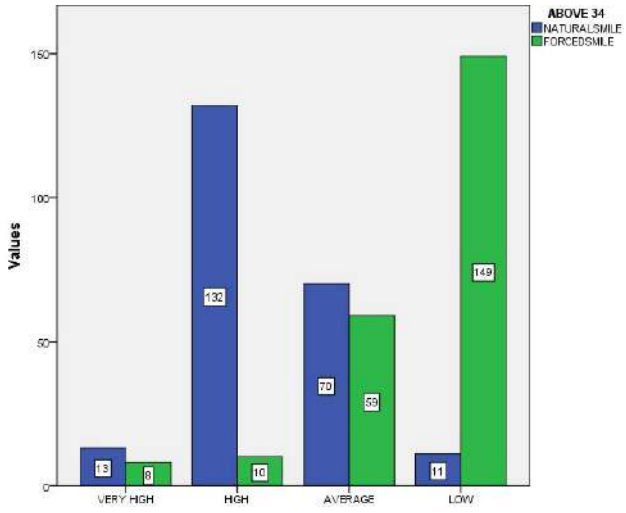
TABLE VI: frequency distribution of 18-34 years age group people during natural smile and forced smile

a	Very High	High	Average	Low
Natural smile	56	446	238	34
Forced smile	37	24	188	525

In facial profile based analysis during natural smile, class II smile line was the most commonly seen in convex (58.4%), straight (57.5%) and in concave profile (53.5%). During forced smile class IV was the most commonly seen smile line in convex (66.5%), straight (68.6%) and in concave profile (66.6%).The data analysis shows that there was no statistical significant difference in facial profile based smile analysis.

Discussion

The forced smile is voluntary in nature and the natural smile is involuntary in nature. Forced smile is otherwise called as social smile which is used as a greeting. It occurs when lips part due to moderate muscular contraction of the lip elevator muscles [5]. The natural smile represents the emotion of a person. It results from maximal contraction of the upper and lower lip, elevator, and depressor muscles, respectively. A natural smile causes full expansion of the lips, with maximum anterior tooth display and gingival visibility.



Graph VII: Frequency distribution of 35-50 years age group people during natural smile and forced smile

Table VII: Frequency distribution of 35-50 years age group people during natural smile and forced smile

a	Very High	High	Average	Low
Natural smile	13	132	70	11
Forced smile	8	10	59	149

The gingival visibility and the amount of anterior tooth display are muscle determined factors. It differs from individual to individual. The individual variables like upper and lower lip muscle strength, mobility of lip muscles, lip vertical length, clinical crown length, and skeletal relationship, especially vertical maxillary length can lead to variation in the amount of dental and gingival exposure during speech and smile in different persons. [6]

Gingival architecture and tooth length are important contributors to an esthetically pleasing smile.[7] Various conditions like mal positioning of teeth, altered passive eruption, recession, loss of interproximal papilla leads to an unesthetic appearance.[3]

To the best of our knowledge this is the first smile analysis study among south Indian population where 1000 subjects were assessed.

Crispin and Watson [8] conducted a study among 425 dental school students and stated that maxillary lateral incisor was the most common visible tooth. During normal smile 66% of gingival margin was visible and during forced smile, 84% of the subjects displayed the gingival margin. But he did not assess the influence of age, gender or profile in his study.

In this study the amount of gingival display was compared between various age groups, gender and profile. In gender based analysis there is a statistically significant difference found between males and females during forced and natural smile. The data shows that females have more gingival display than males while smiling. The results of the present study was well correlated with the previous studies conducted by Jensen et al[9], Vig et al[10], Ahmad[11], Tarantili et al[12].

Das G et al[13] conducted a study among 400 people and investigated the effect of gender and facial profiles on gingival display. He stated that gingival display was found to be more in females than males. A study done by Lavelle [14] showed a contrasting result that there is no gender difference in gingival visibility.

Based on assessment of influence of age in gingival visibility, the results of this study showed no significant differences in younger and older age groups during natural and forced smile. A study conducted by Wichmann M[15] et al also showed parallel results with the results of the present study.

This study also compared the gingival display with facial profiles. There is no statistically significant association found between straight, concave or convex profiles and gingival display which was parallel to the study done by Ahmad[11], Gillien RJ[16].

In this study during smile line analysis the head position was oriented in Frankfort horizontal plane to assure proper positioning of head. The results of this study helps to attain the requirements for constructing an esthetic pleasing smile in patients who needs smile correction. Moreover further smile analysis studies are needed with definitive quantitative measurements for better treatment planning and also studies can be conducted based on the psychological impact of smile variations among patients.

Conclusion

An attractive smile improves a person's esthetic appearance which indicates the importance of smile analysis. Excessive gingival display is an esthetic concern both to the patient and clinician. The gingival influence on "smile line" can be altered or corrected through periodontal surgical techniques. The knowledge about the factors influencing the smile can enhance the capability of a dental surgeon to do wonders in smile designing.

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Concept of Osseodensification - "To cut or to compress??"

Priyada C.[1], Bindu R. Nayar[2]

ABSTRACT

Primary stability of dental implants is a prerequisite for the establishment of Osseo integration/ secondary stability. A new technique of implant bed preparation has been developed based on an Osseo densification drilling concept for the placement of endosteal implants. The theory behind this technique is that, drill designing allows the creation of an environment that increases the initial primary stability through densification of the osteotomy site walls by means of non-subtractive drilling. Specially designed densifying burs, known as densah burs are designed to be used with standard surgical engines,to preserve and condense bone in a counterclockwise direction (Densifying Mode), and to precisely cut bone if needed in a clockwise direction (Cutting Mode). However very few studies has been conducted on this concept. Before practicing osseo densification concept, further experimental as well as clinical studies are needed to clarify the biological reaction of peri-implant bone to osseo densification method and its influence on actual implant micro motion.

Keywords: osseodensification, densah burs, implant stability

Introduction

Endosteal implants are used in a variety of medical procedures, varying from dental implants to orthopedic treatments. Endosteal implant functions as anchorage into the bone, which ensures its long-term stability.

Stability of a dental implant can be described as either, the mechanical stability between the implant and the bone, or the biological stability that is achieved by osseointegration.[1] Primary stability is the mechanical anchorage of a dental implant as it is wedged in a properly prepared hole in the host bed in living bone. Primarily this contact between the two materials has only mechanical connection characteristics and not biological. Since bone is a living tissue, due to surgical trauma, a periphery of about 1mm around the implant body is devitalized, resorbed and remodeled. This biologic procedure will, consequently loosen the bone-to-implant mechanical contact decreasing, thus, implant's primary mechanical stability. Fortunately, as bone forms around the implant body, according to the phenomenon of osseointegration, the implant's connection to new bone is increasing. Therefore, a biologic stability of the implant is achieved, the so-called secondary stability, leading to an osseointegrated implant[2].

Dental implants inserted at posterior region of the maxilla exhibit the lowest success rates mainly due to the thin cortical plate and the low density trabecular bone by which this region is characterized. But, trabecular bone has only a minor influence on the implant stability compared to the marginal compact bone. In cases of low quality bone D3 & D4; (posterior maxilla),

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it is potentially difficult to achieve high insertion torque and adequate primary stability. In these cases implants are more vulnerable to failure especially if immediate loading is exercised.

Osseodensification concept

Primary stability of the implant is, of utmost importance as it is a prerequisite for the establishment of Osseo integration/ secondary stability of the implant. Many surgical techniques have been proposed to increase primary stability of an implant placed in low density bone, such as bicortical fixation of the implant, undersized preparation of the implant bed and bonecondensation by the use of osteotomes[2]. Many studies confirm that the compaction of trabeculae is an effective method to increase primary stability of an implant. Accordingly this bone-condensing technique can be recommended as an alternate surgical approach for implant site preparation in reduced bone density to achieve greater implant stability.

Recently a new technique of preparation of implant bed has been developed based on an osseodensification drilling concept for placement of endosteal implants by Huwais et al, (2014). The theory behind this technique is that drill designing allows the creation of an environment that increases the initial primary stability through densification of the osteotomy site walls by means of non-subtractive drilling[3,4] (Figure 1).

2.1 Rationale

Densification of the bone immediately in contact to the endosteal device results in higher degrees of primary stability due to physical interlocking (higher degrees of contact) between the bone and the device, and also in faster new bone growth formation due to osteoblasts nucleating on instrumented bone that is in close proximity with implant.[5] Osseo densification is performed in an attempt to develop a condensed auto graft surrounding the implant.[6]

2.2 Clinical evidence

Huwais et al 2014 conducted 72 osteotomies in porcine tibial plateau bone samples using three techniques; standard drilling; osseous extraction drilling with a new tapered, multi-fluted bur design; and osseous densification with the same bur rotating in a reversed direction (Densah bur). It was observed that (i) Osseous densification technique would increase primary stability, bone mineral density, and the percentage of bone at the implant surface compared with drilling.

(ii) By preserving bulk bone,the healing process will be accelerated due to the bone matrix, cells, and biochemicals that are maintained in situ and auto grafted along the surface of the osteotomy site.[7]

Lahens 2016 placed endosteal implants in low density bone of five male sheep. Total of 30 implants were placed such that each animal received 3 implants of different type, inserted as follows: regular-drilling, clockwise Osseo densification and counter- clockwise Osseo densification drilling with Densah Burs. He noted that (i) Insertion torque revealed higher

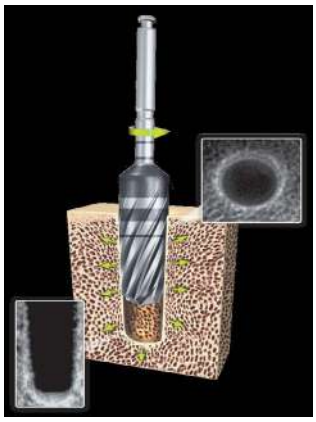

Fig 1

Fig 2

Fig 3a: counterclockwise direction(Densifying Mode)

Fig 3b: clockwise direction (Cutting Mode)

values for Osseo densification relative to regular drilling,regardless of implant macro geometry. (ii) Significantly higher bone-to-implant contact (BIC) for both osseodensification techniques. (iii) Bone chips (Healing) in proximity with implants were seldom observed in regular drilling group unlike in others in six week post operatively[8].

Trisi 2016 placed dynamix implants (Cortex) on iliac crests edges of 2 sheep using the conventional drilling (control) & osseodensification (test) method. There were (i) Significant increase of ridge width and bone volume percentage (%BV) (approx 30% higher) was detected in the test group. (ii) Significantly better removal torque values and micromotion under lateral forces were recorded for the test group.[9]

2.3 Conventional drilling versus Osseo densification drilling

Traditional drilling as a method of osteotomy preparation for implant placement is considered to be a subtractive procedure that cuts and removes bone tissue from the implant site. However, primary stability of the implant is greatly affected as bone is removed from the implantation bed. Special drills with a retentive design (deep grooves) have been manufactured, that enables storage of displaced bone chips between drill flutes for potential retrieval & regenerative use.

In contrast to the conventional drilling process, which uses a positive rake angle to extract a small thickness of material with the passing of each flute creating an osteotomy with no bone residue remaining in the hole,the Osseo densification drilling process begins with the creation of an osteotomy using a

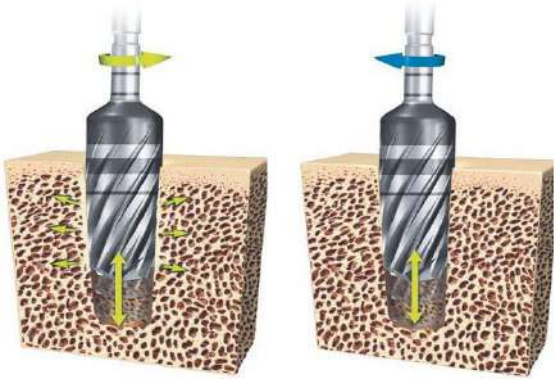

Fig 4

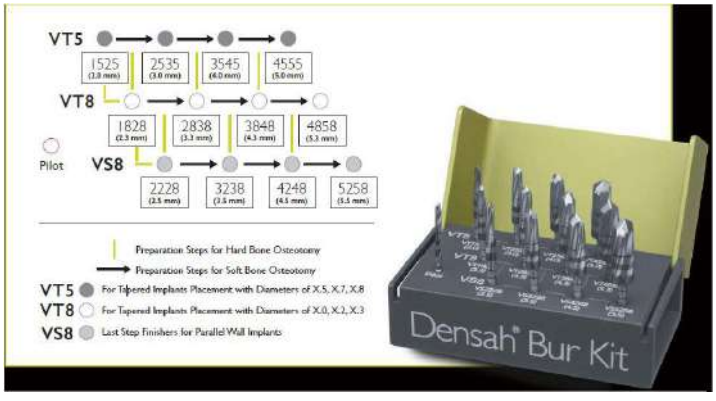

Fig 5

Fig 6

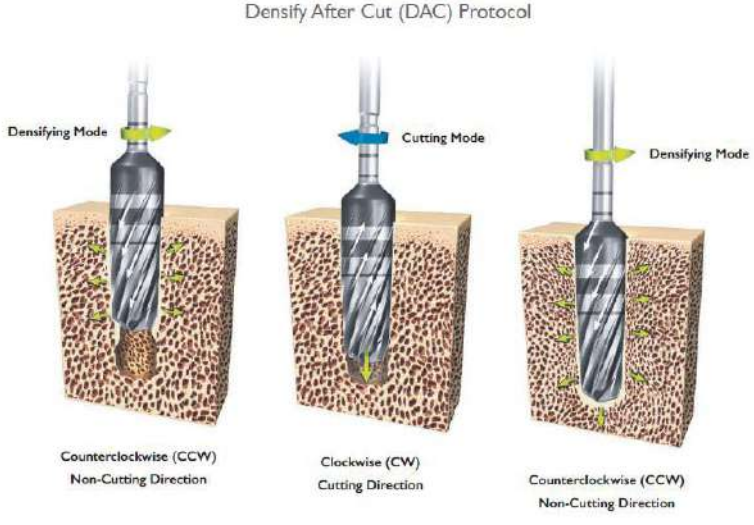

Fig 7

tapered,multi-fluted bur drill[9] (Figure 2).

Densah Burs have many lands with negative rake angle which work in a non-cutting mode to create a layer of compact, dense bone surrounding the wall of the osteotomy. Regular twist drills or straight fluted drills have 2-4 lands to guide them through the osteotomy. Densah Burs are designed with 4 or more lands, which precisely guide them through bone. More lands means less potential chatter.

During Osseo densification, Densah Burs produce a controlled bone plastic deformation, which allows the expansion of a cylindrical osteotomy without excavating any bone tissue. Densah burs have a cutting chisel edge and a tapered shank so, as they enter deeper into the bone, they expand the osteotomy, smoothly compacting bone in the periphery. They work in order to forward bone chips and debris inwards the implant bed rather than removing it from the implant bed. They can be used in a non-cutting counter-clockwise direction to smoothly condense bone or in a cutting clockwise direction. The implant bed preparation begins with a much smaller hole than conventional drilling due to recovery of elastic strain.

When the osseodensified osteotomy remained empty its diameter was reduced by approximately 91%, which, according to the authors was to the viscoelastic nature of deformation. The residual strains of viscoelasticity create compressive forces against the implant surface, as a spring-back effect, increasing the bone-to-implant contact and primary stability.

2.4 Modes

Densah Burs progressively increase in diameter throughout the surgical procedure and are designed to be used with standard surgical engines,to preserve and condense bone (800-1500 rpm) in a counterclockwise direction (Densifying Mode) (Figure 3a), and to precisely cut bone if needed (800-1500 rpm) in a clockwise direction (Cutting Mode) [4] (Figure 3b).

2.5 Motion

The Densah Burs are always to be used with copious irrigation in a Bouncing-Pumping motion (minor vertical pressure to advance the drill into the osteotomy, then pull out for pressure relief, then advance with vertical pressure again and so on in an in/out fashion). The duration and number of bouncing-pumping episode (in/out) are usually dictated by bone density and desired length (Figure 4).

2.6 Armamentarium[10]

The Densah Bur kit includes 12 burs that are designed to create osteotomies for all major dental implants in the market (Figure 5). Each Densah Bur is marked with depth markings from 8-20 mm. They are designed to be used in a consecutive increasing order to achieve the desired osteotomy diameter. Densah Burs are designed to be used for Osseo densification in small increments (alternate between VT5 and VT8) in dense bone to allow gentle expansion of the osteotomy. Soft bone, osteotomy final preparation diameter should be prepared with Densah Bur with an average diameter that measures 0.5-0.8 mm smaller than the implant average diameter. Hard bone, osteotomy final preparation diameter should be prepared with Densah Bur with an average diameter that measures 0.2-0.5 mm smaller than the implant average diameter. Densah Burs are externally irrigated and designed to be used at drill speeds of 800-1500 rpm.

2.7 Densah Bur Marking

They are marked with laser markings from 8-20 mm depth. Densah Burs have a tapered geometry; catalog number is a reflection of their minor and major diameter dimension (Figure 6).

E.g., Densah Bur VT3848 has a tip diameter of 3.8 mm and a coronal diameter of 4.8 mm. with an average diameter of (4.3 mm).

2.8 Working

The expansion occurs at high speed and can operate in both counterclockwise (CCW) or clockwise (CW) cutting directions, where the former more efficiently exerts the densification process than the later and thus are respectively indicated for low and high density bones.

Applications

a) For osseodensification in medium and soft bone qualities as well as indense bone quality especially in the mandible.

b) Facilitates lateral ridge expansion

The Plus1 Protocol

When utilizing narrow ridge expansion technique, implant diameter selected may be up to 1.0 mm larger in diameter than the pre-surgical narrow ridge. *A minimum of 3.0 mm of alveolar ridge width is needed to place a 3.7 mm or 4.0 mm fixture.* If less than 1.0 mm buccal bone plate thickness has resulted after Osseo densification, bone grafting is recommended post implant placement and complete implant coverage should be considered for 2-stage healing protocol.

c) Facilitates vertical ridge expansion, for maxillary sinus autografting

Indications & Contraindications

Indications

1. To prepare osteotomies for dental implant placement in the mandible or maxilla.
2. Can be used in both Cutting and Densifying modes within the same procedure.
3. Changing between multiple osteotomy sites in a patient :(cutting in one site and densifying in another) using the same Densah Bur.
4. In hard bone, same Densah Bur can be used to densify-cut- densify again within the same osteotomy. (Densify After Cut Protocol) (Fig 7)

Contraindications

1. Patients with medical problems such as: compromised immune system, drug or alcohol abuse, uncontrollable bleeding, endocrine disorders or titanium allergy should be carefully evaluated prior to treatment or excluded.
2. Proximity to vital structure should be noted cautiously.

Advantages & Disadvantages

Advantages

1. Autograft bone condensation, maintaining bulk of bone resulting in higher BIC.
2. Enhanced bone density helps in accelerated healing response.
3. Increased residual strain of compaction enhances osteogenic activity through mechanobiology.
4. Increased primary implant stability with higher insertion torque values & ISQ, reduced micromotion facilitating better osseointegration.

Disadvantages

1. Lack of invivo human studies to clarify the biological reaction of peri-implant bone to this new method and its influence on actual implant micromotion.
2. Expensive procedure, requires additional armamentarium &clinical expertise.

Conclusion

Achieving high primary implant stability is of utmost importance for the establishment of osseointegration. Based on the recognition that neither insertion torque nor bone-implant contact is an accurate measure of implant stability it is obvious that few studies report, actual measurement of primary implant stability immediately after condensation. Further, experimental as well as clinical studies are needed to clarify the biological reaction of peri-implant bone to osseodensification method and its influence on actual implant micromotion.

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Salivary biomarkers and periodontal diseases: A review

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ABSTRACT

Saliva is a secretion of the salivary and mucous glands and is of major importance in the maintenance of oral health. For detecting caries, periodontal diseases, oral cancers and many other systemic diseases the use of saliva as a diagnostic fluid is increasing today. Easy handling, testing and non- invasive collecting method make saliva a more preferable diagnostic method. Saliva is widely regarded as a microbial reservoir and can serve as a carrier for bacterial transmission. Gingival crevicular fluid biomarker transit in to the saliva making it a more relevant biomarker for monitoring the periodontal diseases. Whole saliva can be collected by individuals with modest training, including patients. Analysis of saliva can offer a cost-effective approach for the screening of large populations.

Key words: saliva, biomarker, gingival diseases, periodontal diseases

Introduction

Saliva is an exocrine secretion from minor and major salivary glands and having many functions. The various components of saliva and the changes in their levels has been investigated in periodontal diseases. Periodontal disease is a chronic infectious-inflammatory disease characterized by connective tissue breakdown, and alveolar bone destruction.[1] Periodontal pocket depth, attachment level, plaque index, bleeding on probing and radiographic assessment of alveolar bone loss are the traditional diagnostic methods for assessing the disease severity.[2]

An upcoming new biomarker in dentistry is the biochemical analysis of saliva. Locally produced proteins of host and bacterial origin (enzymes, immunoglobulins and cytokines), genetic / genomic biomarkers such as DNA and mRNA of host origin, bacteria and bacterial products, ions, steroid hormones and volatile compounds are the potential diagnostic salivary biomarkers for periodontal diseases.[3]

(A) Specific Salivary Biomarkers:

1.Immunoglobulins

The predominant immunoglobulin present in saliva is IgA. IgG and IgM are present in trace amounts. IgA is secreted by the plasma cells of the salivary glands. There are two subclasses of IgA: IgA1 and IgA2. IgA1 is predominant in serum while IgA2 is found in higher concentrations in external secretions, that is, tears, saliva, and milk.[4] Lehner in 1969 proposed the concept of the 'salivary domain' to emphasize the protective effect of IgA antibodies against supragingival plaque bacteria.[5] Since then, salivary immunoglobulins have been extensively investigated for their protective activity against various oral pathogens. There are strong evidences that immunoglobulins contribute to the inhibition of bacterial adherence and colonization, enhance bacterial phagocytosis, and help detoxify bacterial toxins. Thus, they play a major role in the defence against bacterial infections. Several studies showed increased level of IgA in periodontitis patients.[6,7]

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2.Salivary Enzymes

2.1.Lysozyme

It have antimicrobial property disrupting the bacterial cell wall. The presence of external lipopolysaccharide layer in gram negative bacteria makes it more resistant to lysozyme.[8] It has been reported that patients with low levels of salivary lysozymes are more susceptible to plaque accumulation, which is considered as a risk factor for periodontal disease.[8]

2.2. Lactate dehydrogenase (LDH)

It is a marker of cellular damage and inflammation. One study showed that with the presence of calculus and pockets greater than 5mm there was increased LDH activity associated with periodontal diseases.[9]

2.3.Alkaline phosphatase (ALP)

It is an intracellular enzyme particularly present in bones and its main function is the maintainance of periodontal ligament and root cementum. In pathological cases and during renewal of the tissues an increased ALP activity is reported in the periodontal ligament.[10] This enzyme is increased during severe alveolar bone loss indicative of periodontitis.[11]

2.4. Aspartate Aminotransferase (AST)

It is a good indicator of inflammation and cellular destruction. In a study done by Totan et al.(2006), it was observed that there was a significant increase in salivary enzymatic activities in periodontitis patients.[12] Some other studies showed that there was significant reduction in AST level after periodontal therapy.[13,14] It has been also shown that increased pocket depth is associated with higher AST levels.[15]

2.5.β-Glucuronidase

This enzyme is found in neutrophil lysosomes. Digestion of proteoglycans is the main function of this enzyme. The salivary level of β – glucuronidase indicate neutrophil influx into GCF and its level in saliva also correlate with the severity of the periodontal destruction.[16] There is evidence that there was increased level of this enzyme in periodontitis patients.[17]

2.6. Matrix Metalloproteinases (Mmps)

They are host proteinases responsible for both tissue degradation and remodeling. The major collagenolytic MMPs associated with the severity of periodontal inflammation and disease are collagenase-2 (MMP-8) and collagenase-3 (MMP-13), whereas collagenase-1 (MMP-1) is related to the physiological periodontal tissue turnover.[18] MMP-1 is of fibroblast origin, MMP-8 is of neutrophil origin whereas MMP-13 is osteoblast derived collagenase. During progressive periodontal breakdown, gingival and

Table 1: The various biomarkers in saliva

SALIVARY BIOMARKERS

- IMMUNOGLOBULINS
- LYSOZYME
- LACTATE- DEHYDROGE-NASE
- ALKALINE -PHOSPHATASE
- ASPARTATE -AMI-NOTRANSFERASE
- β –GLUCORONIDASE
- MATRIX -METALLOPRO-TEINASES
- PEROXIDASE
- CALCIUM
- MUCIN
- LACTOFERRIN

- HISTATINS
- FIBRONECTIN
- CYSTATINS
- GROWTH FACTORS
- CORTISOL
- BACTERIA
- CYTOKINES
- C-REACTIVE -PROTEIN
- ANTIOXIDANTS
- DEFENSINS
- TRANSCRIPTOMICS
- PROTEOMICS
- METHYLOMICS

periodontal ligament collagens are cleaved by host cell–derived interstitial collagenases. Studies have been done to investigate MMP-2 and MMP-9 in oral fluids of healthy individuals and periodontitis patients and the contributions of different oral cells to the enzyme production. The study result showed that gelatinase (MMP-9 and MMP-2) was produced by various cells of the oral cavity and was increased in case of periodontitis. Gelatinase is a proteolytic enzyme that allows a living organism to hydrolyse gelatine into its sub-compounds (polypeptides, peptides, and aminoacids) that can cross the cell membrane and be used by the organism. And the level of this enzyme was reduced after periodontal therapy.[19] Another study was done to investigate the level of MMP-8 and MMP-9 in patients with type 2 diabetes mellitus. The author concluded that in uncontrolled diabetics, the increased oxidative burden in plasma is mainly by triggered neutrophils and they did not support the concept of generalized neutrophil dysfunction in unbalanced diabetes. The author also concluded that the level of MMP-8 might be useful in monitoring periodontal disease in diabetes.[20]

2.7. Peroxidase

Peroxidase is a salivary enzyme produced by acinar cells in the salivary glands. This enzyme removes toxic hydrogen peroxide produced by oral microorganisms and reduces acid production in the dental biofilm, thereby decreasing plaque accumulation and the establishment of gingivitis and caries. Patients with periodontal disease have demonstrated high levels of this enzyme in saliva.[4]

3. Salivary Ions

Calcium (Ca) is the ion that has been most intensely studied as a potential marker for periodontal disease in saliva. Sewon et al. reported a higher concentration of Ca detected in whole stimulated saliva from the periodontitis patients.[4]

(B). Non Specific Markers

1. Mucins

Mucins are glycoproteins secreted by submandibular and sublingual glands and some minor salivary glands. The main function of mucin (MG1 and MG2) are lubrication and maintenance of viscoelasticity in secretions. The aggregation and adherence of bacteria is affected by MG2 and is known to interact with A.actinomycetemcomitans and the decreased level of MG2 increases the colonization of pathogen.[4]

2. Lactoferrin (LF)

Lactoferrin is an iron-binding glycoprotein produced by salivary glands, which inhibits microbial growth by sequestering iron from the environment, thus depriving bacteria of this essential element. A study demonstrated that the level of lactoferrin was increased in periodontitis patients and following surgical periodontal therapy the level of lactoferrin was decreased.[21] Another study demonstrated that the concentration of LF is strongly upregulated in mucosal secretions during gingival inflammation and is detected in a high concentration in saliva of patients with periodontal disease as compared with healthy patients.[22]

3. Histatins

histatin is a salivary protein with antimicrobial properties and is secreted from parotid and submandibular glands. It neutralizes the endotoxic lipopolysaccharides located in the membrane of gram-negative bacteria. There are atleast 12 histatin like proteins found in human saliva. Histatin 1,3 and 5 are predominant in parotid saliva.[23] Antibacterial activity, inhibition of inflammatory cytokine induction, inhibition of host and bacterial proteinases ,neutralization of potentially noxious substances and inhibition of the release of histamine from mast cells are the important functions of histatin 5.[24-26]

4. Fibronectin

Fibronectin is a glycoprotein that promotes selective adhesion and colonization of certain bacterial species while inhibiting others. It mediates adhesion between cells and is also involved in chemotaxis, migration, inflammation, and wound healing and tissue repair.[4]

5. Cystatins

Cystatins (cysteine proteinases) are proteolytic enzymes originated from pathogenic bacteria, inflammatory cells, osteoclasts, and fibroblasts. These enzymes have collagenolytic activity, which may cause tissue destruction. Cystatins are physiological

inhibitors of cysteine proteinases, and may function by modulating enzyme activity in the periodontium[4].

6. Growth factors

Epidermal growth factor (EGF) is mainly secreted by parotid gland. It stimulate the epithelial cells and is involved in oral wound healing. Vascular endothelial growth factor (VEGF) is important in inflammation and wound healing and is elevated in periodontitis patient.[4]

(C). Other markers in saliva

1.Hormones

Cortisol

Recent studies have suggested that emotional stress is a risk factor for periodontitis. One mechanism proposed to account for the relationship is that elevated serum cortisol levels associated with emotional stress exert a strong inhibitory effect on the inflammatory process and immune response.[27] The presence of cortisol in saliva has been recognized for more than 40 years. Recently, salivary cortisol levels were used to evaluate the role of emotional stress in periodontal disease. Higher salivary cortisol levels were detected in individuals exhibiting severe periodontitis, a high level of financial strain, and high emotion focused coping, as compared to individuals with little or no periodontal disease, low financial strain, and low levels of emotion-focused coping.[28]

2. Bacteria

Specific species of bacteria colonizing the subgingival environment have been implicated in the pathogenesis of periodontal disease. It has been suggested that microorganisms in dental plaque can survive in saliva, and can utilize salivary components as a substrate. It was shown that saliva could serve as a growth medium for oral Streptococus species and Actinomyces. viscous.[4]

3. Cytokines

The source of salivary cytokines has been investigated and it seems to be GCF. In a study done by Rahul et al.(2004) it was found that the concentration of IL-1α, IL-6 and IL-8 in the whole saliva were significantly higher than in major salivary gland secretions. They concluded that these cytokines were not derived from salivary glands, but probably from GCF.[29]

One study reported a positive correlation between levels of salivary IL-1β and the extend of alveolar bone loss, investigated in 98 periodontitis patients.[30] Many other studies found that there was no significant correlation between cytokines and periodontal status of the patient. Researches has also been done on cytokines related to bone cell activity such as osteocalcin, RANKL, and OPG because these markers may indicate bone loss during periodontal destruction.[31,32] One study has reported elevated level of RANKL in saliva from periodontitis patient where some studies found no significant difference in RANKL level in periodontitis and control patients.[33]

Osteocalcin and osteonectin which are markers of bone metabolism have also been investigated in saliva taken from periodontitis and control patients and reported variable results for their correlation with the periodontal status of the patient.[34,35]

4. C-Reactive Protein (CRP)

It is produced by the liver and is stimulated by circulating cytokines, such as tumor necrosis factor-alpha and interleukin-1, from local and/or systemic inflammation such as periodontal inflammation. Circulating C-reactive protein may reach saliva via GCF or the salivary glands. High levels of C-reactive protein have been associated with chronic and aggressive periodontal diseases and with other inflammatory biomarkers. C-reactive protein has recently been shown to be measurable in saliva from periodontal patients using a lab-on-a-chip method.[4]

5. Antioxidants

During inflammatory process various reactive oxygen species are produced and these are neutralized by various antioxidants in saliva such as superoxide dismutase, glutathione peroxide, peroxidise, catalase, etc.[36] Uric acid, albumin, glutathione, vitamin A and vitamin C,etc are the nonenzymatic antioxidants. Superoxide dismutase has been detected in periodontal ligament and may represent an important defense mechanism within gingival cells against superoxide release. In the deep periodontal pockets it has been reported that the level of superoxide dismutase were

significantly reduced.[37]

Glutathione converts oxidised glutathione into reduced glutathione. Studies showed that there was low level of glutathione in chronic periodontitis patients.[38]

Moore et al. (1994) observed that there was no significant difference in the amount and activity of antioxidants in case and healthy control groups.[39] Chapple et al. (1997) observed that there was low level of antioxidants in periodontal disease patients.[40] Kim et al. (2010) found that the whole saliva antioxidant level increases after scaling.[37]

6. Defensins

Defensins can be divided into two families α and β defensins. They are involved in both adaptive and innate immune response. There are 6 α-defensins in the human body and are produced by PMNs. The functions of α-defensins includes decrease in the production of IL-10, increase in the production of pro-inflammatory cytokines and enhancing or suppressing the classical pathway activation of complement system.

β-defensins (HBDs), primarily produced by epithelial cells, are small cationic peptides. Their bactericidal action is by creating pores into the bacterial membranes of gram negative and gram positive bacteria and hence , play an important role in the oral cavity as the first line of defence against bacterial infection. In the oral cavity , epithelial cells mainly express three HBDs: HBD-1, HBD-2 and HBD-3.[41,42] Studies showed that salivary HBD-2 concentration was higher in chronic periodontitis patients as compared with healthy individuals. It has been proposed that salivary levels of defensins can alter in oral diseases and these can be useful markers for risk assessment.[43]

7. Transcriptomics

Studies have shown that salivary secretions not only harbor RNA but also have other discriminatory biomarkers. More than 3,000 species of mRNA and over 300 miRNAs in the salivary fluids of healthy and diseased subjects were identified by some investigations which suggests the possibility that transcriptomic analysis may yield valuable information regarding the condition of the body. The identification of salivary biomarkers for Sjogren's syndrome and a number of cancers were reported by many investigators.[2]

8. Proteomics

Human saliva contains a large collection of diverse proteins, each having different biological functions. Digestion and lubricating oral cavity are the functions of some, while others help to maintain homeostasis and oppose pathogenic bacteria. Saliva is actively being investigated as a rich source of protein biomarkers capable of discerning healthy from diseased subjects, although its proteomic content is estimated to be only 30% that of blood. Discriminatory protein profiles for oral cancer, diabetes, periodontal disease, AIDS, and mammary gland carcinoma were revealed by many studies.[2]

9. Methylomics

DNA methylation induces cells to maintain or alter unique characteristics by controlling and modulating gene expression. Some investigators reported discerning oral squamous cell carcinoma (OSCC) and head and neck squamous cell carcinoma (HNSCC) patients from their respective controls by saliva based genomic methylation analyses. The possibility of saliva-based predictive screenings for age-related diseases were also suggested by many studies. In forensic science and body fluid identification also salivary methylomics have its potential role. Using pooled DNA from blood, saliva, semen, menstrual blood, and vaginal fluid by bisulfate sequencing, 5 tissue-specific differentially methylated regions (tDMRs) were distinguished. This results are an important path for future genomewide DNA methylation analyses. In the determination of unknown host bodily fluids these technique can be used as a standard forensic technique.[2]

Summary

Saliva testing is a non-invasive and inexpensive test that can serve as a source of information useful for diagnosis of disease. As we enter the era of genomic technologies and genomic research, collection of saliva has increased. Diagnosis and monitoring often require painful invasive procedures such as biopsies and repeated blood draws, adding undue stress to an already unpleasant experience. The discovery of saliva-based microbial, immunologic, and molecular biomarkers offers unique opportunities to bypass these measures by utilizing oral fluids to evaluate the

condition of both healthy and diseased individuals. The results of research reported suggest that in the near future human saliva will be a relevant diagnostic fluid for clinical diagnosis and prognosis.

Conclusion

For both oral and systemic disorders saliva can be used as a potential diagnostic marker. Numerous methodologies for knowing the microbial and molecular constituency of saliva have been introduces now a days. Unique saliva-based biomarker profiles can be used in case of certain diseases and it will give an individual's current physiologic state information. In establishing oral fluids as a credible diagnostic biofluid there is a considerable role played by salivary biomarkers by discovering, validating and understanding these biomarkers .

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Surgical Exposure Techniques In Impacted Canines

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ABSTRACT

The frequency of occurrence of maxillary and mandibular canine impactions are quite high while the modern life style is considered. An inter disciplinary approach with coordination between periodontal and orthodontic parameters are necessary while management of impacted canines. The aim of this paper is to discuss the clinical significance of three surgical methods such as window technique, apically repositioned flap and closed eruption technique from both periodontal and orthodontic point of views with the help of case studies. While doing so, related diagnostic methods and other surgical methods are explained along with their merits and demerits. Among the other two methods, the closed eruption technique has more merits and should be the choice of treatment, with conservative removal of bone tissue and complete flap replacement, producing better aesthetic and periodontal results with preservation of attached gingiva. It is concluded that, unless contradicted, surgical exposure methods with orthodontic correction could be preferred to treat impacted canines.

Keywords: Impacted Canine, open and closed surgery, apically repositioned flap, window technique.

Introduction

"A frequently occurring clinical problem" is the most suitable layman's definition that can be given to the maxillary and mandibular canine impactions. The frequency of occurrence is so high that, in most of the cases, an interdisciplinary approach has to be followed as treatment procedure. During the recent years, the approach has become so wide, to the extend, that from surgical exposure to complex orthodontic mechanisms are been considered. This article coherently articulates different surgical exposure procedure along with periodontal and orthodontic parameters considered in the management of impacted canines.

Canines can be considered as vital part of an aesthetic smile, since they play the main role in case of functional occlusion. The best possible explanation of an "impacted teeth" is given by Shafer, Hine, Levy and which goes like this; "Those teeth which are prevented from eruption due the presence of certain physical barrier along the eruption path". Due to the presence of obstructions, manual removal of such teeth was considered complex and tricky. Recent studies show that occurrence of impacted teeth in case of females are twice than in males.[1,2] At an advance level, occurrence of canine impaction in the maxilla is more than twice than in mandible.[3] Out of these maxillary canines, 8% of the patients are having bilateral impactions.[4]

Diagnosis of Canine Impaction

Clinical Evaluation

A canine impaction could be identified clinically by taking in to consideration of following guidelines;[5,6]

1. Delayed eruption of the permanent canine or

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prolonged retention of the deciduous canine beyond 14–15 years of age,

2. Absence of a normal labial canine bulge,

3. Presence of a palatal bulge, and

4. Delayed eruption, distal tipping, or migration (splaying) of the lateral incisor.

Radiographic Evaluation

This required information can be partially obtained from conventional two-dimensional radiographs as the first step which includes periapical radiographs, occlusal films, panoramic views, and lateral cephalograms.[7] In most cases analysis should begin with routine periapical films. A single periapical film would relate the canine with the neighboring teeth both mesiodistally and superoinferiorly. To estimate the buccolingual position of the canine, a second periapical film is obtained by using a Tube Shift Technique (Clark's Rule) or Buccal Object Rule.[7]

CT/CBCT

Clinicians can localize canines by using advanced three-dimensional imaging techniques. Cone beam computed tomography (CBCT) can identify and locate the position of impacted canines accurately. By using this imaging technique, dentists also can assess any damage to the roots of adjacent teeth and the amount of bone surrounding each tooth. However, increased cost, time, radiation exposure, and medicolegal issues associated with using CBCT limit its routine use. The proper localization of the impacted tooth plays a crucial role in determining the feasibility of as well as the proper access for the surgical approach and the proper direction for the application of orthodontic forces.

Fig 1. Pre-treatment – 1

Fig 2. Pre-treatment – 2

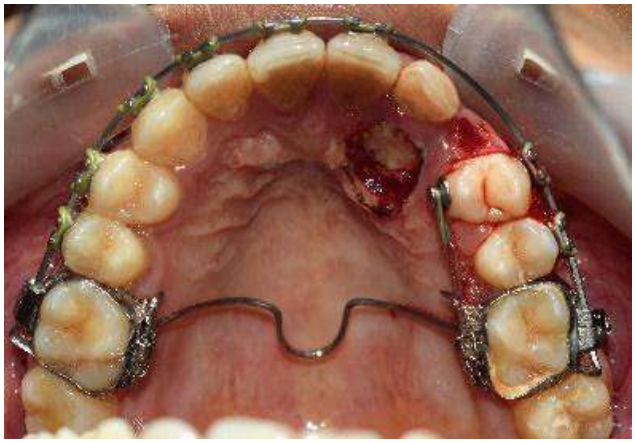

Fig 3. Immediate after exposure

Fig 4. Traction given after one week

Treatment Options

Interceptive Treatment

Interceptive treatment shall be adopted when the growth of canine crown through the root of lateral incisor becomes insufficient or due to the lack of space in the arch that caused by the midline shift. According to Williams,[8] in case of canine impaction in Class I uncrowded cases, a selective extraction of deciduous canines could be a favourable option, even at an early stage of 8 to 9 years. As per Kuron and Ericson,[9] wherever the canine crown is distal to the midline of the lateral incisor, selective extraction of deciduous canines before 11 years shall be best option in order to normalize the position of the ectopically erupting permanent canines. Their study showed that this principle applies in 91% of the cases.

Treatment Alternatives

- Auto transplantation of the canine.
- Extraction of the impacted canine and movement of a first premolar in its position.
- Extraction of the canine and posterior segmental osteotomy to move the buccal segment mesially to close the residual space.
- Prosthetic replacement of the canine.
- Surgical exposure of the canine and orthodontic treatment to bring the tooth into the line of occlusion. This is obviously the most desirable approach.
- No treatment if the patient does not desire it.

Surgical Exposure[6]

The aim of the surgical phase could be classified in to following;

- To eliminate hard and soft tissue pathologic / obstructive entities
- To provide Orthodontist access to the impacted teeth including the creation of a suitably isolated micro-environment for the bonding of an attachment.

Fig 5. Pre-treatment

Fig 6. Two vertical incision and flap raised

Fig 7. Apically positioned flap sutured

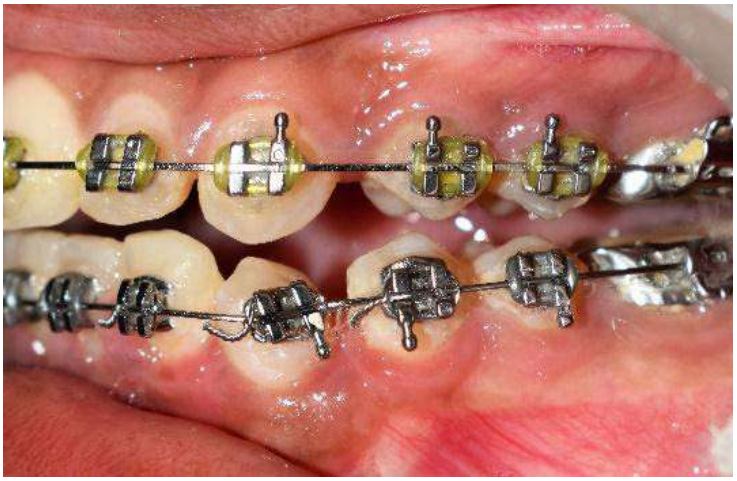

Fig 8. After two months of alignme

- To perform these tasks with minimum tissue damage.

Surgical Methods[10]

Following surgical methods could be used during the treatment of impacted canines.

1. Open eruption techniques (Circular incision)
2. Window technique
   a. Full flap open procedure
   b. Apically repositioned flap technique.
3. Closed eruption techniques
   a. Minimal exposure technique
   b. Maximal exposure technique
   c. Tunnel approach

1. Open Eruption Technique (Circular Incision)

The first method is most appropriate if the canine has the correct inclination and will then erupt spontaneously. Schmidt[11] suggested to uncover palatally impacted canines early, during the mixed dentition in order to encourage autonomous eruption, without orthodontic intervention. They have reported that the overall treatment time is reduced with superior periodontal and aesthetic results since the bone levels and attachment levels improved on the canine and lateral incisor and also little to no root resorption occured on the lateral incisors. Kokich and Mathews[12] also recommended earlier timing for uncovering palatally impacted canines before starting orthodontic treatment. In some cases, surgical exposure could be performed during the late mixed dentition. First a full-thickness mucoperiosteal flap is elevated, then all bone over the crown is removed down to the cementoenamel junction. Although it has been noted that autonomous eruption occurs within 6 to 9 months postoperatively, there is currently no report in the literature to support this statement.[13] After the canines erupt to the occlusal level an attachment could be bonded for the further orthodontic treatment.

2. Window Technique

In this way, the mucosa and bone immediately overlying the impacted tooth shall be removed surgically. It could be very successful when the superficially located labial tooth along with its palpable and palatally impacted canine is covered by thick mucosa, bone and follicle.[14]

Advantages

- Ease of performance
- Rapid reduction of impaction
- Suitable access can be provided for bonding of the attachment.

Disadvantages

- Tooth will be invested on labial side with thin oral mucosa rather than attached gingiva.
- Typical soft tissue contour aggravates plaque accumulation which leads to gingivitis.
- Inflammation will prevent regeneration of the periodontal ligament which leads to apical movement of the epithelial attachment.

Case Study 1 (Window Technique)

The case study is about a 31 years old female with a Class I molar right side, end on canine, molar occlusion on the left side, deciduous retained canine on right side and an unerupted upper permanent canine on same side. The clinically palatal bulge suggestive of palatal impaction of canine, whose crown was in close proximity to the root of the lateral incisor. Radiographs confirmed the diagnosis.

The surgical exposure started in the palpable palatal bulge with a small window opening by removing thick mucosa, bone and follicle. After two days, the lingual button was bonded. One week later, the traction started and monthly evaluated canine position. Adrian Becker et al[22] study about Periodontal status following the alignment of palatally impacted canine teeth, the results indicated no significant difference in the plaque index and the amount of attached gingiva, while the gingival index, pocket depth, and particularly the bone support all showed statistically valid differences.

3. Full Flap Exposure

This method was proposed by McBridge in 1979 and is more effective for buccal and palatally impacted tooth. In this procedure, a full palatal flap shall be reflected to reveal the crypt of the canine. Then the canine shall be exposed to its maximum circumference. Later, the flap shall be sutured back to its original position after having first excised a circular portion of the mucosa immediately overlying the tooth.

Advantages

- It's a conservative bone removal method in which immediate traction is possible.
- Less discomfort when compared with previous procedure and good post-operative haemostasis.
- Tooth can be erupted towards and through the attached gingiva which maintains the width.
- No gingival scarring and vertical relapse due to the good periodontal attachment is established.

Disadvantages

- Placement of the bonding attachment is necessary at the time of exposure.
- If there is a bond failure, then it needs re-exposure.
- It is difficult to gain dry field.

4. Apically Repositioned Flap

This procedure was introduced by Vermette in 1995. It involves rising of the labial attached mucogingival flap from the crest of the ridge and re-suturing it at the cervical level, leaving the crown exposed.[15]

Advantages

- Maintain the width of attached gingiva
- Easy access for bonding of the attachment
- Tooth can be visualized from the time of the exposure

Disadvantages[16]

- Uneven and unesthetic gingival margin
- Increased clinical crown length
- Some degree of attachment and bone loss on the labial surface, which was considered as possibly related to an increased potential for plaque accumulation.
- Vertical orthodontic relapse: After apical repositioning, the gingival tissue heals to the adjacent mucosa, producing soft tissue band of gingival scarring. As the tooth is pulled incisally, this mucosa gets stretched down with it, toward the alveolar crest. Thus, it tends to relapse once the force is released.

Case Study 2 (Apically Repositioned Flap)

The case study is about a 16-year-old female with Class I molar and canine occlusion on the right side with labial bulge. Radiographs confirmed the diagnosis and show vertically impacted canine. The treatment plan involved the use of MBT 0.022" slot. A surgical exposure using apically positioned flap was planned.

5. Closed Eruption Technique

This procedure could be used when the impacted tooth is located in the center of the alveolus. In here, the flap around impacted canine is raised and an attachment is fixed on the impacted tooth. A ligature wire or a chain is connected with the attachment to apply traction force. Later, the raised flap is repositioned in its original location. After one week, traction force is applied to permit eruption of impacted canine in normal direction.

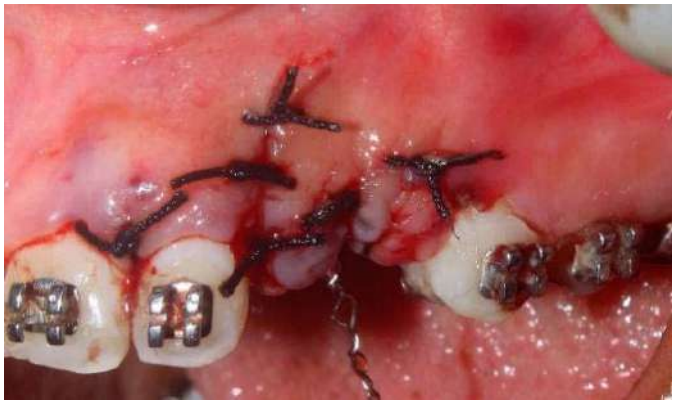

Fig 9. Surgical exposure along with deciduous canine extraction

Fig 10. Attachment bonding

Advantages

- Becker and Chausu[17] stated that morbidity is lower in closed eruption approach than for open procedures.
- Healing is faster.
- Postoperative pain is considerably reduced.
- Postsurgical bleeding is virtually eliminated.

Disadvantages

- Increase in treatment time.
- Additional surgical procedures.
- Diminished control of tooth movement, as well as adverse periodontal responses[18]

Case study 3 (Closed Eruption Technique)

The case study is about a 22 years old female with a Class II molar bilaterally deciduous retained canine on left side and an unerupted upper permanent canine on same side. Use of IOPA with SLOB rule indicated that the impacted canine was buccally positioned, rotated and the crown was in close proximity to the root of the lateral incisor. Closed eruption technique was selected as treatment option. The flap around impacted canine was raised and multipurpose attachment was fixed on the impacted tooth. Then ligature wire was connected with the attachment to apply traction force. Later, the raised flap was repositioned in its original location. After one week, traction force was applied to permit eruption of impacted canine in normal direction.

Discussion

For a clinician, selection of a proper surgical method is important while managing impacted canines, it also requires applying the measured forces in a favourable direction. The choice of surgical procedure could be closed or open depending up on the related factors. The prime difference in selection between open and closed surgical method are based on the attachment bonding. A closed surgery provides a wide surgical field where the widely reflected flap which is the main source of bleeding can be retracted away from the bonding area. For open surgery, the cut and the raw mucosal tissues rapidly close with in first few days and access to the tooth may be lost, even when the exposure was very wide. Placement of a surgical pack for the first 2-3 weeks of the healing period will delay the tissue closure. But bonding an attachment deep in to a surgically created cavern with an oozing periphery following the pack removal shall make the situation difficult. A closed procedure provides better access to a buried tooth by reflecting a wide mucosal covering of the area as a first step, making for better vision and haemostasis, particularly in the palatal area. This also provides for visibility of the entire field and consequently, the surgeon can remove a minimum of bone around the tooth and expose a small area just enough for placing a small eyelet.[19, 20]

Fig 11. Closed by suture and traction force given after one week

Michael H. Pearson[21] concluded that both simple exposure and with bracketing are effective in managing the palatally impacted canine. The use of a ligature wire to facilitate traction is unreliable and it is suggested that a gold chain would be better alternative. Simple procedure can be routinely carried out using local anaesthesia, which has both clinical and financial benefits. A prospective study is suggested to assess the efficacy of both methods and to examine the outcome of orthodontic treatment with reference to the periodontal status of the aligned canine.[19,20] Periodontal outcome is not necessarily the same with different teeth and with different surgical methods. Surgical repair after a closed procedure occurs by primary intention, while open procedures heal by secondary intention.

Conclusion

The management of impacted canines has a multidisciplinary approach as it plays a vital role in esthetics and function. Careful selection of surgical and orthodontic techniques is essential for the successful alignment of impacted canines. The closed eruption technique should be the choice of treatment, with conservative removal of bone tissue and complete flap replacement, producing better aesthetic and periodontal results, with preservation of the attached

gingiva. Surgical exposure and orthodontic correction is the most preferable treatment unless contraindicated. Extraction of the impacted canine should be the last resort, as every impacted canine should be treated in a hostile way to prevent its complications.

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JSPIK

Crown lengthening with orthodontic extrusion -a case report

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ABSTRACT

Movement of a tooth by extrusion involves applying traction forces in all regions of the periodontal ligament to stimulate marginal apposition of crestal bone. Because the gingival tissue is attached to the root by connective tissue, the gingiva follows the vertical movement of the root during the extrusion process. Similarly, the alveolus is attached to the root by the periodontal ligament and is in turn pulled along by the movement of the root.

Anterior teeth with fractures that extend subgingivally require a complex treatment plan that addresses biologic, esthetic, and functional factors, such as mastication and speech. Treatment of crown fractures often requires a multi-disciplinary approach. However, crown-root fractures with fracture line below the gingival attachment or alveolar bone crest present restorative difficulties. This case report presents a 42-year-old female patient was referred from the Department of Conservative Dentistry and Endodontics for crown lengthening of endodontically treated 22. On examination, it was found that the patient had Ellis class III fracture of 22 and the fracture line was present subgingivally.

The diagnosis of complicated crown fracture with apical periodontitis in relation to 22 was made. Root canal treatment of the tooth was done followed by J hook cementation for the forced eruption of the tooth by orthodontic wires and gingivectomy. After 14 weeks, restoration of tooth with post and core followed by crown was done.

Keywords: crown lengthening, orthodontic extrusion, gingivectomy

Introduction

Tooth fracture or advanced caries at or below the level of the crestal bone poses a periodontal and restorative challenge.[1] These teeth were doomed for extraction because of poor access for restoration. But on the long terms, tooth extraction is an expensive option with multiple disadvantages. Extraction results in resorption of the alveolar bone, which makes aesthetics difficult to accomplish.[2] Alternatively, crown lengthening procedure has made retention and restoration of such grossly damaged teeth possible.[3]

Crown Lengthening:

Crown lengthening is the procedure which increases the supragingival tooth structure for both restorative and or aesthetic purposes.[4] Crown lengthening that is done for restorative (functional) purposes aims to gain sound tooth structure above the level of the alveolar crest to enhance the retention and resistance form of the tooth.[4] To restore a damaged tooth by crown lengthening, the coronal extent of the remaining tooth structure should have a minimum length of 3.5-4 mm from the alveolar crest or 1-2 mm of sound tooth structure coronal to the epithelial attachment.[5] If the tooth structure is lesser than 3.5 mm from the alveolar crest, the preparation needs to be extended subgingivally to obtain at least 1.25 mm of ferrule, and this causes a risk of impingement on the junctional epithelium and the connective tissue attachment.[5] In order to prevent this, crown lengthening has to be

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done. Crown lengthening can be done either surgically or orthodontically.

Surgical Crown Lengthening:

Surgical crown lengthening is the traditional method of treatment of a tooth with caries or trauma extending upto or apical to the alveolar crest. Surgical crown lengthening is done by gingivectomy or apically positioned flap with or without bone recontouring.

Gingivectomy will suffice if only 1-2mm of crown height needs to be increased and if the tooth has sufficient width of attached gingiva and has a probing depth of 4mm.[3,4] Apical repositioning of the flap with bone recontouring is done when more amount of crown has to be exposed. The main disadvantage of crown lengthening with apically positioned flap is that supporting bone from adjacent teeth is removed to achieve an even contour, which can compromise their function.[3] This procedure can also result in loss of the interdental papilla, opening of the embrasures, long clinical crowns and compromises the aesthetics, which the clinician is striving to achieve. [2,3]

Orthodontic Tooth Extrusion / Forced Eruption:

Orthodontic root extrusion was first introduced by Heithersay and Ingber. This technique is based on principles of osteophysiology and orthodontics and it uses continuous force.[1]

The objectives of orthodontic tooth extrusion include preservation of biologic width, exposure of sound tooth structure for optimal placement of restorative margins, and esthetics.[1] Orthodontic tooth extrusion can be done as a slow or rapid extrusion.[6]

In slow orthodontic eruption, the periodontium

Fig 1

Fig 2

Fig 3: J hook cemented in the root canal is attached by an elastic chain to .018SS sectional wire for orthodontic traction.

Fig 4: Gingivectomy and stabilization by a ligature.

– gingiva, periodontal ligament and alveolar bone also migrate coronally along with the tooth. The tension created by the light orthodontic force elongates the periodontal fibre bundles and induces osteoblasts to deposit new bone, which results in the coronal shift of the bone as the tooth moves occlusally. Once the desired crown length is achieved, ostectomy is performed in the particular tooth without causing alteration of the periodontium of the other surrounding teeth.[7]

In rapid orthodontic extrusion, the alveolar bone is left behind temporarily and to prevent the bone from moving coronally, circumferential fiberotomy is performed.[6] Circumferential fiberotomy is the procedure where scalpel blade is used to severe the supracrestal connective tissue fibers around the tooth.[8] The supra crestal connective tissue fibers of the tooth are stretched as the tooth is extruded.[1] These fibres are resected by supra crestal fiberotomy in order to remove the tensile stress on the alveolar crest, which in turn prevents the gingiva and bone from following the tooth.[1] Fiberotomy also maintains inflammation in the area near the marginal bone and this inflammation does not allow the marginal bone to follow the tooth coronally and the procedure is performed every 7-10 days.[9]

Orthodontic extrusion is not possible in:

a) Unfavourable axial tooth position.

b) Compromised periodontal health.

c) Short roots that would result in inadequate crown-to-root ratio

d) Tapered roots.

e) Wide internal root form.

Orthodontic tooth eruption is the preferred mode of treatment to avoid the negative consequences of surgical crown lengthening, especially in aesthetic areas. Whenever orthodontic extrusion is decided as the means for crown lengthening, rapid extrusion is preferred to slow extrusion as it obviates the additional

Fig 5: After removal of J hook and post and core build up

Fig 6:Crown Preparation

Fig 7: Temporary Crown Cementation

Fig-8 Permanent Crown Cementation

surgical procedure which is needed when a tooth is slowly extruded.

Case report

A 42-year-old female patient was referred from the Department of Conservative Dentistry and Endodontics for crown lengthening of endodontically treated 22. On examination, it was found that the patient had Ellis class III fracture of 22 and the fracture line was present subgingivally. The gingiva was healthy with the probing depth of 2mm. (Figure 1)

IOPA radiograph revealed an intact root canal filling in 22 with normal bone architecture. There was no root fracture and periapical pathology in 22. (Figure 2)

Considering aesthetics and the amount of tooth structure available, the case was planned for slow orthodontic extrusion of 22 along with Gingivectomy. Patient was made aware of the cost, time commitments, and necessary plaque control procedures.

Orthodontic extrusion options with fixed and removable appliances were discussed with the patient. Treatment was started after written consent with the sectional fixed appliance as per the patient preference. Jhook was fabricated with 1mm diameter stainless wire and cemented in the root canal with a composite.

A sectional .018SS wire was bonded between 21 and 23. The round hook in the sectional wire was made such that the direction of force applied would be along the long axis of the tooth (Figure 3). This was done to prevent labial tipping.

The elastic chain was activated every 10–15 days for 6 weeks. The patient was encouraged to maintain good oral hygiene. The orthodontic extrusion was evident by the visualization of margins of the previously embedded portion of the tooth

The tooth was stabilized by a ligature from the J hook to the sectional wire for a period of 14 weeks.

Gingivectomy was done on the labial aspect of 22 under local anasthesia to achieve an aesthetic gingival margin (Figure 4).

On review after 2 weeks, the healing was satisfactory. Probing depth was 2mm

The J hook was removed (Figure 5), the post space was prepared and a prefabricated post was cemented with aresin-based cement.

A heavily filled light cured composite resin core [3M ESPE] was placed and was prepared for a crown (Figure 6). A temporary composite crown was placed for two weeks after which porcelain fused to metal crown was cemented as the final restoration (Figure 7,8).

Discussion

Crown lengthening is a procedure that is done to increase the clinical crown length to permit aesthetic restoration of the tooth without violating the biologic width.[10] It is mandatory that sound tooth structure be available coronal to the tooth's attachment apparatus to optimally restore a tooth.[11] Several techniques are available for crown lengthening. Each technique has its unique indications, contraindications, advantages and disadvantages. This case describes the successful and optimal restoration of the tooth 22 that was fractured at the subgingival level.

As the tooth 22 was fractured at the subgingival level, there were three options for restoration of 22 – post and core with crown, surgical crown lengthening, orthodontic forced eruption.

Whenever a tooth is prepared to receive a crown, the margins should remain on sound tooth structure for the restoration to be stable and have a good prognosis. This requires a ferrule of 1.25 to 2.5 mm. The fracture resistance of the restoration increases when the ferrule length is 1.5 to 2.0 mm.[12] However, a tooth with root canal filling and post and core demands for a ferrule of at least 2 mm to resist fracture.[13] Since the tooth was fractured at the subgingival level and the probing depth was 2 mm, placement of a subgingival crown margin to achieve the desired ferrule was not possible as it will violate the biologic width. So the first option of restoring the tooth using post and core with crown was eliminated.

The second option was surgical crown lengthen-

ing. The advantage of this procedure is that the length of the crown can be immediately increased.

The third option was orthodontic forced eruption. The length of the root as measured from the radiograph was 14 mm. 2 mm of tooth was planned to be extruded and it was calculated that after 2 mm extrusion, adequate root length will still remain to provide favourable crown-to-root ratio of more than 1:1.[11]

Crown-to-root ratio serves as an aid to predict the prognosis of the tooth.[14] Ideally the ratio should be 1:2 or a bare minimum of 1:1 in extreme cases. When the ratio is higher, the crown portion of the prosthesis will have greater leverage and the root will have lesser resistance, which will ultimately affect the prognosis of the tooth.[15]

The root form of 22 as noted from the intra oral periapical radiograph was broad and cylindrical and hence favourable for forced eruption. Generally there is a significant tendency for the roots to taper from the cervical margin to the apex, especially in the maxillary anteriors.[5] When the root has a marked taper, the cervical diameter becomes lesser as the root is extruded.[5] This will cause the crown restoration to have bulky unphysiologic cervical margins or crown will have a distinctly narrow cervical dimension causing excessively wide, unaesthetic embrasures.[5]

The canal space of 22 was narrow and hence indicated for forced eruption. If the root canal is wider, the root structure between the root canal filling and the external root surface will be narrow. In such a scenario, crown preparation will result in much thinner root structure, which may result in fracture of the tooth.[6]

The tooth 22 met all the criteria for crown lengthening by forced eruption. When faced with the option of slow and rapid extrusion, rapid extrusion was decided because extrusion can be done as rapid as 1 mm per week.[16,17] Forced eruption coupled with fiberotomy and gingivectomy is the most preferred option when crown lengthening is required for a single tooth as it is easier, fast and cost effective.

After 2 mm of crown was extruded, the tooth was stabilized in place for 4 months to allow for proper reorganization of periodontal fibres. This is because the periodontal fibers are stretched and obliquely oriented as the root is moved coronally and these fibres take about 6 weeks to 6 months to reorient themselves.[6] Also, in the 4 – 6 months period, bone remodeling and maturation occurs which prevent reintrusion of the tooth.[16]

During fixed appliance treatment, there is an increase and change in the microbial load with a substantial increase in motile rods supragingivally and spirochetes subgingivally.[18] Hence, most of the patients treated with fixed orthodontic appliance experience moderate gingivitis and varying degrees of gingival hyperplasisa. The gingival hyperplasia can be managed nonsurgically and surgically. As the nonsurgical interventions such as scaling and root planning failed to resolve the hyperplasia, gingivectomy was done and physiologic gingival contour was obtained.

After a healing period of 2 weeks ceramic crown was fabricated and cemented with glass ionomer cement in 22 and the patient's smile was made aesthetically pleasing.

Conclusion

Multiple treatment options are available for restoring a tooth with gingival or subgingival fracture. An important criterion which the clinician has to bear in mind is preservation of the biologic width. Though the choice of treatment depends upon several tooth related factors and also the clinician's preference, this novel multidisciplinary technique of forced eruption is the best choice when clinical crown lengthening is required in the aesthetic zone for a single tooth, provided the tooth has favourable root length and taper.

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JSPIK

Split mouth de-epithelization technique for gingival depigmentation using diode laser and scalpel - a case report

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ABSTRACT

Gingival esthetics and smile designing are the cosmetic expectations that have increased with time and current trends. Excessive gingival pigmentation is a major esthetic problem for many people, especially on the labial aspects of anterior teeth. It has become the important component of general esthetics. Pigmentation is defined as the discoloration of the gingiva due to lesions and conditions associated with numerous extrinsic and intrinsic factors. Gingival hyperpigmentation is mostly caused by the physiologic deposition of melanin by melanocytes. Melanin pigmentation is completely benign and presents no medical problem. For depigmentation of gingiva, different treatment modalities have been describe such as scalpel, cryosurgery, electro surgery, lasers etc. The present paper aim to compares the effectiveness of depigmentation by scalpel and diode laser.

Keywords: De-pigmentation, gingiva, scalpel surgery, melanin, laser.

Introduction

A smile is a way of communication and it expresses a feeling of happiness, success, sociability, friendliness and politeness. It play an important role in improving esthetics and radiates health and self-confidence. For an attractive smile, gingival health and appearance is an essential component. The harmony of the smile is determined by the shape, the position and the color of the teeth or lips besides by the gingival tissues. The color of healthy gingiva is variable ranging from a pale pink to a deep bluish purple hue.[1] The color of gingiva depends on several factors such as number and size of blood vessels, thickness of the epithelium, level of keratinization, quantity of pigments .Oral pigmented lesions can have many etiological factors including drugs, heavy metals, genetics, endocrine disturbance, inflammation and also smoking may stimulate melanin production and cause melanin pigmentation.[2,3] Oral pigmentation might be physiological or pathological in nature.[4] The main normal physiologic pigmentation within the oral cavity are melanin, carotene and oxyhaemoglobin. Melanin is a natural brown pigment and produced by melanocytes. It is formed only in the cytoplasm of melanin forming cells otherwise the melanocytes .Melanocytes are dendritic cells arise at the epidermal dermal junction of the skin, mucous membranes, in the leptomeninges of the central nervous system and in the retina of the eye.[5] It is present in the basal and supra basal cell layers of the epithelium. It is transferred to adjacent keratinocytes through membrane-bound organelles called melanosomes. Melanin is a derivative of tyrosine, which is a polymer composed of polyacetylene, polypyrrole and polyalanine. Variety of factors that depend the degree of the pigmentation, especially the activity of the melanocytes. Non pigmented gingiva may be seen in fair skinned individuals, but in darker skinned persons have the chances of pigmented gingiva. In the area of the incisors, the rate of gingival pigmentation is highest .In the oral cavity, the melanin is found in the gingiva, hard palate, mucosa and tongue. Appearance of the melanin may be diffuse, solid or irregularly

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shaped. Depending on the amount and distribution of melanin in the tissue, the color of the oral melanin pigmentation may vary from light to dark brown or black. Gingival hyperpigmentation is increased pigmentation beyond the normally expected degree of the oral mucosa. Several physiologic or pathologic factors can cause hyperpigmentation.[6] The most common cause is physiologic or ethnic hyperpigmentation. Physiologic hyperpigmentation is genetically determined. It is clinically manifested as variable amounts of diffuse or multifocal melanin pigmentation in different ethnic groups. Depigmentation is a procedure of removing or reducing of gingival hyperpigmentation.

Different techniques for depigmentation are:[7]

1. Scalpel technique
2. Cryosurgery
3. Electro surgery
4. Lasers

Nd: YAG (neodymium-doped yttrium aluminum garnet) laser,

Er: YAG (Erbium -doped yttrium aluminum garnet) laser,

Carbon dioxide (CO2) laser

5. Chemical methods including acoustic agents – not used nowadays

a. 90% phenol and 95% alcohol

b. Ascorbic acid

6. Method aimed at masking the pigmented gingival from less pigmented gingival areas

a. Free gingival graft

b. Acellular dermal matrix allograft

Case report

A young female patient, 22 years old was reported to the Department of Periodontics with the chief complaint of black colored gums [Figure 1]. The dental history of the patient revealed that the blackish discoloration of gingiva was present since birth and was indicative of physiologic melanin pigmentation. On clinical examination, the patient had a very high smile

Fig 1: Pre operative view

Fig 2: Contact of scalpel tip with the pigmented tissue

Figs 3 & 4: Removalof the pigmented tissue using scalpel

line that revealed the deeply pigmented gingiva on the labial side of maxillary arch extending from right molar to left molar region. [Figure 1]. On intraoral examination, generalized diffused deep blackish pigmentation was observed. Gingiva was healthy and completely free of any inflammation. Patient's facial skin tone was whitish and her gingiva was heavily pigmented causing a mismatch with the complexion of gingival color and facial color. Considering the patients esthetic concern a surgical gingival de-epithelization using scalpel technique for the right side upper arch and laser for the left side upper arch was planned. Treatment procedure was explained to the patient before starting of the surgical procedures and informed consent was obtained.

Surgical Procedure

The surgical procedure was performed under local anesthesia (Lignocaine with adrenaline in the ratio of 1:80,000 by weight). At the right maxillary anterior region from central incisor to first molar region, Bard-Parker handle with a no .15 blade was used. A partial thickness incision was given for depigmentation [Figure 2, 3 &4]. Partial thickness tissue was sliced and maintaining an even thickness of gingiva and care should be taken not to expose the underlying bone which can be affected to the overall result. This was followed by scrapping of the area if any pigmentation was left over the gingival tissues. Pressure was applied with a sterile gauze moistened in saline to control hemorrhage. High volume suction was used near the tissues [Figure 5 &6].

On the left side, maxillary anterior region from central incisor to first molar diode laser of 810nm with 3.5W in continuous mode was used [Figure 7]. Exposure parameters were set using the recommended guidelines .Using laser careful removal of epithelium containing melanin layer [Figure 8]. There was absolutely no bleeding during and after the procedure [Figure 9].

After completion of depigmentation, oral hygiene instructions were given to the patients [Figure

Figs 5 & 6: Immediate post operative photogragh after scalpel technique

Fig 7: Contact of laser tip with the pigmented tissue

Fig 8: Removal of the pigmented layer using laser

10]. The patients were advised to use chlorhexidine mouthwash twice daily for 2 weeks postoperatively. Post-operatively the patients were prescribed, Non-steroidal anti-inflammatory drugs, (Meftal forte thrice daily for three days). Patients were recalled after 1 week for re-evaluation. Wound healing was uneventful on both the sides. Post-operative follow up after 1 month showed the areas were completely healed, with no signs of re-pigmentation [Figure 11]. After 6 months, the patient is still on follow-up visits. Depigmentation was not carried out for mandibular anterior region because they were of no aesthetic concern for the patient.

Discussion

There are wide differences in the gingival color in normal healthy persons. The color of the gingiva is determined by the degree of vascularization, the thickness of keratinized layer and the amount of the pigmented containing cells. Melanin pigmentation is the result of the melanin granules which are produced by melanoblast. They are inter-wined between the epithelial cells at the basal layer of epithelium.[8] Gingival hyperpigmentation is one of the most demanded periodontal aesthetic treatment. Very little literature has been published regarding the clinical methods of treatment of pigmented gingiva and the procedures that were tried in the past. It consisted of chemical cauterization, gingivectomy, scalpel scraping procedure and abrasion of gingival tissue. Recent techniques of gingival depigmentation widely used in clinical practices include free gingival graft, laser treatment and cryosurgery which have achieved satisfactory results.

In 1960, Maimam first developed the working laser. The word laser is an acronym for light amplification by stimulated emission of radiation. Application of the laser to dental tissue was first reported by Goldman et al in 1964 and Stem and Sognnaes in 1972. Lasers of two type soft and hard laser. Soft lasers are demanded to aid healing and to reduce inflammation and pain. Applications of soft tissue laser include frenectomies, incisional and excisional biopsies, gingivectomies, gingivoplasties, de–epithelisation, operculum removal, coagulation of graft donor sites and certain crown lengthening procedures. Surgical hard lasers can cut both hard and soft tissues.

The present study had a split-mouth design .It is an excellent method to determine the clinical significance of comparison between the two depigmentation techniques to remove gingival pigmentation. By comparing the techniques within a subject, it reduces the influence of numerous factors such as age, facial complexion etc.

According to Wigdore et al [9], reported that there are many advantages of Laser over surgical procedure. The advantages of laser include minimal post-operative pain, dry and bloodless field, instant sterilization of surgical field, reduced bacteremia, reduced mechanical trauma, minimal post-operative swelling and scarring. In the present study, all the above stated advantages are evidently experienced. Lasers need only less chair side time when compared to the scalpel techniques. There is increased coagulation and a necrotic slough is formed over the surface of the soft tissue. Disadvantages of

Fig 9: Immediate post operative photogragh after laser technique

Fig 10: Immediate post operative photogragh after scalpel and laser technique

the lasers they are expensive and technique sensitive. There is need of protective eye wear for doctor, patient as well as the assistant.

Lagdive et al[10], compared gingival depigmentation using scalpel and diode laser in a spilt mouth study. There was no bleeding at the laser depigmentation areas. Diode laser depigmentation showed delayed healing compared to scalpel blade depigmentation. The sites operated with the scalpel blade, two out of three patients complained of moderate pain and one patient complained severe pain on the visual analog scale. On evaluation the site treated with diode laser showed only slight pain or not painful .All the patients were pleased with the esthetically significant improvement in the gingival color with both the techniques. The study concluded that the application of diode laser is safe and alternative procedure for the treatment of gingival pigmentation. In the present case report also patient was treated with laser and scalpel blade. And also healing by scalpel was faster than that by laser. Site treated with scalpel surgery causes unpleasant bleeding during and after the operation, no bleeding at the laser depigmentation areas.

In 2009, Ameet et al[11] compared three different surgical techniques lasers, scalpel and bur abrasion on the same patient with three year follow up. Comparing the healing of three surgical sites, bur abrasion and diode laser sites showed delay healing than scalpel blade site. At the VAS evaluation site operated on with the scalpel blade and bur abrasion, the patient complained of moderate pain. Diode laser treated area had only slight or no pain was recorded. After 1 week pain had reduced considerably. The melanin pigmentation index score showed that there was no reappearance of pigmentation at 3 months in the region done by laser. In the present study also diode laser treated area had only slight or no pain was recorded. There was no recurrence of pigmentation at 6 months in the region done by laser.

Fig 11: Healing after 1 month

One of the limitation of our study was that chances of re pigmentation. The mechanism of re-pigmentation is not understood. There is little information on the behavior of melanocytes after surgical injury. According to migration theory, active melanocytes from the adjacent pigmented tissues migrate to treated areas causing re-pigmentation Re pigmentation is defined as spontaneous and has been recognized to the activity and migration of melanocytic cells from the surrounding areas.

Conclusion

People with high smile lines increasing demand for esthetics needs removal of excessively pigmented gingival areas. The two methods used here are easy and the results are satisfactory. Discomfort and pain level associated with laser was lower than conventional surgery. In the modern dental practice using laser technology, procedures can be accomplished with less invasive methods and less postoperative discomfort. Larger series of patients is needed to suggest a definite indication of the efficacy and safety of the procedure.

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JSPIK

Interdisciplinary management of a geriatric patient - A case report

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ABSTRACT

Creating a functional occlusion along with aesthetics is the utmost aim of rehabilitating a geriatric patient. The Periodontist, the Prosthodontist and the Restorative dentist often have to work in harmony to achieve this goal. Healthy soft tissue is very important for survival and long term success of a dental restoration. Before replacing the missing teeth, it is important to maintain the periodontal health of the remaining teeth. This case report highlights geriatric patient managed by meticulous periodontal therapy followed by endodontic therapy, Implant and Prosthetic rehabilitation.

Keywords: geriatric patient, hemi section, implant

Introduction

Aging is a natural, biological process. Management of oral health is definitely difficult and different in aged patients. A demographic revolution has already started throughout the world and proportion of older people is arising tremendously when compared to the other age group. Approximately 600 million people in the world are aged 60 years and above and this number will be double by the year 2025. Surprisingly this number will rise to 2 billion by the year 2050 with almost 80% living in the developing countries.[1] As a result of advances in field of medicine, the lifespan of every old person has increased. In dentistry, major problem that we may encounter in a geriatric patient are tooth loss, dental caries, (especially in roots) prevalence of periodontal disease, Xerostomia,altered taste sensation and above all an increase in knowledge of awareness among the elderly patients is seen. And the need to replace the missing teeth by fixed dentures is also increased. Healthy soft tissue is also important for survival rate and long term dental restoration and creating a functional occlusion along with aesthetics is the utmost aim of rehabilitating geriatric patient. The periodontist often has to work in harmony with other disciplinary dentistry to achieve this goal.

This case report highlights the interdisciplinary approach in the management of a geriatric patient with careful treatment planning and meticulous periodontal therapy by hemi section and replacement of missing teeth by dental implants.

Case Report

A female patient aged 65 years reported to our department of periodontics and implant dentistry, of our institution with complaints of pain in right lower tooth since 3 months and to replace her missing front tooth with fixed prosthesis. Upon examination, the periodontal status was as per with her age with multiple teeth recession (class I and II) along with missing 31,32,41,42 (Figure 1a-e). Intra oral Radiograph revealed bone loss up to apex in relation to mesial root of 46, suggestive of an endo perio lesion. Patient was advised for root canal treatment in 46, 47 followed by periodontal therapy including hemisection in relation mesial root of 46 (Figure 2). 45, 46, 47 were treated by endodontic treatment. Later hemisected tooth was replaced with splinted fixed prosthesis in relation to

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44,45,46,47, and 48 (Figure 3). Patient was wearing a removable prosthesis in relation to 17 which she was not comfortable. Hence the patient was not willing for removal partial denture or conventional fixed partial denture, implant denture was advised and patient accepted the treatment protocol. Patient was rehabilitated with 2 conventional implants (Figure 4) and replaced with 4 anterior teeth(Figure 5). Patient kept under strict maintenance protocol with regular check-up, at intervals of 1, 2, 3 and 6 months (Figure 6).

Discussion

Aging is a natural process. Old age should be regarded on a normal inevitable biological phenomenon. An elder person above 65 years have health problems which call for special consideration.[2] The geriatric population which comprises 7.7% of the total population suggests that India is in a phase of demographic transition. By 2050, as estimated by United Nation Population Division, Geriatric population will double in Africa and triple in Asia with one sixth population residing in developing countries.[3] As the life expectancy and the number of elderly people increase,there will be rise in the chronic conditions which will affect not only systemic but also oral health of an individual.[4] Alteration of oral health and function is commonly seen in geriatric patient.[5]

Tooth loss, dental caries, rise in prevalence of periodontal diseases, xerostomia, altered taste sensation and potentially malignant disorder are seen most frequently in the elderly people with poor oral hygiene.[6] In addition, constant irritation to the oral mucosa in the form of trauma like cheek biting, diseases like lichen planus, habits like smoking and salivary disorders can bring about alteration in the clinical appearance of oral mucosa.[7]

In old age individuals most of the teeth are affected either by dental caries or by periodontal diseases. Almost every patients today are not willing for extraction or losing their natural dentition. At least, they want to retain part of their natural tooth. Teeth affected due to periodontal lesions can be salvaged to an extent by periodontal surgery including resective procedures such as hemisection.

Fig 1a: Front view

Fig 1b: Right side view

Fig 1c: Left side view

Fig 1d: Occlusal view

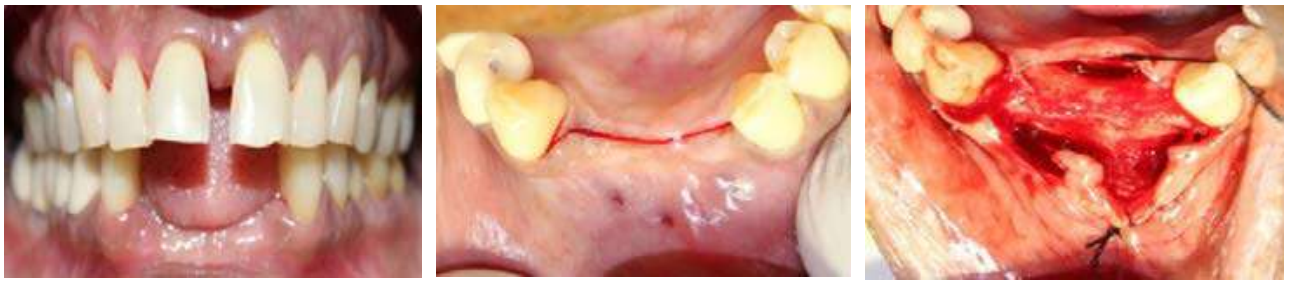
Fig 1e: Pre operative OPG

Fig 2: Hemisection procedure in relation to 46

In this case report, 46 which was suggestive of endo perio lesion (Simon & Glick) was advised for root canal treatment in 45,46, 47 followed by periodontal therapy including hemi section of mesial root 46 (Figure 2). After satisfactory healing, fixed prosthesis was planned and placed in relation to 44 to 48, by the prosthodontist to the satisfaction of the patient (Figure 3). Park et al[8] suggested that molars with questionable prognosis can maintain the teeth without detectable bone loss for a long-term period by hemi section but, the patient should maintain a good oral hygiene.

This report is in accordance with the studies

Fig 3: Prosthetic rehabilitation in Hemisected tooth



Preoperative | Crestal Incision | Full Thickness Flap Raised

Osteotomy preparation | After implant placement | Suture placed | OPG

Fig 4: Implant Site Preparation for replacing lower anteriors.

by Buhler[9] who stated that hemi section should be considered before every molar extraction, because it provides a good, absolute and biological cost saving alternative with good long term success and also in accordance with the report by Kost WJ,[10] Rapport RH[11] who stated that when a tooth loses part of its root support, it will require a restoration to permit it to function independently or serve as an abutment for fixed partial denture or splint.

In recent years, the impact of oral health status the quality of life and general health has been prime importance. More over general health is compromised due to poor maintenance of gingival health, improper eating abilities which affect nourishment of the elderly and also can lead to malnutrition and weight loss. Functional impairments have a significant impact on oral health and self care of these patients.

Tooth extraction which is the cause of Edentulism is due to increase in prevalence of dental caries and periodontal disease.[6,12] Root surface caries and coronal caries have increased prevalence in the old age population.[6] In geriatric patient loss of teeth is also associated with their social behavioural and well being. These patients feel depressed without teeth especially in aesthetic area. Most of the patients want to retain their natural teeth as they feel secured with their natural dentition both for aesthetics and function.

In order to cater the needs of these elderly geriatric patients, an interdisciplinary approach is needed to give a healthy and functional dentition through periodontal management and replacement of missing teeth by implants.

The ultimate goal of dental implant therapy is to satisfy patients desire to replace one or more missing teeth in excellent aesthetics, secured, functional and long lasting manner.[13] Since, the patient was not willing to alter the shape of the natural teeth, Implants were advised. As patient maintained good plaque control and oral health, missing 31, 32,41,42 was replaced with fixed implant prosthesis with 2 implants (Figure 4 & 5). This case report is in accordance with the study of Burt BA, Eklund et al[14] who reported that the older adults who maintain optimum oral self care less susceptible to periodontitis. And also in correlation with studies by Bashutski JD et al[15] who proposed that Implant therapy is a predictable option with good functionality.

This case reports is a perfect example where an interdisciplinary approach was followed, where a periodontist along with the prosthodontist showcase their skills in managing the resected tooth site with fixed splint prosthesis and also in replacing missing teeth by dental implants.

Conclusion

Dentist should recognize the oral problems that afflict the elderly but treatment should extend beyond replacement of diseased or missing parts. Elderly persons may have special problem of tissue deficiencies, mental and emotional disturbances. These are markedly different from those seen in young and middle aged adults. Patient care to elderly peoples requires special knowledge and special skills.

We have seen a tremendous increase in the number of geriatric patients, along with periodontal problem and tooth loss; it is the duty of the periodontist to manage such patients. As a specialist, we should manage elderly patients will special care and understand the dental problems associated with them.

Fig 5: Fixed Implant Supported Prosthesis-after 1 month

Fig 6: Follow up (After 6 months)

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Impact of thyroid dysfunction on Periodontium: A case report

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ABSTRACT

Periodontitis is a chronic inflammatory disease of the supporting tissue of the teeth caused by specific microorganism resulting in progressive destruction of the periodontal ligament and alveolar bone with pocket formation, recession and or both. Millions of people worldwide have periodontitis. Besides the role of microbial dental plaque as an initiator of the periodontal disease, a wide variety of determinants and factors influence its manifestation and progression. The strongest type of causal relationship is that with systemic diseases including endocrine disorders, hematologic disorders, stress etc.

Similarly, in this paper we present an interesting rare case of generalised inflammatory gingival enlargement coexisting with hypothyroidism in a female patient which altered the periodontal therapy. With repeated non-surgical periodontal therapy an obvious improvement in her periodontal condition was achieved, but only once the thyroid status was brought under normal limits. A possible association of thyroid dysfunction and Periodontal health is considered in this case report.

Key words: gingival enlargement, hypothyoidism, periodontitis.

Introduction

Gingival enlargement is a bizarre worrisome situation, causing esthetic, functional, psychological, and masticatory disturbances to the patient. It may be caused by plaque accumulation, adverse effects of medications or due to underlying systemic conditions like nutritional deficiencies and hormonal imbalances. Here is a case of generalized gingival enlargement associated with hypothyroidism that was treated successfully without complications.

Thyroid hormones play an important role in the regulation of growth, development, and metabolic functions of the body. Among the endocrine system disorders, thyroid dysfunction is the second most common glandular disorder and is increasing predominantly among women. Thyroid disease can alter the healing capacity of tissues and also lead to an imbalance in the homeostasis of the body. However, the data available regarding the relationship between thyroid hormone imbalance and periodontal health is only limited.

This case report presents the influence of thyroid hormone dysfunction and its impact on periodontal disease progression, systemic health of the patient, and the management of periodontal disease. The report emphasizes the need for proper diagnosis and timely management of the underlying systemic condition, to prevent further complications by considering the potential association of gingival enlargement with thyroid dysfunction.

Case report

A 47-year-old female patient reported to the Department of Periodontology, complaining of bleeding gums and an increase in the size of gums in the upper and lower jaws since the last six months, and loose teeth in the lower front teeth region for 4 months.

She revealed that the bleeding from the gums was

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occurring as spontaneous episodes, sudden in onset and had gradually progressed since then. She had noticed a gradual increase in the size of gums sine last few months that she felt to be aesthetically displeasing.

History revealed that she had undergone oral prophylaxis twice from a local dental practitioner outside. Nevertheless, the removal of local factors did not resolve the gingival swelling and bleeding gums.

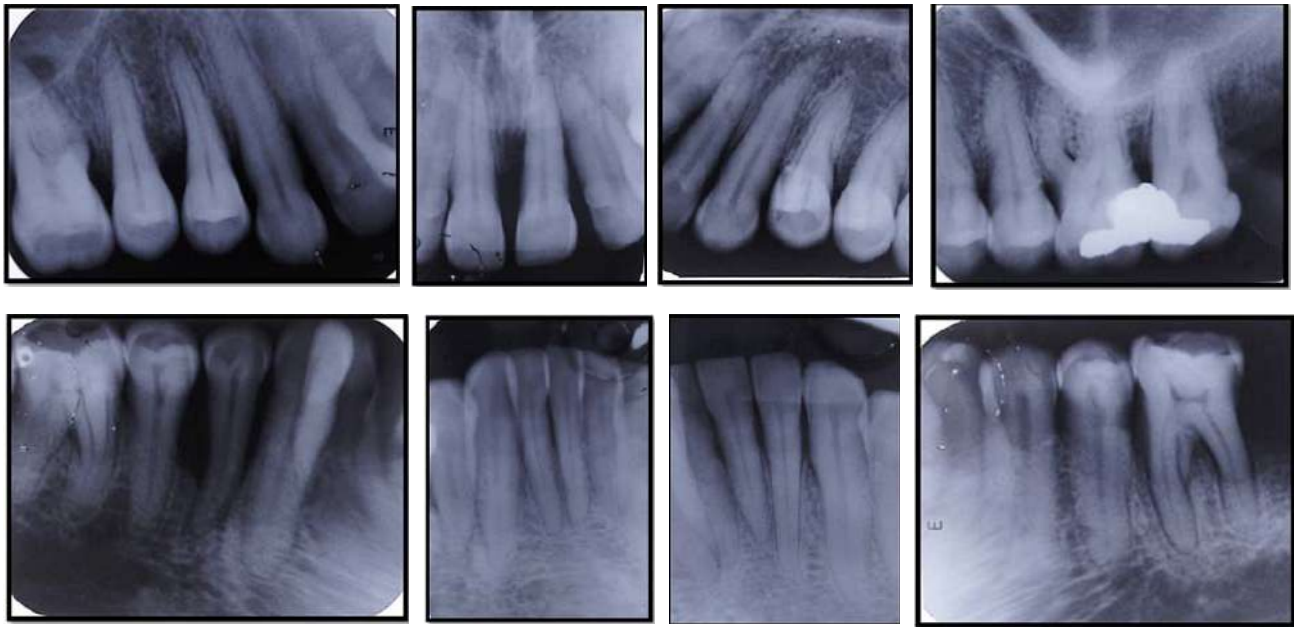
Her medical history revealed that she is a known case of hypothyroidism for the last one year and she was apparently on homeopathic medication for the same. On chemiluminescent immunoassay, thyroid stimulating hormone (TSH) levels of 9.29μIU/ml were reported.

On intraoral examination oral hygiene index scores appeared fair. Generalized gingival inflammation was seen with a reddish pink colour of the gingiva with rolled out margins and blunt interdental papillae. Only minimal local deposits were present with generalized grade II type of inflammatory enlargement, loss of stippling, spontaneous bleeding, and the presence of periodontal pockets of 5-7 mm. Grade III and Grade II mobile teeth were present. The preoperative radiographic examination revealed the presence of generalised bone loss with combined vertical and horizontal bone deficiencies.

In the present clinical scenario, since the patient was systemically compromised presenting an uncontrolled state of hypothyroidism with levels of thyroid-stimulating hormone (TSH) greater than 5 μIU/mL, she was referred to an endocrinologist for the management of hypothyroidism prior to the commencement of any dental treatment. Accordingly, she was prescribed 50 mg of systemic thyroxine per day.

One month after systemic thyroxine therapy, again

Pre-operative clinical picture



Pre-Operative Radiographic Presentation

when the TSH level was evaluated and it was found reduced to a value of 5.925 µIU/mL. So, the etiotropic phase was initiated that comprised of a thorough subgingival scaling and root planing (SRP) together with meticulous oral hygiene instructions (OHI). She was then kept on a periodic maintenance program for a period of 10 months. On the first and the second reviews a week and two weeks later there were improvement in the gingival condition with reduced bleeding scores.

But during her next visit about 2 months post SRP, patient was presented with a deterioration in the periodontal health compared to previous review visits. So again, once the TSH was evaluated it was reported to be as high as 10.9 uIU/ml suggestive of an imbalance in the thyroid status. Patient was referred to her physician and her medication was raised to 75 mg/day. Similarly for every month she has been reviewed and finally after 10 months once the TSH value reached 1.45 uIU/ml, there was tremendous improvement in the periodontal condition that was obvious clinically as well as radiographically with around 30% gain in the bone height. Clinically there was significant reduction in bleeding scores, disappearance of tooth mobility and reduction in pocket depth to 3mm.

Discussion

Hypothyroidism is a systemic condition characterised by an underactive thyroid gland in which the production of thyroid hormones is diminished, resulting in metabolic slowdown. The common oral findings in hypothyroidism include the characteristic

Post-operative clinical picture

Post-operative radiographic presentation

macroglossia, dysgeusia, delayed eruption, altered tooth morphology, and delayed wound healing. [1]

Results demonstrating elevated TSH (>5.5 µIU/mL) and low circulating free T4 levels are indicative of hypothyroidism. This is a condition increasingly prevailing in the adult Indian population especially among females.[2]

The present case report shows the coexistence of periodontal disease with hypothyroidism. Here the tissue response to periodontal therapy was adversely affected by an uncontrolled thyroid dysfunction. And later achieved periodontal health once the thyroid status became normal. However, during the course of therapy, a thyroid imbalance occurred, not only preventing healing, but causing additional alveolar bone resorption.

Although there are studies[3-6] showing the correlation between thyroid disorders and periodontal disease, there is no adequate literature available regarding the exact mechanism by which thyroid hormone level alters the periodontal tissue response to therapy. Thyroid hormones is found to stimulate osteoblasts and osteoclasts directly, thereby influencing bone remodelling. In hyperthyroidism, the resorptive and formative phases are accelerated and shortened in length, leading to normal resorption depth and reduced wall thickness of the osteon, the bone structural unit, at the end of each cycle. Whereas in hypothyroidism, the resorption depth is reduced, and the completed wall thickness of the osteon is increased.[1]

In hypothyoid patients the incidence of periodontitis is more because of increased susceptibility to infection. There is delayed wound healing due to decrease in the metabolic activity of the fibroblasts and longer exposure of the unhealed tissue to pathogenic organisms. The increased subcutaneous mucopolysaccharides due to decrease in the degradation of these substances and the decreased ability of small blood vessels to constrict and may result in increased bleeding from infiltrated tissues including the mucosa.[7]

Chaikin B. S. in 1963 was the first to report a case of this kind in which the patient upon first examination seemed like to have an ordinary periodontitis and occlusal trauma due to local factors. But it did not heal well until after the thyroid extract level was within normal limits and the breakdown retreated.[3]

Mosekilde in 1990 proposed a possible mechanism of link between periodontal disease and thyroid dysfunction. Hypothyroidism affects bone healing, by reducing the recruitment, maturation, and activity of bone cells leading to reduction of bone resorption and formation.[4] Soni et al. in 2005 reported a case of a 42-year-old male with a 5-year history of recurrent gingival bleeding who was diagnosed with acquired von Willebrand disease and associated hypothyroidism. The hypothyroidism was treated with levo thyroxine, which initially corrected the bleeding problem. However, the bleeding reoccurred after the patient failed to comply with levo thyroxine supplementation. [5]

Feitosa et al. (2008) studied the impact of thyroid hormone imbalance on alveolar bone loss using a rat model of ligature-induced periodontitis. The result showed that there was statistically significant increase in alveolar bone loss in the hypothyroid rats, relative to the controls. The progression of periodontal disease in a hypothyroid state is more related to the negative effect of hypothyroidism on the immune system & not related to the effect of the hormone imbalance on the alveolar bone quality.[6]

Scardina and Messina (2008) compared the microvascularity of the interdental papilla Hashimoto thyroiditis patients with that of healthy individuals and found out that there are alterations in the microvasculature consisting of an increase in capillary density and reduction in the capillary diameter in Hashimoto thyroiditis patients. This alteration of microvascularity might act as a risk factor for periodontitis.[8]

Findings of the review done by Zahid in 2011 to summarize the relationship between thyroid disease and periodontal status. Results of this review suggest that thyroid diseases may affect the status of periodontal diseases, especially in hypothyroid conditions.[1]

Conclusion

Thyroid diseases may affect the periodontal status, especially in hypothyroid conditions. Dentist should be aware of a potential association between clinically observable gingival enlargements and hypothyroidism. Patients with this combination of symptoms should be referred to an endocrine clinic for definitive diagnosis, to prevent the potential complications of uncontrolled hypothyroidism.

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