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IDA Bangalore branch being awarded Best local branch award IDC National conference, Thiruvananthapuram, 24/01/20

EDITORIAL

The second wave of Covid-19 pandemic has led to a dramatic loss of human life worldwide and fiercely escalated to a global health and economic crisis. These unprecedented times has presented an unparalleled challenge to all sections of health care system. Dentistry and dental professionals were at the crest of the catastrophe, since they were in the highly vulnerable segment with an excessive possibility of exposure to the SARS-COV-2 virus persisting in the oro-nasopharyngeal area. This led to a great deal of ambiguity and dilemma in the minds of the dental health care professionals concerning the future of dental profession. This scenario affected both the clinical and academic domains of dental students, academicians and clinicians likewise. However despite of the challenges, the dental profession has rebounded back with various alternatives with the aid of the existing regulations of governing council. In the clinical as well as in the academic front modifications and various options were adopted to successfully tackle the scenario and emerge out of the unprecedented situation. Under the present circumstances it is imperative to maintain our ongoing quest in research with an additional insight into the impact of the virus in dental scenario. Hence in tandem with the above proposition, this issue of the journal focuses on the current research in dentistry and implications of covid-19 on oral health. Wishing all safe and healthy days ahead.



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PRESIDENT'S MESSAGE

Dear respected IDA member,

It is my great privilege to communicate with you from Presidents desk. I congratulate to all of you for being a part of IDA family. During this Covid situation, our team of office bearers with the help of institutions & Dentists have tried utmost to cater to the needs of Dental professionals by reaching out to in difficult circumstances & enriching knowledge by conducting CDE & health awareness programs on online platform. 'Dentists Day 2021' was one such extravanza which was conducted entirely on online platform witnessing a good participation from dental fraternity & enjoyed great success.

Looking forward for many more such activities & programs from our branch in forthcoming days & wishing everyone a great year ahead.



With regards,
Dr. Sateesha Reddy B H
 President, IDA Bengaluru Branch

SECRETARY'S MESSAGE

Dear colleagues,

Seasons' Greetings! "Nothing worth having comes easy." The journey of our Indian Dental Association Bangalore Branch has also seen tumultuous times but emerged stronger than ever with every passing year. I take this opportunity to sincerely thank each member of IDA who has made us stronger, sturdier, and fiercer as a pack standing together to enhance the impact that Dental Surgeons make on the society. The various activities of the association have met with greater success than ever before with enthusiastic participation in all scientific congregations. I would like to urge all members to actively participate in the form of their innovative ideas and suggestions for improvising communications on online and offline platforms. Last, but not the least, congratulate Dr Prashanth for his relentless efforts in streamlining information for the Journal and compiling it. Let's not sit back, keep moving and keep the fire burning.



Warm Regards,
Dr Sudarshan Sajjan
 Hon.Secretary
 IDA Bengaluru Branch

TREASURER MESSAGE

Dear colleagues,

"A drop of water offered as a little help deserves a fountain to return the favor". I express great appreciation and heartfelt gratitude to the editorial team and reviewers of our journal for their valuable contribution to the success of this journal. It would have been impossible to achieve and maintain high standards and rigor of the journal without the teams' efficiency and hardwork



With regards,
Dr. D V VidhyaSagar
 Hon. Treasurer, IDA Bengaluru Branch

Long Term Alkalizing Effect of Centon N At Different Ph Levels - An in Vitro Study.

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ABSTRACT

Background and objectives : Centon N is an “alkasite” restorative material which is said to contain an alkaline filler, capable of releasing acid-neutralizing ions which is helpful in maintaining the pH of the saliva, thus preventing carious activity. Hence the aim of this study is to investigate the alkalizing action of the Centon N restorative material at 3 different pH levels (5.5,6.5,7.0) for 9 weeks.

Materials and Method : Solutions of distilled water with pH values adjusted to approximately 5.5, 6.5, and 7 with Lactic acid and NaOH were prepared. 30 disk shaped specimens (2-mm thickness, 7-mm diameter) of Centon N were made. Each disc was exposed to 8cm³ of these solutions in small conical flasks. After 1week, the specimens were blotted dry and transferred to a fresh 8 cm³ volume of solution. The pH of the previous solution were determined using an electrode attached to a pH meter. This was repeated at weekly intervals up to 9 weeks.

Results : There was an increase in pH from all the 3 initial pH values (5.5,6.5,7.0) at the 1st week, continuing every week upto 9th week and this was statistically significant.

Conclusion : Centon N has alkalizing (buffering) potential. Alkalizing action was evident and much higher

INTRODUCTION

Dental caries is considered a biofilm-sugar dependent disease.¹ Biofilm accumulation can produce caries in a tooth, when the pH drops due to acid production by biofilm bacteria.² The pH drop caused by acid production is the driving force governing the loss or gain of Ca and Phosphate ions from the mineral structure of the teeth. When the pH remains below 6.5 for dentin and 5.5 for enamel, demineralization takes place.³ This pH drop is usually neutralized by the salivary buffer system.⁴ Stephan, after series of experiments concluded that caries results from prolonged exposure to a pH below the critical value and that the saliva takes an average of 30 – 60 min to buffer the pH back to normal.⁵ The ability of a material to neutralize acids produced in dental plaque and to affect the plaque pH, is crucial for the demineralization/ remineralization processes during caries progression.⁶ Hence it is important to have a material that has buffering action to neutralize the acids. Continuous progress in restorative technology has made this a possibility.

Centon N (Ivoclar Vivadent) is a new class of alkasite restorative material and a subgroup of composite material class. It is a dual cure material and contains

an alkaline filler capable of releasing acid-neutralizing hydroxyl ions in addition to fluoride and calcium ions. The manufacturer claims the ion release to be pH dependent i.e. a larger amount of ions are released when the pH-value is low (acidic) than when the pH-value is neutral.⁷ Hence this study was designed to investigate the alkalizing action of Centon N at 3 different pH levels (5.5,6.5,7.0) for an extended time of 9 weeks.

MATERIALS AND METHODOLOGY

30 disk-shaped specimens (2-mm thickness, 7-mm diameter) of Centon-N were prepared as per the manufacturer's instructions and light curing was done with LED unit for 40 seconds. Specimens were divided into 3 groups each of 10 according to the initial pH values – 5.5, 6.5 and 7.0.

The pH of distilled water was adjusted approximately to 5.5, 6.5, 7 by adding lactic acid and NaOH to it. Each specimen was exposed to 8cm³ of these solutions in small conical flasks. After 1week, the specimens were blotted dry and transferred to a fresh 8cm³ volume of solution. The pH of the previous solution were determined using an electrode attached to a pH meter (ELICO LI 120 pH Meter). This was repeated at weekly intervals up to 9 weeks.

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FIG 1 : MATERIALS



FIG 2 : pH METER



FIG 3 : CENTON SPECIMENS



FIG 4 : pH LEVELS ADJUSTED TO 5.5, 6.5 AND 7

RESULTS

Statistical analysis :

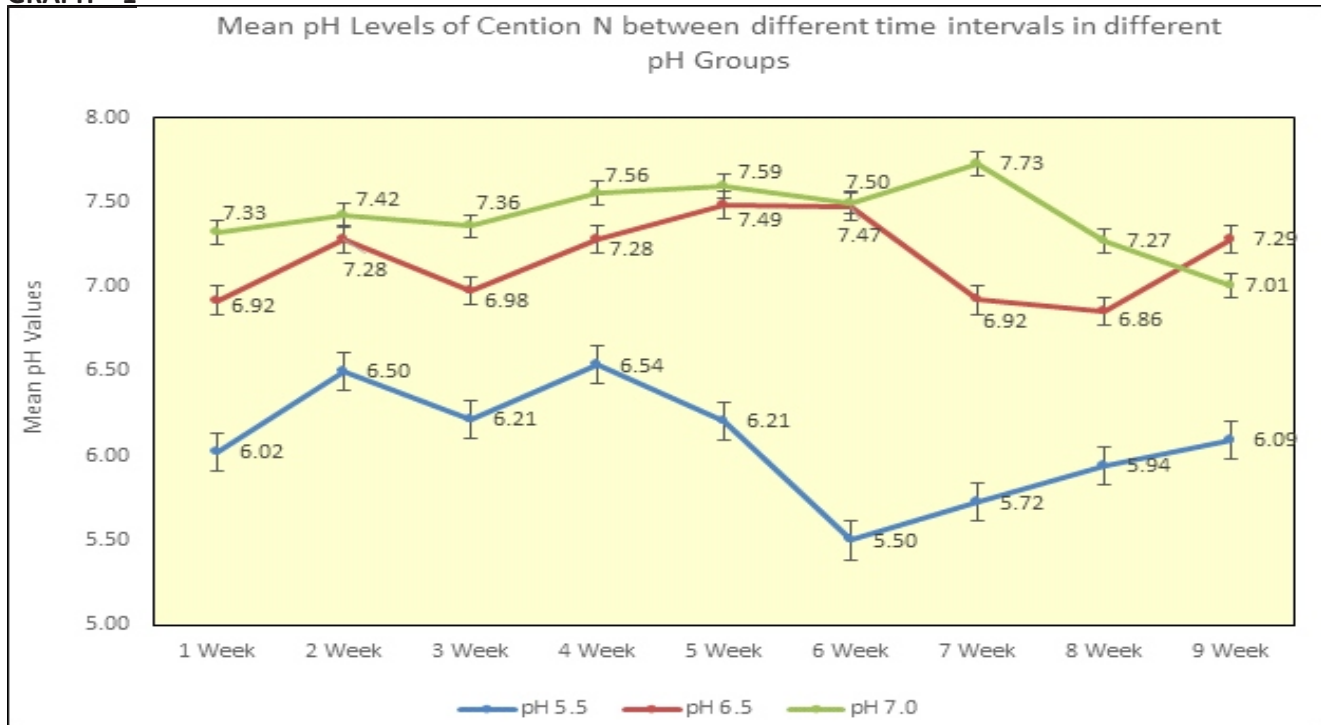
Statistical Package for Social Sciences [SPSS] for Windows Version 22.0 Released 2013. Armonk, NY: IBM Corp., was used to perform statistical analyses

Descriptive analysis includes expression of pH level change in various solutions in terms of mean and standard deviation. One-way ANOVA test followed by Tukey's HSD Post hoc Analysis was used to compare the mean pH values between the groups at each time interval. The level of significance was set at $P < 0.05$

Comparison of mean pH levels of Cention N between groups at different time intervals using One-way ANOVA Test followed by Tukey's Post hoc Test									
Time	Groups	N	Mean	SD	Min	Max	P-Value ^a	Sig. Diff	P-Value ^b
1 Week	pH 5.5	10	6.02	0.21	5.8	6.6	<0.001*	5.5 Vs 6.5	<0.001*
	pH 6.5	10	6.92	0.02	6.9	7.0		5.5 Vs 7.0	<0.001*
	pH 7.0	10	7.33	0.05	7.2	7.4		6.5 Vs 7.0	<0.001*
2 Week	pH 5.5	10	6.50	0.27	6.1	6.9	<0.001*	5.5 Vs 6.5	<0.001*
	pH 6.5	10	7.28	0.06	7.2	7.3		5.5 Vs 7.0	<0.001*
	pH 7.0	10	7.43	0.03	7.4	7.5		6.5 Vs 7.0	0.13
3 Week	pH 5.5	10	6.21	0.16	6.0	6.6	<0.001*	5.5 Vs 6.5	<0.001*
	pH 6.5	10	6.98	0.07	6.9	7.2		5.5 Vs 7.0	<0.001*
	pH 7.0	10	7.36	0.03	7.3	7.4		6.5 Vs 7.0	<0.001*
4 Week	pH 5.5	10	6.54	0.18	6.3	6.9	<0.001*	5.5 Vs 6.5	<0.001*
	pH 6.5	10	7.28	0.09	7.2	7.4		5.5 Vs 7.0	<0.001*
	pH 7.0	10	7.56	0.02	7.5	7.6		6.5 Vs 7.0	<0.001*
5 Week	pH 5.5	10	6.21	0.04	6.2	6.3	<0.001*	5.5 Vs 6.5	<0.001*
	pH 6.5	10	7.49	0.09	7.4	7.6		5.5 Vs 7.0	<0.001*
	pH 7.0	10	7.59	0.07	7.5	7.8		6.5 Vs 7.0	0.005*
6 Week	pH 5.5	10	5.50	0.07	5.4	5.7	<0.001*	5.5 Vs 6.5	<0.001*
	pH 6.5	10	7.47	0.16	7.2	7.6		5.5 Vs 7.0	<0.001*
	pH 7.0	10	7.50	0.12	7.3	7.7		6.5 Vs 7.0	0.89
7 Week	pH 5.5	10	5.72	0.01	5.7	5.8	<0.001*	5.5 Vs 6.5	<0.001*
	pH 6.5	10	6.92	0.18	6.7	7.3		5.5 Vs 7.0	<0.001*
	pH 7.0	10	7.73	0.05	7.7	7.9		6.5 Vs 7.0	<0.001*
8 Week	pH 5.5	10	5.94	0.05	5.9	6.0	<0.001*	5.5 Vs 6.5	<0.001*
	pH 6.5	10	6.86	0.14	6.6	7.0		5.5 Vs 7.0	<0.001*
	pH 7.0	10	7.27	0.03	7.2	7.3		6.5 Vs 7.0	<0.001*
9 Week	pH 5.5	10	6.09	0.26	5.9	6.7	<0.001*	5.5 Vs 6.5	<0.001*
	pH 6.5	10	7.29	0.06	7.2	7.4		5.5 Vs 7.0	<0.001*
	pH 7.0	10	7.01	0.06	6.9	7.1		6.5 Vs 7.0	0.001*

* - Statistically Significant

There was an increase in pH from all the 3 initial pH values (5.5,6.5,7.0) at the 1st week, continuing every week upto 9th week and this was statistically significant.

GRAPH – 1

At 5.5 pH, there was an increase in pH at all the weeks. Maximum alkalizing action upto 6.5 was obtained and complete neutrality was not achieved.

At 6.5 pH, alkalizing action was seen and the values exceeded beyond neutrality to almost 7.5

At the neutral pH of 7, there was an increase in pH at all weeks.

DISCUSSION

Progress in restorative technology has made possible the availability of numerous direct filling materials to the modern dental practice. A new alkasite dual cure bulk fill restorative material, Cention N (Ivoclar Vivadent, Liechtenstein) has been introduced, which has been claimed not only to release substantial levels of fluoride but also hydroxide and calcium ions. The release of hydroxide ions from a restorative material will neutralize the acids formed during cariogenic attack, thus preventing demineralization.⁸ This property which is the ability of the material to raise the pH of lactic acid solutions to which they are exposed is known as buffering and this has been evaluated in this study.⁹

Bacterial acid production resulting in pH drop (acidic) is the causative force for carious process.¹⁰ Lactic acid is the major acid produced and at the critical pH of 6.5 for dentin and 5.5 for enamel demineralization takes place.^{9,3} Hence, the buffering capacity of Cention N against lactic acid at this critical pH (5.5 and 6.5) and neutral pH (7) was evaluated in this study.

The results of this study shows that there was an increase in pH at all the 3 tested pH levels (5.5, 6.5, 7.0) at the first week, continuing every week upto 9th week and this was statistically significant. This confirms the release of hydroxide ions from the alkaline filler, calcium fluorosilicate glass present in Cention N which are able to have a direct effect on the pH levels in the oral cavity, thus creating conditions wherein the acidity due to cariogenic bacterial activity could be neutralized. In addition, this material also releases fluoride ions that will enhance remineralisation.

At pH 5.5, there was an increase in pH at all the weeks. And this was statistically significant. Maximum alkalizing action upto 6.5 was obtained and complete neutrality was not achieved.

At pH 6.5, alkalizing action was seen and the values exceeded beyond neutrality to almost 7.5. And this was statistically significant.

Even at neutral pH 7, there was an increase in pH at all weeks. And this was statistically significant.

Cention-N demonstrated a significantly high alkalizing

potential in acidic pH compared to neutrality as claimed by manufacturers that the release of ions is dependent on the pH of oral cavity ie when the pH-value low (acidic) Cention N releases a significantly larger amount of ions than when the pH-value is neutral.

Cention-N demonstrated a significantly high alkalizing potential in acidic pH. This may be due to the hydroxyl and calcium ions release by alkaline glass fillers from Cention-N, which are able to have a direct effect on the pH levels in the oral cavity, thus creating conditions whereby any acid release due to cariogenic bacterial activity could be neutralized.

The results of this study are similar to the findings of the study conducted by Nupur Gupta et al where the alkalizing potential of Cention N was tested for a period of 21 days only.⁸

Cention N can be the material of choice in patients with high caries index like rampant caries, root caries, salivary disorders, paediatric patients and those undergoing radiation therapy. However further long term in vivo studies to substantiate the results of the study and if the release of ions would compromise on the properties of the material are required.

CONCLUSION

Within the limitations of this study, it can be said that

1. Cention N has alkalizing (buffering) potential and the alkalizing action was found at all 3 pH levels and this was statistically significant
2. The alkalizing action was active at 1st week , continued every week till 9th week for all 3 tested pH values and this was statistically significant.
3. At pH 5.5, there was an increase in pH at all the weeks. Maximum alkalizing action upto 6.5 was obtained and complete neutrality was not achieved.
4. At pH 6.5, alkalizing action was seen and the values exceeded beyond neutrality to almost 7.5
5. Alkalizing effect was seen even at neutral pH of 7 which continued till the 9th week of the study.
6. Alkalizing action was evident and much higher at acidic pH as compared to pH at neutrality. This implies when exposed to acidic environment, alkalizing action was higher than that seen at neutrality and was active even by the end of 9 weeks.

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Mucormycosis in covid infection : A case report and review

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ABSTRACT

Mucormycosis is a rare but serious angio-invasive infection caused by a group of fungi called mucormycetes. The incidence rate of mucormycosis globally varies from 0.005 to 1.7 per million population. In India, prevalence of mucormycosis is estimated as 140 per million population, which is about 80 times higher than the prevalence in developed countries. The covid pandemic with its accompanied steroid medication brought an increased incidence of the disease. Predisposing factors for mucormycosis include organ transplantation, AIDS, poorly controlled diabetes mellitus, iron overload, tuberculosis, cancers such as lymphomas, kidney failure, long term corticosteroid and immunosuppressive therapy, cirrhosis and malnutrition. This case report describes a patient who had covid infection, high blood sugar level, spontaneous exfoliation of teeth and exposure of bone, and was diagnosed as having mucormycosis. The treatment of mucormycosis includes antifungal therapy along with the surgical debridement. The purpose of this article is to highlight the clinical features and stress upon the early diagnosis of mucormycosis.

INTRODUCTION

Since China reported its first cases to the World Health Organization in December 2019, there have been more than 1,948,617 laboratory-confirmed cases and over 121,846 deaths worldwide.¹

With great impact on day to day life of the population and emergence of 2 waves, morbidity due to the virus has been further aggravated by the incidence of another life-threatening fungus-caused disease known as the mucormycosis ('black fungus' infection). The latest Ministry of health bulletin on 22/7/21, puts the total reported cases at 45,374 and deaths at 4332.

Cases of Mucormycosis have also been reported from South American nations of Chile and Uruguay, Egypt and Iraq, in the Middle East, Bangladesh, Pakistan and Afghanistan, the US, UK, China and Russia. Thus, mucormycosis has turned into a pandemic. No statistical figures are cited for the above countries as they keep changing day by day. The majority (71%) of the reported cases of mucormycosis are from India.²

Mucormycosis is fungal infection caused by fungi in the order Mucorales. Generally, species in the Mucor, Rhizopus, Absidia, and Cunninghamella genera are most often implicated. The disease is often characterized by hyphae growing in and around blood vessels and can be potentially life-threatening in diabetic or severely immunocompromised individuals. Mucormycosis is an invasive fungal infection that was first described by Paulltauf A. in 1885.³ On the basis of the clinical presentation and particular site of involvement, six manifestations of the disease can be described: rhinocerebral, pulmonary, cutaneous, gastrointestinal, disseminated, and localized infections not otherwise belonging to the previous categories. Mucormycosis frequently infects the sinuses, brain, or lungs.⁴ While infection of the oral cavity or brain are the most common forms of mucormycosis, the fungus can also infect other areas of the body such as the gastrointestinal tract, skin, and other organ systems. In rare cases, the maxilla may be affected by mucormycosis. The rich blood vessel supply of

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maxillofacial areas usually prevents fungal infections, although more virulent fungi, such as those responsible for mucormycosis, can often overcome this difficulty.³

Predisposing factors for mucormycosis include organ transplantation, AIDS, poorly controlled diabetes mellitus, iron overload, tuberculosis, cancers such as lymphomas, kidney failure, long term corticosteroid and immunosuppressive therapy, cirrhosis and malnutrition. People with low neutrophil count are also at risk of infection. The rising of iron due to deferoxamine treatment in kidney disease has also been reported to increase the risk of Mucormycosis.⁵ As swabs of tissue or discharge are generally unreliable, the diagnosis of mucormycosis tends to be established with a biopsy specimen of the involved tissue.⁶

Pathologically, the fungus has a remarkable affinity for arteries. It dissects the internal elastic lamina from the media, resulting in extensive endothelial damage and thrombosis. The histopathological picture is one of acute inflammation and necrotic changes. Mucormycosis is usually commences in the nose and by direct extension it involves the para nasal sinuses, orbit, cribriform plate, meninges and brain. It rarely invades the hard palate. Lesion is treated by controlling the underlying cause; systemic amphotericin; and local drainage and debridement. The prolonged use of potassium iodide is controversial. In skull base lesion combined treatment is indicated and even endovascular therapy with sacrificing involved carotid artery.⁷

CASE REPORT

A 56-year-old male patient reported to the department of Oral medicine and Radiology with the chief complaint of swelling and pain on the right side of the face since six months. Patient was known to have diabetes and hypertension and was under medication. The patient gave a history of Covid infection in August 2020 and was hospitalized for about 45 days. During hospitalisation the patient's HbA1c was 6.7%.

During hospitalization he noticed a painful swelling on the right side of the face. Patient described swelling as sudden in onset, increased in size and gradually reduced on taking medications, details of the

medicines are not known. Patient also gave history of spontaneous exfoliation of multiple teeth one month after hospitalization. Investigation during the hospitalization included Nasal crust KOH Calcoflour which was Positive for budding yeast. This investigations were repeated a week later showed the presence of *Rizopus* species suggestive of mucormycosis. Patient was advised Amphoterecin nasal douching.

Patient also gave history loss of vision in right eye during the course of his hospitalization. Patient was advised Lubrex E/D O1H for each eye, along with Dorzolamide E/D for right eye three times a day. Patient was also put on Exocin eye ointment for the right eye.

Extra oral examination showed solitary diffuse swelling on right side of the face in the middle third region. Swelling was soft in consistency and tender on palpation. Skin overlying the swelling appeared normal showing no local rise in temperature. (Figure 1)



Figure 1: showing mild extra oral swelling on the right side of the face

Intra oral examination revealed that all teeth of the first quadrant (11 to 18) were missing, with denudation and exposure of alveolar bone extending from the midline up to the maxillary tuberosity area on the right side as seen in figure 2. The bony fragment was mobile and was tender on palpation. An opening was seen on the midline which appeared more like a perforation on the palate exposing the hard palate. (figure 3).



Figure 2: Denudation of the gingiva and part of the palate seen exposing the alveolar bone on right side.



Figure 3: an opening exposing the palate shown with black arrow.

CT reports of head and neck of the patient done in private hospital revealed an ill-defined extensive, enhancing soft tissue density epicentered in the right maxillary sinus. The posterolateral, medial walls and floor and alveolar processes of the right maxillary sinus, right pterygoid bone showed extensive destruction. The lesion was noted to encroach upon right foramen ovale with no demonstrable intracranial extension. Radiological diagnosis of right sino nasal mucormycosis with extensive osseous destruction of the right maxillofacial complex skull base, osteomyelitis and right orbital cellulitis was described.

Some of the CT scan images taken in the axial view are

listed below in the figure 4 a & b. Panoramic radiograph revealed missing teeth in the first quadrant (11 to 18) and unhealed sockets. (figure 5) Noting the extensive involvement of the entire maxilla it was necessary to perform surgical debridement along with systemic antifungal therapy. Hence the patient was referred to higher centre.

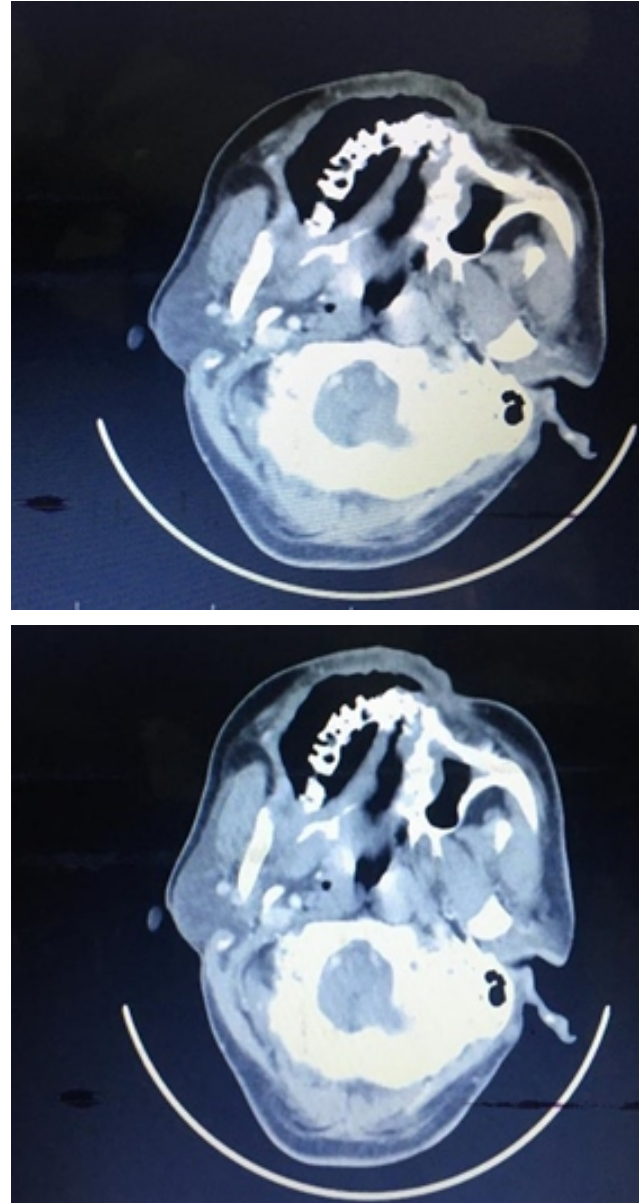


Figure 4: Axial view of the CT images



Figure 5: Orthopantomogram revealing a destruction a maxillary alveolar ridge on right side involving the maxillary sinus , and floor of the orbit .

DISCUSSION

Mucormycosis is an opportunistic, fulminating fungal infection of the sino-nasal region, occurring predominantly in patients with immune suppression. The hard palate is a rare site of the disease, and few cases have been reported in the literature. Hard palate involvement in mucormycosis is a sign of poor prognosis and is usually preceded by orbital and intracranial extension.⁷ The complications of mucormycosis are serious and are related to the body area initially infected but also can occur in other body regions because the fungi often spread to the organs or tissues that physically contact or are near the originally infected area. Serious complications include blindness, meningitis, brain abscesses, osteomyelitis, pulmonary haemorrhages, gastrointestinal hemorrhages, cavitory lesions in organs and eventually secondary bacterial infections, sepsis, and death.⁸

Our patient had a predisposing factor of high blood sugar level, presented with fever, intra oral and extra oral pain on the right side of the oral cavity and right side of the face respectively. He also presented with spontaneous exfoliation of teeth.

Four factors are critical for eradicating mucormycosis: rapidity of diagnosis, reversal of the underlying

predisposing factors (if possible), appropriate surgical debridement of infected tissue, and appropriate antifungal therapy. Early diagnosis is important because small, focal lesions can often be surgically excised before they progress to involve critical structures or disseminate. Correcting or controlling predisposing problems is also essential for improving the treatment outcome. In diabetic ketoacidotic patients, hyperglycaemia and acidemia should be corrected. Discontinuation of deferoxamine or immunosuppressive therapy, particularly steroids, should be strongly considered when the diagnosis of mucormycosis is made.

Given the rapidly progressive nature of rhinocerebral mucormycosis and the marked increase in mortality when the fungus penetrates the cranium, any diabetic patient with a headache and visual changes is a candidate for prompt evaluation with imaging studies and nasal endoscopy to rule out mucormycosis. The initial imaging study is frequently negative or has subtle findings. Radiographic findings lag behind clinical progression in this disease, and a negative imaging study does not provide a rationale to delay more aggressive diagnostic maneuvers (e.g., endoscopy with biopsy) if clinical suspicion is high. The appearance of tissue at endoscopy may also lag behind invasion, as the mucosa can appear pink and

viable during the initial phase of fungal invasion.

Finally, time is of the essence in the management of mucormycosis. Because patients with rhinocerebral disease may initially present with normal mental status and appear clinically stable, the urgency for establishing the diagnosis is frequently underappreciated. Initial spread of the fungus to the

brain may be relatively asymptomatic. Once the fungus has penetrated the cranium or entered the major intracranial vasculature, mortality increases substantially. The sensitivity of the organisms varies considerably, so that a patient on amphotericin B alone may be receiving completely ineffective therapy during the diagnostic period.

Drug	Dosage	Route of administration
-AmphotericinB deoxycholate (AmB) -Liposomal Amphotericin B (LAmB) -Amphotericin B lipid complex (ABLC)	1.0–1.5 mg/kg/day 5–10 mg/kg/day 5–7.5 mg/kg/d	Intra venous administration
Posaconazole	300 mg every 12 hours on the first day, then 300 mg once daily	Oral suspension
Iron chelation Deferasirox plus lipid polyenes	20 mg/kg po qd for 2–4 weeks	Enterally
Hyperbaric oxygen	100% oxygen, each dive ranging from 90 minutes to 120 minutes at pressures from 2.0 to 2.5 atmospheres with 1 or 2 exposures on a daily basis for total of 40 treatments. ¹⁰	
Cytokine therapy ⁴	Dose G -CSF at 5 $\mu\text{g/kg/day}$; GM-CSF at 100 –250 $\mu\text{g/m}^2$; IFN- γ at 50 $\mu\text{g/m}^2$ for those with body surface area ≥ 0.5 m^2 and 1.5 $\mu\text{g/kg}$ for those with body surface area <0.5 m^2	Parenteral

Role of Surgery

Mucormycosis is frequently rapidly progressive, and antifungal therapy alone is often inadequate to control the infection. The numerous agents of mucormycosis have a broad range of susceptibilities to antifungal agents; some strains may be highly resistant to amphotericin B. Furthermore, the hallmark angioinvasion, thrombosis, and tissue necrosis of this disease result in poor penetration of anti-infective agents to the site of infection. Therefore, even if the causative organism is susceptible to the treating antifungal agent in vitro, the antifungal may be ineffective in vivo. Finally, surgery is necessary due to the massive amount of tissue necrosis occurring during mucormycosis, which may not be prevented by killing the organism. Surgical debridement of infected and necrotic tissue should be performed on an urgent basis.⁴

Role of dentist

The role of dentist is of immense importance because mucormycosis primarily occurs around rhinomaxillary or rhinocerebral areas involving facial tissues, palate, alveolar bone and mandibular bone. Inhalation through nasal passage or infection of extraction sockets with sporangiospores in immunocompromised patients always involve larger areas necrosis and with systemic dissemination.⁹ For better prognosis of mucormycosis, early diagnosis and treatment is utmost important. It is important for the dentist to identify the clinical features ranging from nasal obstruction, bloody nasal discharge, facial pain or head ache, facial swelling or cellulitis, visual disturbances with concurrent proptosis, facial paralysis in case of facial nerve involvement. As the disease progresses in to cranial vault it may lead to blindness, lethargy, seizures, and death. Upon visual inspection, infected tissue may appear normal during the earliest stages of spread of the fungus. Infected tissue then progresses through an erythematous phase, with or without edema, before onset of a violaceous appearance, and finally the development of a black, necrotic eschar as the blood vessels become thrombosed and tissue infarction occurs. Infection can sometimes extend from the sinuses into the mouth and produce painful, necrotic ulcerations of the hard palate.⁴ Diagnosing mucormycosis by imaging studies (radiological or CT or MRI), culture

studies or serological tests are not unswerving. Good clinical examination with history and astute approach in treating without delay can reduce morbidity and mortality. Non healing of extraction sockets and immunocompromised states should alert high suspicion. Therefore, judicious approach by the clinician and early diagnosis and appropriate management helps to reduce the size of defect and complications⁹

Various guidelines regarding the prevention of mucormycosis in Covid 19 patients were given by Government health organisations and health services all over the country.

CONCLUSION

Mucormycosis is a rapidly progressing fungal infection among humans, which can prove fatal; it can lead to the formation of palatal fistula in immunoincompetent patients. Control and prevention of opportunistic fungal infections in patients suffering from debilitating diseases is very important. The major advantage in this case was early diagnosis and early management, as the disease is rapidly progressive in nature.¹⁰ Invasion of the hard palate is a rare complication of overwhelming fungal infection of the nose and paranasal sinuses. It is a poor prognostic sign and is usually preceded by orbital and even cerebral extension. Clinicians should maintain a high degree of clinical suspicion in the management of patients with debilitating illness and ulceration of the palate.⁷

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Free Gingival Graft – An Autograft with a Multipurpose Utility

Running title: Free gingival Graft

AUTHORS : Dr. Sphoorthi Anup Belludi¹, Dr. Ruchi Banthia², Dr. Arnav Mukherji³, Dr. G Kavyashree⁴

ABSTRACT

In the current practice of periodontics, clinicians are faced with the challenge of not only addressing the biological and functional problems present in the periodontium, but also of providing therapy that results in acceptable aesthetics. The recession of gingiva is increasingly becoming a more prominent condition in the oral health of many patients and should be treated at its earliest detection. The presence of gingival recession associated with an insufficient amount of keratinized tissue may indicate the need for gingival augmentation.

Clinical relevance: The most common technique for gingival augmentation procedure is the free gingival autograft. Free gingival grafting is a well established pure mucogingival procedure for increasing the dimensions of the gingival tissues to stop or prevent recession, to facilitate plaque control and to improve aesthetics and to reduce or eliminate root sensitivity.

Objective: Hence in this case report the multi-factorial etiology, decision modality, and treatment of gingival recession are discussed in the wake of achieving a predictable esthetic result.

Key words: Recession, free gingival graft, root coverage, attached gingiva.

INTRODUCTION

Gingival recession is the most common mucogingival deformity and it is characterized by the displacement of the gingival margin apically from the cemento-enamel junction (CEJ). Gingival recession can be localized or generalized and can be associated with one or more tooth surfaces. Gingival recession has a multifactorial etiology associated with anatomical factors like fenestration or dehiscence of the alveolar bone, abnormal tooth positioning, aberrant path of tooth eruption and individual tooth morphology.¹ All these anatomical factors may result in a thinner alveolar osseous plate, which may become more susceptible to resorption. In addition to the above-mentioned factors, malpositioned teeth, toothbrush trauma, aberrant frenal attachment, occlusal injury; and iatrogenic factors such as orthodontic, prosthodontic or endodontic procedures where in the improper placement of bands, brackets separators or crowns can insult and injure the gingiva are recognized as the other etiologic factors for gingival recession. Pathological factors consist of periodontal disease as a sequel to improper oral hygiene and

subsequent formation of plaque and calculus.^{1,2}

Since attached gingiva is not static and may respond to alterations in the functional environment of teeth; it calls for a need of surgical intervention. Autogenous gingival grafting or free gingival grafting is a well established pure mucogingival procedure for root coverage and for increasing the width of attached gingiva. Since its introduction in 1963, the procedure has proven reliable in increasing attached gingiva and stopping progressive gingival recession. This technique accomplishes the following objectives: enhances plaque removal around the gingival margin, reduces gingival inflammation and improves esthetics.³ Some studies reported stability of gingival margin and reduction of recession after free gingival augmentation procedure. Also, long-term stability (up to 4 years) of these treatment outcomes has been demonstrated.^{3,4}

CASE REPORT

This is a case series wherein two patients aged 26 and 32 years reported to the department of periodontics with a chief complaint of dirty teeth. On examination

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it was found that they had gingival recession in the mandibular region. Free gingival graft procedure was used for both these patients with different aims of achieving root coverage and to increase the width of attached gingiva respectively.

Free gingival graft procedure was initially introduced by Bjorn in 1963.⁵ Later Nabers 1966⁶ and Sullivan and Atkins 1968 described the indications, techniques and the principles of the free gingival grafts:⁷

In Case-I, the surgical procedure was performed according to the following steps with the aim of increasing the width of attached gingiva with the mandibular incisors with class III recession. (Figure-1):



Figure-1

Step 1. Preparing the recipient site.

The area on the mandibular incisors that were to receive the soft tissue graft was prepared by the technique proposed by Sullivan and Atkins⁷ After local anesthesia had been achieved, the exposed root of the mandibular incisors was planed thoroughly with a Gracey's curette. The recipient site was prepared with initial incision at the existing mucogingival junction with a #15 blade starting with the removal of the epithelium of the inflamed marginal tissue by sharp dissection followed by an incision made in such a way to prepare sufficient area of recipient bed apically and laterally to the area of the recession. This was expected to provide sufficient collateral circulation and allow the survival of the graft apical to the recession.

Step 2. Harvesting the free gingival graft from palate.

The free gingival graft of 1.0 to 1.5 mm thickness was harvested from the palate. The graft consisted of epithelium and a thin layer of underlying connective tissue. (Figure-2)

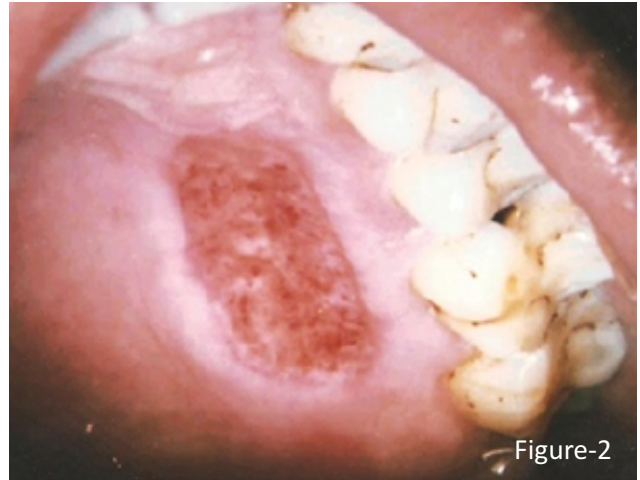


Figure-2

Step 3. Transferring and immobilizing the graft.

The gingival graft was adapted to the recipient site and sutured at the lateral and coronal borders to the periosteum to secure it in position. Periodontal dressing was applied over the surgical area for ten days. (Figure-3)



Figure-3

Step 4. Protecting the donor site.

The donor site was compressed and covered with periodontal dressing and a self retentive acrylic stent for ten days. (Figure-4)

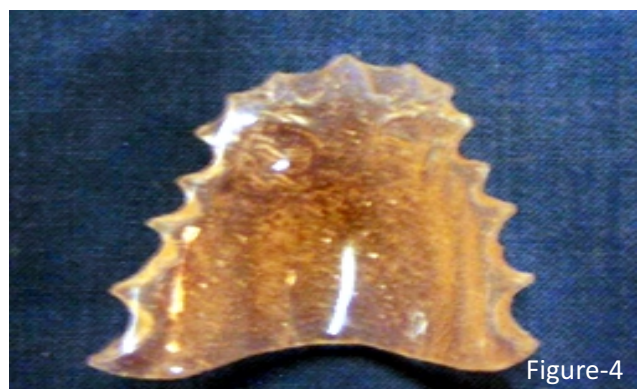


Figure-4

Sutures were removed 10 days after surgery (Figure-5).



Figure-5

After initial healing the subjects were recalled every 3 months for supportive periodontal treatment.

In Case-II the mandibular central incisors had class II recession. Free gingival graft procedure was carried out with the aim of achieving complete root coverage (Figure-6)



Figure-6

After the initial steps of achieving anesthesia and root debridement modification of the Classic technique by Miller was adopted.⁸ A horizontal incision in the interdental papillae at right angles to create a margin against which the graft may have a butt joint with the incision. Vertical incisions are made at the proximal line angles of adjacent teeth, and the retracted tissue is excised. Maintain an intact periosteum in the apical area. The rest of the steps were followed according to the previously described steps (Figure-7). Eventually after 10 days sutures were removed with satisfactory root coverage (Figure-8).



Figure-7



Figure-8

DISCUSSION

For many years the presence of an adequate zone of gingiva was considered critical for the maintenance of gingival health and for the prevention of progressive loss of connective tissue attachment. It is generally acknowledged that an inadequate zone of gingiva would facilitate subgingival plaque formation as well as the apical spread of plaque-associated gingival lesions. The study by Lang and Loe² regarding the significance of attached gingiva for periodontal health concluded that two mm of keratinized gingiva is adequate to maintain gingival health, and this expression has been widely quoted as a definition as to what constitutes an adequate width of gingiva for the maintenance of periodontal health. There are several evidences that persons who practice optimal oral hygiene may maintain periodontal health with minimal amount of keratinized gingiva.⁹ However, a number of authors suggest that sufficient amount of keratinized tissue is considered essential to preserve the healthy periodontal status and to support the dentogingival unit more resistant during the masticatory function and oral hygiene procedure.

Therefore the presence of gingival recession associated with a minimal amount or lack of keratinized gingiva may lead to root exposure making the surfaces prone to abrasions, sensitivity and root caries. Additionally it is not aesthetically pleasing and hence may indicate the need of gingival augmentation procedure.¹⁰

CONCLUSION

Aesthetic, biological and functional issues associated with mucogingival problem also dictate the need for treatment. Important functional points in the treatment of mucogingival problems are to stop the progressive recession process and to facilitate plaque control in the affected area. The relative ease of mastering this technique and the mystique of plastic surgical procedures have led to more widespread use of the procedure than some clinicians believe is merited. Hence this case report confirms this evidence and suggests the consideration of this treatment approach for a better outcome.

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Figures

Case I – Free gingival graft for increasing width of attached gingiva

Figure 1 – Miller's Class III gingival recession

Figure 2 – Donor site

Figure 3 – Recipient site showing graft sutured in place

Figure 4 – Palatal stent

Figure 5 – Post-surgical healing after 10 days

Case II – Free gingival graft for root coverage of mandibular central incisors

with Class II gingival recession

Figure 6 – Recipient site

Figure 7 – Placement and suturing of graft

Figure 8 – Post-surgical healing after 10 days

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Diagnosis and Prediction using software in an Orthognathic case- A report

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Abstract

A simulation and prediction of an orthognathic case is a very important part of treatment planning. The manual method of prediction was given by Epker and Fish which is very time consuming and therefore various computerized digital prediction methods have become more popular. Accuracy of digital prediction and treatment skills aid in comprehensive treatment planning and patient motivation. A 19year old boy who complaints of forwardly placed upper front teeth and requires Bilateral sagittal split osteotomy. This report provides an insight into how to use a software for diagnosis, precise simulation and prediction for an orthognathic case.

Introduction

Severe skeletal dysplasias require interdisciplinary management and the role of orthodontist and the oral and maxillofacial surgeon is of paramount importance. The incorporation of the diagnostic and treatment skills of both help us to diagnose in a better way and have become a standard procedure for treating these severe dysplasia's. Considering the age in mind there are various treatment modalities available like growth modification in children , camouflage and orthognathic surgery in non-growing individuals.

Comprehensive Diagnosis and treatment planning is the key to a successful and esthetic outcome. Orthodontic diagnosis and planning has considerably evolved over the years. Cephalogram prediction in orthognathic surgery can be performed by manual methods or computerized methods. Manual methods used a template or overlay method for prediction.¹ The manual method of prediction tracing as illustrated by Epker and Fish had been the gold standard in planning for orthognathic cases.² with the advancement of technology various softwares have come which help us in Planning an orthosurgical case with improved prediction outcome and motivate the patient.

Dolphin imaging software is one such modality which helps us to digitize various dental skeletal and soft

tissue landmarks on the cephalogram. It helps to magnify the image and aid in landmark identification in a better way thereby minimising errors.

This article illustrates an Interdisciplinary case report of diagnosis and planning of an orthognathic case of a 19year old boy who complaints of forwardly placed upper front teeth and requires Bilateral sagittal split osteotomy. This report provides an insight into how to use a software for precise simulation and prediction for an orthognathic case.

Case Report - Diagnosis and Etiology

A 19year old male patient had a chief complaint of forwardly placed upper front teeth. Facial photographs showed a symmetric face, convex profile with a retruded chin, a proportionally larger lower anterior facial height, and potentially incompetent lips at rest. [Figure 1]

Intraorally, he had Angle's Class II div 1 subdivision malocclusion with an 11 mm overjet and a 5 mm overbite, mild crowding in the mandibular anteriors and midline shifted to the left. [Figure 2] Cephalogram tracing was done manually and COGS and Arnett analysis were interpreted to know about the quality and quantity of skeletal discrepancy.

Cephalometric findings revealed the patient had class II skeletal pattern ($ANB = 8^\circ$) with retruded mandible ($SNB=72^\circ$) and Tvl to chin was -17mm, vertical growth

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pattern (FMA= 34°) and bidental proclination. [Table 1]. Considering the amount of skeletal discrepancy, it was decided, to correct the skeletal Class II malocclusion by doing orthodontic treatment initially followed by

Bilateral sagittal split osteotomy and genioplasty. Surgical treatment was planned with the aim of achieving facial esthetics and optimal functional occlusion.



1- Pre-treatment extra oral photos

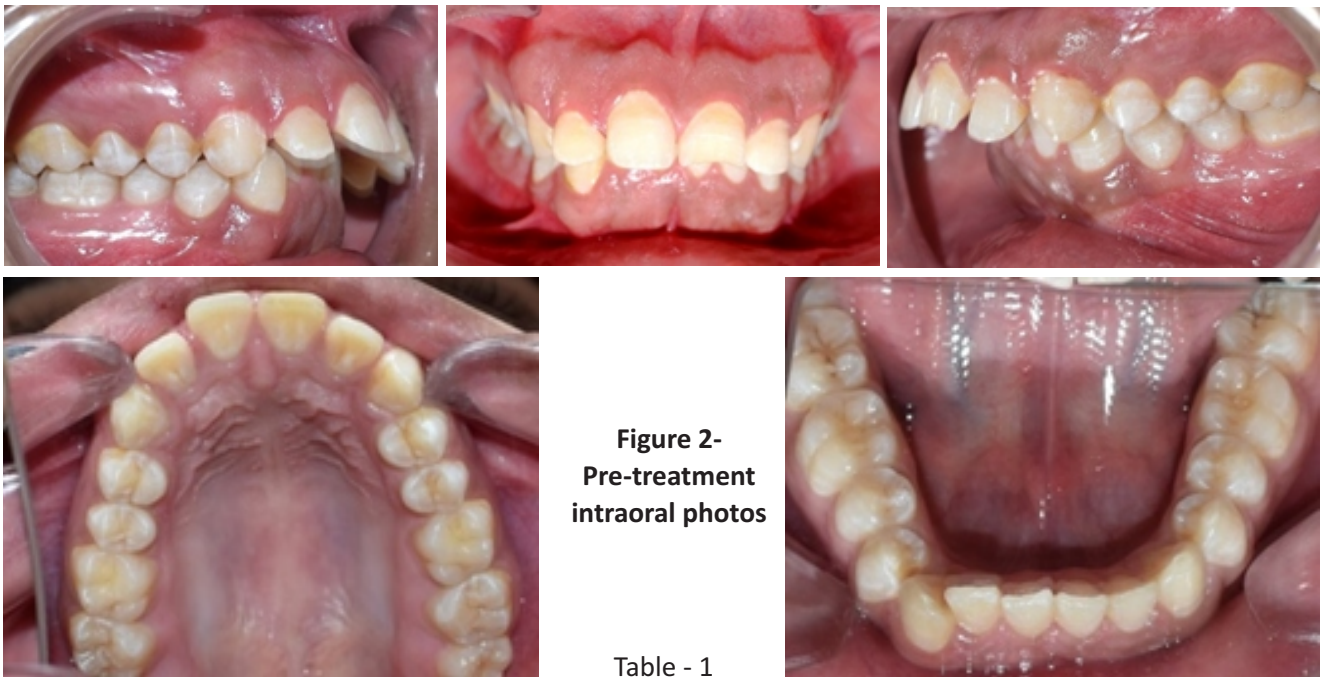


Figure 2-
Pre-treatment
intraoral photos

Table - 1

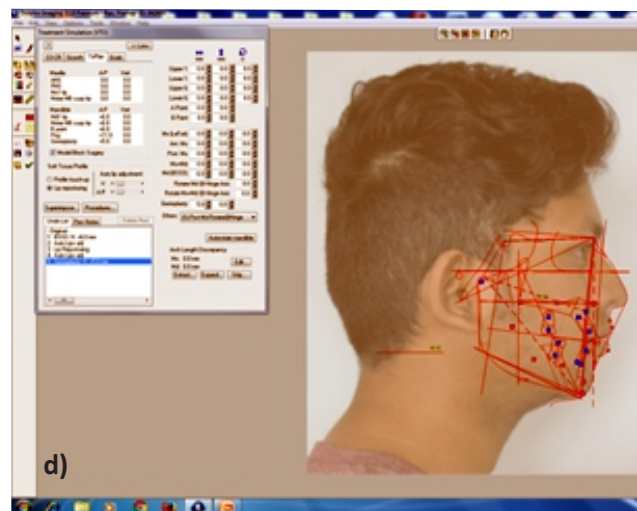
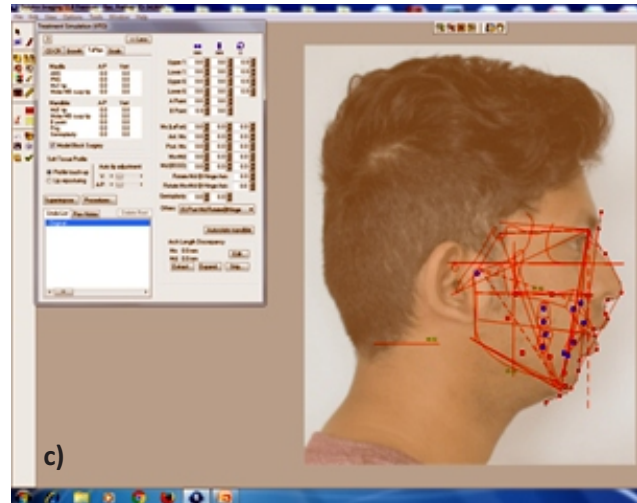
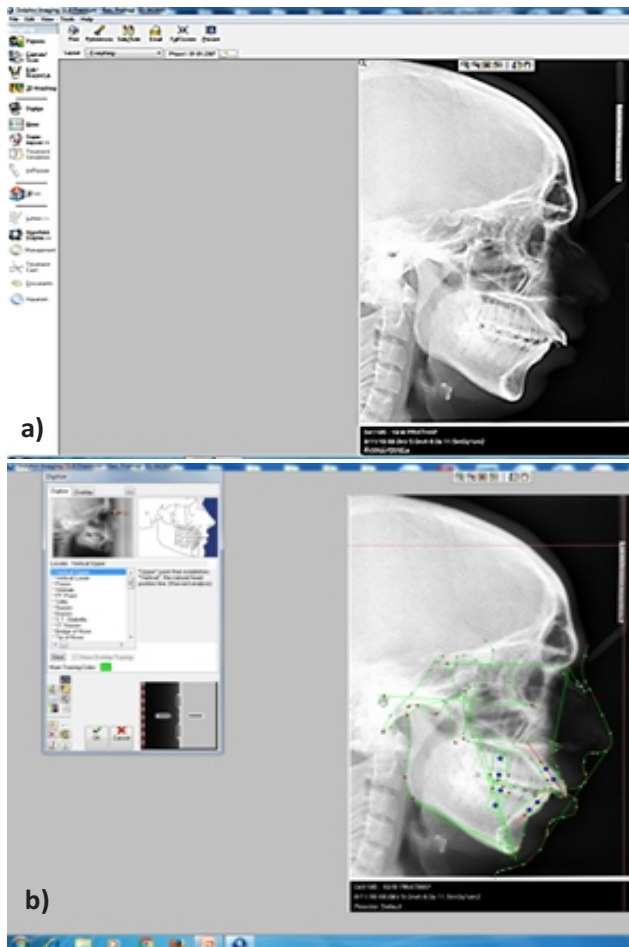
Parameters	Pre-Treatment
SNA	80°
SNB	72°
ANB	8°
Wits	6mm
F-M-A	34°
LAF (Mc Namara)	72mm

Parameters	Pre-Treatment
UI - Palatal Plane	130°
UI – TVL	-7mm
IMPA	102°
Interincisal angle	100°
Tvl ⊥ Chin	-17mm

To predict the final outcome, we decided to do prediction by computerized method as will be explained now.

Digital predictive method-

- Patient's cephalogram and lateral profile photographs were uploaded in Dolphin software version 11.8.
- Digitization of various skeletal, dental and soft tissue landmarks was performed.
- Following this, the patient's lateral profile photo was superimposed on the cephalogram and the tracing and the planned advancement was done.
- Overjet was reduced, molars were moved into Class I molar relationship on setting the mandible forward by 7 mm and genioplasty of 6mm. The new cephalogram tracing was automatically drawn with this new advancement reading.
- The morphing was done to simulate and predict the change in the lateral profile of the patient.



Results - The value for mandibular advancement as predicted using this method was 7mm. Following this, a model mock surgery was done for visualizing 3D postoperative relationship of jaws with Class I molar relation.

Discussion

Management of severe skeletal deformities require an interdisciplinary approach to achieve stable facial and esthetic outcomes. Orthodontics alone won't be sufficient to bring about stable results and hence surgery along with orthodontics is the best plan. For any such cases , careful analysis and prediction methods are required to quantify the amount of skeletal discrepancy and predict the probable facial outcomes. Dental specialists harness the latest technology to best of there capabilities. Manual tracings were done in the 1970's until Robert M Ricketts created a computerized cephalometric tracing/visual treatment objective system.

Dolphin imaging software is a powerful tool that makes processing data extremely simple and aids in efficient planning. The soft tissue limitations encountered by various other softwares , is drastically reduced using the dolphin imaging software. Smith et al⁵ compared the ability of Dolphin Imaging in simulating the soft tissue outcome after surgery with four orthognathic programs currently dominating the U.S. market, namely Dentofacial Planner Plus , Dolphin Imaging, Vistadent AT (GAC) OrthoPlan and Quick Ceph study found that Dolphin simulation to be the second most accurate

The digitized cephalogram tracing provides ease of identification of anatomical landmarks , has less chances of errors and is less time consuming making the digital tracings more accurate method for cephalometric analysis.³ It is mandatory to perform surgical prediction before planning for an orthognathic case.

Conclusion

Computerized predictions do not directly influence or affect the patient's overall treatment plans. But can be used as adjuncts to plan the extent of surgery to be carried out and may motivate the patient by strengthening the patients' self-image, and realistic expectations A simulation and prediction software confirms the necessity of surgery as a treatment option by painting a verbal picture.⁴

Integration of CBCT in the dolphin software along with volumetric analysis will aid clinicians to quantify various skeletal asymmetries accentuate efficient diagnosis and treatment planning by orthodontists and maxillofacial surgeons.

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Management of Radicular Cyst associated with Endodontically treated Deciduous molars - A case report

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ABSTRACT

Radicular cyst in primary dentition is a rare condition. It is an inflammatory type of cyst caused due to proliferation of epithelial cell rests of malassez. An untreated or long standing cyst may develop into a periapical abscess leading to cellulitis and draining fistula. Pulp therapy is recommended for treatment of primary teeth with pulpitis or apical periodontitis. It seems that there may be a relationship between the intracanal medicaments used for pulp therapies and the distinctive intraepithelial inclusions which are found in cyst walls that may provide a site for prolonged antigenic stimulation which can lead to proliferation of cell rests of malassez resulting in cyst formation. This case report presents a case of an 8 year old female patient with a radicular cyst following pulp therapy.

Keywords : radicular cyst, pulp therapy, primary dentition

INTRODUCTION

Odontogenic cysts and tumours represent a surprisingly diverse group of pathologic lesions of the jaws and overlying soft tissues.¹ The radicular cyst is known as a common type of odontogenic cyst arising from the proliferation of the Hertwig's epithelial root sheath.² Nevertheless, the radicular cyst in deciduous dentition is an extremely rare condition with just under 4% among 1300 cases which were diagnosed as those cysts in both primary and permanent teeth.³ Most radicular cysts of the primary dentition are associated with mandibular molars.⁴ Pulp therapy is recommended for treatment of primary teeth with pulpitis or apical periodontitis. Side effects of pulp therapy treatments may include cyst formation, delayed eruption or enamel defects of permanent successor teeth. It seems that there may be a relationship between the intracanal medicaments used for pulp therapies and the distinctive intraepithelial inclusions which are found in cyst walls that may provide a site for prolonged antigenic stimulation.⁵ Cyst formation in children may cause bony expansion and resorption, delayed eruption,

malposition, enamel defects or damaging of the developing permanent successors. The normal treatments for radicular cysts include total enucleation in the case of small lesions, marsupialisation for decompression of larger cysts, or a combination of the two techniques. Inflammatory cysts do not recur after adequate treatment.⁶

CASE REPORT :

An 8 year old female patient accompanied by her mother reported to the Department of Paediatric and Preventive Dentistry, K.L.E Society's Institute of Dental Sciences, with a chief complaint of pain and swelling in lower left back tooth region since 1 month. The pain was spontaneous, dull aching, gradually progressive, intermittent. Patient gave no report of taking any medication.

On extra oral examination, patient exhibited a brachycephalic, euryprosopic face, competent lips and convex profile [Figure-1]. Intraoral examination revealed presence of stainless steel crown wrt 74 and 75 and patient gave a history of endodontic therapy 2 years ago. A diffuse swelling was noted in 73,74,75

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region .On palpation the swelling measured 1.5 x 2 cm, was non tender, hard in consistency. Expansion of buccal cortical plate was noted on left side. No mobility of tooth was noted and surrounding tissue appeared normal. [Figure-2].



figure – 1



figure – 2

Orthopantomograph revealed pulpectomized 74,75 with SS crown along with well-defined oval unilocular radiolucency with radiopaque sclerotic margins wrt periapical area of 75 involving tooth bud of 35 which was in Nolla's stage 8 [Figure-3].



figure – 3

Based on clinical and radiographic examination, a provisional diagnosis of dentigerous cyst associated with second mandibular left primary molar was made.

TREATMENT :

Conservative treatment was planned to save

premolar tooth bud; treatment plan included extraction of left mandibular first and second molars and followed by marsupialisation under local anaesthesia and tissue specimen was then sent for the histological examination.[Figure-4].

The histopathological report of the specimen revealed connective tissue membrane with single bit of epithelium proliferating in arcading pattern . The connective tissue showed dense chronic inflammatory infiltrate. Based on these findings the pathology was diagnosed of radicular cyst w.r.t 74,75.

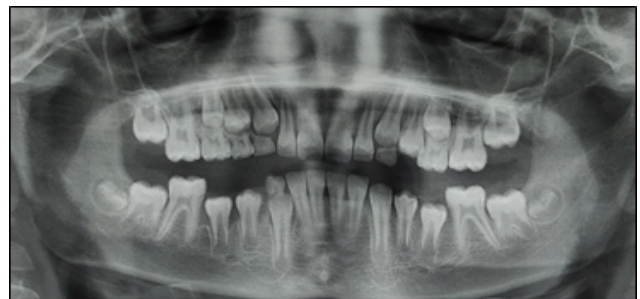


figure – 4

Two months post extraction the premolars were seen erupting.

DISCUSSION

Radicular cysts originating from primary teeth are considered rare. The frequency is low because pulpal and periapical infections in deciduous teeth tend to drain more readily than those of permanent teeth and antigenic stimuli which evoke the changes leading to formation of radicular cyst may be different.⁷

This rare appearance in primary teeth may due to the following reasons:

- The time span of the deciduous dentition is shorter than that of the permanent dentition.
- A variety of accessory canals makes easy to drainage which decreases the cystic pressure and results in no symptoms

- The amount of cells, which are capable of producing immune responses, in pulp tissues of primary teeth is considerably greater than that of permanent teeth
- The distinction in biologic responses of pulp between the primary and permanent teeth may affect the growth of the radicular cyst.
- Additionally, radiolucent lesions around the apical area of a deciduous tooth may be diagnosed incorrectly or ignored or absorbed after extraction^{8,9}

Shetty et al. demonstrated an update of 11 cases of radicular cysts involved in primary teeth with a half of them were suffered from pulp therapy and the rest caused by caries or trauma.¹⁰ Grundy et al. showed 17 cases of odontogenic cysts related to primary molars following pulp therapy.¹¹ Sandhyarani B et al. showed a case of bilateral radicular cysts involved in primary teeth with a history of endodontic treatment used zinc oxide eugenol, then suggested that cause of cysts could be an antigenic response to either the infection or the material filling.¹²

Together, several intracanal medicaments (including formocresol, iodoform, arsenic oxide, and their relatives) used for pulp therapy were considered as antigenic stimuli to the development of the radicular cyst.² In the present case the pulp therapy was done two years ago and there was no evidence regarding the material used for obturation and conservative treatment of the cyst that is marsupialization rather than enucleation is considered to save the premolar tooth bud and monitoring the eruption of the tooth.

CONCLUSION

Radicular cyst in primary dentition is rare. It is important to continuously monitor any endodontically treated tooth. Regular checkups in dental clinics along with proper education and motivation of patients for regular visits should be a routine trend which helps in improving the quality of dental treatment as well as the quality of life.

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Orthodontic treatment of an adult patient with bilaterally impacted maxillary canines: A case report

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ABSTRACT

Impacted maxillary canines is a common finding among orthodontic patients, with a prevalence rate of 1-3%. The most preferred treatment for impacted canines is surgically assisted eruption. It involves surgical uncovering of the crown of the impacted canine followed by its orthodontic traction. There are four techniques for exposing an impacted canine and the choice depends on where the tooth is positioned. The aim of the present case report is to demonstrate the successful treatment of bilateral buccally impacted maxillary canines which were surgically exposed using tunnel traction technique. It is a unique technique that allows transmedullary movement of the tooth. A modified Nance appliance is also presented here for applying the traction force to the canines.

Keywords: Impacted maxillary canine, surgical exposure, surgically assisted eruption, tunnel traction, adult treatment.

INTRODUCTION:

Impaction refers to total or partial lack of eruption of a tooth well after the normal age of eruption.¹ There are variety of reasons due to which an impacted tooth may result, for example inadequate space, some physical barrier like bone, mucosa, retained deciduous tooth, supernumerary tooth etc. in the eruption path or lack of eruptive force. Normally tooth erupts when root length reaches three-fourth of its final length.² Maxillary canine impaction prevalence rate varies from 1 to 3%.³ An impaction is diagnosed when the tooth is in an infraosseous position after the expected time of eruption and in this case a surgical-orthodontic approach is needed.⁴

The incidence of maxillary canine impaction ranges from 0.82%-2.8%. A high incidence of 3.29% of maxillary canine impaction has been reported in Turkish population. The lowest incidence has been reported in the Japanese population. It is estimated that 8% have bilateral impactions of all patients with maxillary impacted canine. The ratio of Palatal impactions is more than buccal canine impactions 2:1 or 3:1. The frequency of maxillary incisor impaction

ranges from 0.06% to 0.2%.⁵

Dental professionals are faced with the dilemma of whether to extract or guide the impacted maxillary tooth into occlusion. The decision to extract is generally considered when the impacted maxillary canine is in an unfavourable position, which can cause complications. Because of the significance of maxillary canines to aesthetics and function, such decision can have very serious consequences. Canine position is much important in denture teeth arrangement, since it promotes facial aesthetics by supporting lip and facial muscles, acts as important guideposts in occlusion, plays a vital role as tissue support at the corner of the mouth and its position is in the turning point of the dental arch. A failure of tooth eruption due to impaction will affect the occlusion and may even influence the psychological development of the affected people.

Currently there are different guidelines for management of impacted maxillary canines published in the literature. However, until now, there is still no absolute consensus among scientists and clinicians on the choice of the best treatment

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protocols for each case. Here, we report a case of orthodontically guided eruption of two buccally impacted maxillary canines in an adult patient.

DIAGNOSIS AND ETIOLOGY

A 32-year-old female patient presented to the department with a chief complaint of spacing in upper front teeth region. Extra oral examination revealed no gross facial asymmetry with a mesoprosopic facial form and competent lips. Patient had a convex facial profile. (Fig.1)

Intraorally, patient had a Class I molar relation on right side and Class II molar relation on left side and a Class I

incisor relation with a generalised spacing of 6mm in upper arch and 5mm in lower arch. (Fig. 2).

She had 1mm of overjet and overbite. Also, she had presented with over-retained deciduous teeth 53,63 with clinically missing 13 and 23.

Panoramic radiograph revealed that both of the maxillary canines were impacted. Cephalometric analysis revealed a Class II skeletal pattern with orthognathic maxilla and retrognathic mandible with vertical growth pattern and bidental proclination. (Fig. 3).



Fig.1 – Pre-treatment



Extra-oral photographs



Fig. 2 – Pre-treatment intra-oral photographs

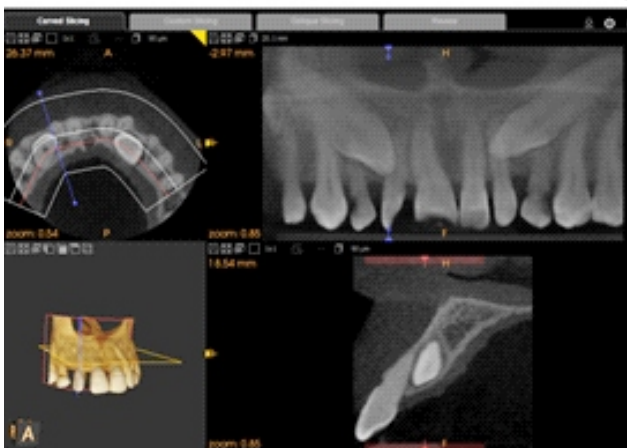




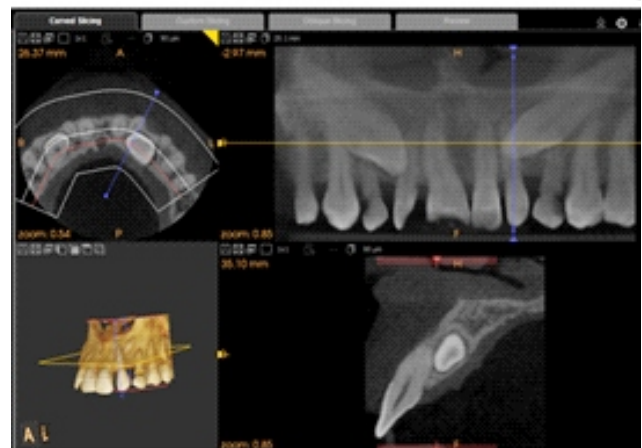
Cephalometric parameter	Value
ANB	5°
SNA	81°
SNB	76°
FMA	35°
UI-PP	123°
IMPA	108°



Fig. 3 – Pre-treatment cephalometric radiograph and panoramic radiograph



CBCT of 13



CBCT of 23

Fig. 4 – Pre-treatment cone beam investigation for impacted maxillary canines

An initial evaluation of the impacted canines position was done using the measurements proposed by Ericson and Kuroi⁶ as follows: -

- **α -angle**, the mesial inclination of the crown of the permanent canine to the midline, was 27° for the right permanent maxillary canine and 48° for the left permanent maxillary canine; -
- **distance d**, the distance between the canine cusp tip and the occlusal plane (from the first molar to the incisal edge of central incisor), was 10 mm for the right canine and 13 mm for the left canine;

- **sector s**, the mesial position of the crown of the impacted tooth with respect to the central and lateral incisors; the right permanent canine was in sector 2, the left permanent canine was in sector 3.

On cone beam investigation it was found that both 13 and 23 were buccally impacted (Fig. 4) and no amount of root resorption of the adjacent lateral incisors was found. Right permanent maxillary canine cusp tip was located distal to the erupted lateral incisor root with the crown at the level of the root's coronal third. Left permanent maxillary canine cusp tip was located in mesial half of the lateral incisor root, with the crown at the level of the root's middle third.

TREATMENT OBJECTIVES:

Considering the chief complaint of the patient, the treatment objectives were to extract the over-retained deciduous teeth, disimpact the bilaterally impacted maxillary canines, and close all the spacing already present. Further, maintenance of the Class I incisor relation and achieving a Class I molar and canine relation were part of the treatment goals. At the end of treatment, achieving an ideal overjet and overbite with a good soft tissue profile were desired.

TREATMENT ALTERNATIVES:

There are various treatment modalities for management of impacted canines which include (a) surgically assisted eruption (b) autogenous transplantation and (c) surgical removal followed by either orthodontic space closure or prosthodontic replacement. The presence of maxillary canines is very important for aesthetics and function. Therefore, all possible efforts must be made to avoid their removal in any treatment planning. Autogenous transplantation of ectopically placed canine is an option to be considered but is often associated with high prevalence of external root resorption.⁷

Surgically assisted eruption is therefore the preferred treatment in most cases and in the case presented here also this was the treatment of choice. It involves surgical uncovering of the crown of the impacted canine followed by its orthodontic traction. There are four techniques for uncovering an impacted canine. They are (a) Window exposure, (b) Apically repositioned flap, (c) Flap closed eruption technique and (d) Tunnel traction. Each technique has its own indications, advantages and disadvantages.

Tunnel traction technique⁸ is the closed eruption technique and is indicated in cases where the impacted canine is placed deep and high -either on the palatal side or the labial side. If the deciduous canine is retained with an unresorbed root, the tunnel traction technique becomes easier. Moreover, tunnel traction is a unique technique wherein the eruption of the impacted tooth simulates physiologic eruption and the esthetic and periodontal outcomes are the best.⁹ Considering the above factors, tunnel traction was chosen as the preferred technique for surgical uncovering of the impacted canine in this case.

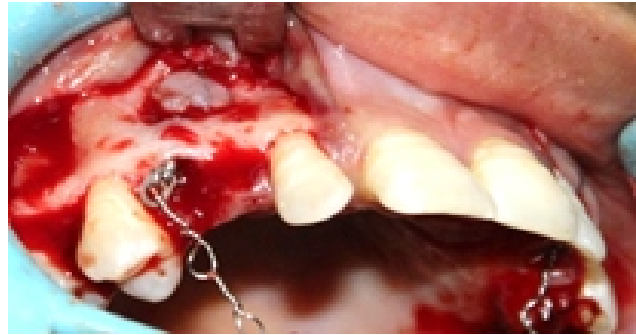


Fig. 5 – Surgical exposure of 13 and 23, Tunnel traction technique.

TREATMENT PROGRESS:

Treatment was initiated with the surgical exposure of the impacted canines using Tunnel traction technique. (Fig 5) The surgically exposed canines were connected by an intrabony tunnel to the socket of the deciduous canine which is extracted. One end of the traction element (elastic chain, a chain made of stainless steel wire) was tied to the attachment fixed on the exposed canine and the other end was taken through the tunnel to emerge out through the extraction socket into the mouth.

After this a modified Nance appliance was delivered with hooks in the region of canine space for applying the traction force to the impacted canines. (Fig 6)



Fig. 6 – Modified Nance appliance

Following healing, maxillary and mandibular arches were bonded using MBT versatile +0.022 appliance system, excluding maxillary lateral incisors as their roots were in close contact to impacted canines. After alignment and levelling was done, 0.018 AJ Wilcock wire was placed in maxillary arch with passive open coil spring between lateral incisor and premolar on both sides, to maintain the space for the permanent canines.

Once the impacted canines were completely erupted, brackets were bonded to lateral incisors and canines and alignment and levelling was done. This was followed by retraction and space closure of residual spaces present.

Total active treatment time was 28 months. Retention was accomplished with removable wraparound retainer in maxillary arch and lingual bonded retainer in mandibular arch.

TREATMENT RESULTS:

Post treatment evaluation showed that the patient's chief complaint had been addressed, and all treatment objectives had been achieved. Both arches were well aligned, arch forms were well coordinated, the maxillary and mandibular spaces were closed, and an ideal overjet and overbite were achieved. The posterior occlusion had good overall intercuspation and was reasonably well settled in a Class I relationship. (Fig. 7,8)

Panoramic radiograph showed good root parallelism and cephalometric comparison of the pre-treatment and post treatment tracings showed that the skeletal pattern remained largely unchanged during treatment, and ideal inclinations of maxillary and mandibular incisors were achieved.



Fig. 7 – Post- treatment extra-oral photographs



Fig. 8 – Post- treatment intra-oral photographs

DISCUSSION:

Surgically assisted eruption is the preferred treatment in most cases for the management of impacted canines. Choosing the correct surgical exposure technique and using appropriate biomechanics is the key to success in surgically assisted eruption. Precise three dimensional localization of the canine is very important because successful surgical exposure technique depends on knowing the exact location of the canine.

Flap closed eruption technique and tunnel traction technique are both closed eruption techniques. In Flap closed eruption technique, the traction element ligated to the attachment on the surgically exposed tooth emerges out through a surgically created small window on the labial cortex (palatal cortex if the tooth is approached through the palatal side) and lies subperiosteally to emerge at the free gingival margin. When traction is applied, the impacted tooth receives a traction directed labioincisally. As the impacted tooth moves labioincisally, it meets increased resistance from the cortical bone. This prolongs the treatment duration. Moreover, the tooth can descend only if the labial cortex below the level of the impacted tooth resorbs. This results in considerable thinning of the investing periodontal tissues on the labial side. Clinically this manifests as increased root prominence.⁹

In tunnel traction, by changing the direction of pull on the traction element that emerges out of the socket, the unerupted tooth can be encouraged to move between the labial and palatal cortical plates without thinning out either of the two. The tooth can be made to erupt by breaking through the gingiva at the crest of the alveolar ridge with adequate alveolar bone and attached gingiva both labially and palatally. Therefore, the eruption of the tooth in tunnel traction simulates physiologic eruption⁸. It is this transmedullary movement that makes this a unique technique.

CONCLUSION

This case report describes the management of an adult patient with impacted maxillary canines. The buccally impacted canines were successfully treated by surgically assisted eruption using tunnel traction technique. At the end of treatment, impacted canines were positioned into proper alignment, giving an esthetic and pleasing smile to the patient.

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Twin Miniscrew Assisted Rapid Maxillary Expansion (TMARME) - A Novel Expansion Approach Authors and Designation:

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ABSTRACT

Introduction- Transverse maxillary deficiency is a relatively common orthodontic problem. Skeletal expansion of maxilla with conventional RME expanders becomes difficult in adults due to rigid interdigitation of midpalatal and nasomaxillary sutures. MARPE or MSE can be used as effective tools for correcting maxillary transverse discrepancy showing stable outcomes. The success rate of MARPE for sutural opening is approximately 82-87%. However, these two methods require four miniscrews with the expander. **Objective-** Skeletal expansion of maxilla in an adult with transverse discrepancy using two miniscrews. **Clinical innovation-** This clinical innovation describes the use of a miniscrew-assisted hybrid Hyrax appliance to orthopedically correct a transverse maxillary deficiency in a 21-year-old patient. Two interradicular miniscrews of 1.5x8mm were placed on the palatal aspect in between maxillary second premolars and first molars bilaterally. An impression was made and bonded hyrax expander was fabricated incorporating the implant heads in the bonded appliance. It was cemented on the maxillary arch. The Hyrax expander was given two turns per day. The appliance was stabilized for three months after the expansion. **Advantages-** Minimally invasive, interradicular screws can be used, bonded RME splint to prevent extrusion of maxillary teeth. **Results-** Pretreatment and post treatment PA cephalograms demonstrated expansion of 7mm at the level of basal bone, 7mm at alveolar level, 4mm at zygomatic bone and 4mm at nasal bone. These results are comparable to the changes reported with MARPE appliances.

Conclusion- This innovative, minimally invasive inter radicular miniscrew assisted bonded Hyrax expander can be used to achieve successful skeletal expansion of maxilla in adults.

Key words: Maxillary transverse discrepancy, Miniscrew assisted rapid palatal expansion

Introduction

Transverse maxillary deficiency is a relatively common orthodontic problem, which has been reported to affect 7.9% and 9.9% of individuals aged 12-18 and 18-50 years, respectively.¹

The rapid maxillary expansion (RME) is the procedure of choice to re-establish the skeletal transverse dimension in children and adolescents, by the association of orthopaedic and dental effects, consisting of the biomechanical principle of separating the two maxillary halves by remodelling of the midpalatal suture and intermaxillary sutures.^{2,3}

However, conventional RME transmits the expansion forces through the teeth, producing some unwanted

results such as root resorption, alveolar bone bending, dental tipping, alveolar bone loss, gingival recession, and clockwise rotation of the mandible. RME in nongrowing patients has been shown to produce limited skeletal expansion effects because of interdigitation of the midpalatal suture and adjacent articulations.⁴

The miniscrew-assisted rapid palatal expansion (MARPE) was proposed by Lee et al⁵ in 2010, aiming to solve the undesirable dentoalveolar effects and optimize the potential of skeletal expansion in individuals in advanced stages of skeletal maturation. This is an effective method of maxillary skeletal expansion, but they incorporate four miniscrews with the expander device.

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Hence attempts have been made to keep the appliance design simple, less invasive and also at the same time clinically efficient. This clinical innovation describes the use of two interradicular miniscrew-assisted hybrid Hyrax appliance to orthopedically correct a transverse maxillary deficiency in a 21-year-old patient.

Objectives of TMARME

- Skeletal expansion of maxilla in an adult patient with transverse discrepancy using two miniscrews.

Fabrication of TMARME appliance

- A helical framework with 0.9mm stainless steel wire was fabricated on the patient's maxillary cast to act as an implant guide. (Figure 1a)
- Two interradicular miniscrews of 1.5x8mm were placed on the palatal aspect in between maxillary second premolars and first molars bilaterally. (Figure 1b)
- An impression was made and bonded hyrax expander with a stainless-steel wire framework was fabricated incorporating the implant heads in the bonded appliance.
- It was cemented on the maxillary arch with Glass ionomer cement. (Figure 1c)

Unique features of TMARME appliance

- Two miniscrews were used instead of the traditional four miniscrews.
- Interradicular screws were used instead of the palatal screws.
- Comparable amount of expansion with TMARME when compared with the study of Bicortical screws.

Appliance usage:

- Bonded hyrax expander was fabricated incorporating the implant heads in the bonded appliance.
- Two turns of expansion per day protocol was followed.
- Expansion was stabilized for three months. (Figure 2)

Results:

- Appreciable midpalatal suture opening was achieved. (Figure 3)

- Increased transpalatal width. (Figure 4)
- Correction of posterior crossbite. (Figure 4)
- Increase in basal bone width, nasal width and width of the zygomatic bone (Figure 5a,5b) (Table1).

Advantages:

- Simple hybrid expander
- Less invasive
- No dentoalveolar side effects

Conclusion:

This innovative minimally invasive TMARME can be used to achieve successful orthopaedic expansion of maxilla in adults.

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Fig 1a,1b,1c	TMARME appliance fabrication
Fig 2	Post expansion -Stability phase
Fig 3	Maxillary occlusal radiograph showing midpalatal suture split
Fig 4 A,B,C	Pre expansion intraoral comparison
Fig 4D,E,F	Post expansion intraoral comparison
Fig 5a,5b	Pre and post expansion PA Cephalogram comparison
Table 1	Comparison of change in basal bone width, nasal width and width of the zygomatic bone. Carlson et al AJO-DO 2006; 149:716-28.

	Values with 4 miniscrews (Carlson et al .Am J Orthod Dentofacial Orthop. 2016; 149:716-28.)6			Values with 2 miniscrews in the current case report		
Width	Initial (mm)	Removal of the expander (mm)	Gain of width (mm)	Initial (mm)	Removal of the expander (mm)	Gain of width (mm)
Basal bone	59.7	65.8	6.1	50	57	7
Zygomatic bone	110.3	116.0	5.7	87	91	4
Nasal cavity	29.9	33.7	3.8	30	34	4



Figure 1a



Figure 1b



Figure 1c



Figure 2

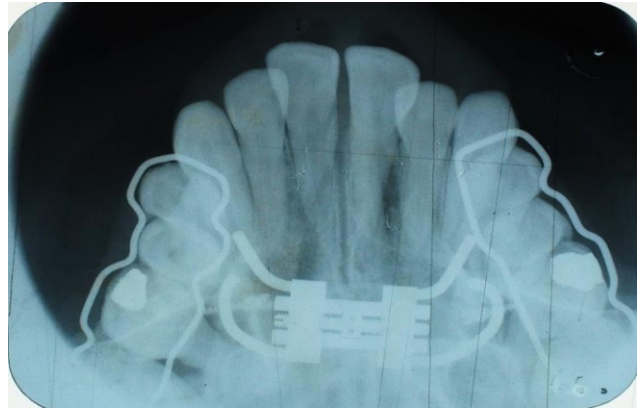


Figure 3



Figure 4 - Pre expansion Intraoral photographs



Post expansion Intraoral photographs



Figure 5a : Pre-Expansion
PA Cephalogram



Figure 5b : Post -Expansion
PA Cephalogram

Management of Dry Socket using Hydrogen Peroxide and Betadine as an Irrigant- A Case Report

AUTHOR: Dr Sushma Mohan¹, Dr Sudarshan², Dr. Janhavi Saxena³

ABSTRACT

Dry socket or alveolar osteitis is one of the common post tooth extraction complication. The object of the study was to obtain maximum optimum result in the treatment of dry socket. A study was carried out to see the effects of pure hydrogen peroxide and betadine on dry socket. This case report presents a case of 63 old female with dry socket. Patient was irrigated with 15 cc of pure hydrogen peroxide and 1% of 20ml betadine instead of commonly used sterile solution of sodium chloride known as normal saline. Dressing of 'ZOE' was placed at the site of dry socket and patient was followed every alternative day. Findings were recorded which were based on pain and discomfort on gentle probing at the dry socket site. There was a good relief in pain and discomfort. Hydrogen peroxide along with betadine had very good curing results on pain and discomfort of dry socket.

Keywords: Hydrogen peroxide, betadine, dry socket, normal saline

INTRODUCTION

Dry socket or alveolar osteitis refers to a post-extraction socket where some or all of the bone within the socket, or around the occlusal perimeter of the socket, is exposed in the days following the extraction, due to the bone not having been covered by an initial and persistent blood clot or not having been covered by a layer of vital, persistent, healing epithelium. The patient may not be able to prevent food particles or the tongue from mechanically stimulating the exposed bone, which is acutely painful to touch, resulting in frequent acute pain. All parts of a dry socket, except the exposed bone, can be gently touched with a periodontal probe or an irrigation needle tip without causing acute pain. Dry socket occurs in approximately 1% to 5% of all extractions and in up to 38% of mandibular third molar extractions.

Food particles that collect inside the socket may dislodge a blood clot. Bacterial biofilm and food particles inside a socket may also hinder the reformation of a dislodged blood clot by obstructing contact of a reforming blood clot with the exposed bone. Food particles and bacterial biofilm may hinder contact of the healing epithelium with the exposed bone, which may prolong the healing time of the dry socket lesion. Food particles that collect inside a dry socket can also ferment due to bacteria. This fermentation may result in the formation of toxins or

antigens that may irritate the exposed bone, produce an unpleasant taste or halitosis, and cause pain throughout the jaw. However, evidence suggests that bacteria is not the main cause of dry socket. By the third day post extraction, pain due to extraction is expected to have subsided appreciably, but when such pain becomes worse and continues through one week after the procedure and the socket does not appear to be healing, the occurrence of dry socket can be established.

Signs and symptoms of dry socket may include:

Severe pain within a few days after a tooth extraction

Partial or total loss of the blood clot at the tooth extraction site, which can be noticed as an empty-looking (dry) socket.

Visible bone in the socket

Pain that radiates from the socket to your ear, eye, temple or neck on the same side of your face as the extraction

Bad breath or a foul odor coming from your mouth

Unpleasant taste in the mouth

Socket is devoid of blood clot, pain and sensitivity, surrounding inflamed soft tissues may overlie the socket and denuded bone walls.

Our aim for this study was to find the best treatment option.

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CASE REPORT

A 63 year old female patient reported to the department of oral and maxillofacial surgery, K.L.E Society's institute of dental sciences, with a chief complaint of severe pain and discomfort in lower left back tooth region since 5days. The pain was severe, intermittent and radiating in nature. Patient gave a history of extraction one week back followed by medication, which did not solve the purpose.

On intraoral examination. It revealed a dry bony bare area related to 34,35 region. There was a mild swelling and redness of the gingiva with halitosis, bone exposure, and severe tenderness. On probing patient elicited severe pain and discomfort which was clinically diagnosed as a dry socket.



Figure-1

Our study was to find the best outcome, hence the socket was irrigated with 2drops of hydrogen peroxide with 1% of 20ml of betadine followed by zinc oxide eugenol paste pack.

Patient was made to follow up every alternative day, where the pack was replaced everytime with frequent irrigation.

Beside that patient was thought to mix 1% of 20ml betadine mouthwash with 2-3 drops of hydrogen peroxide and advised her to rinse her mouth with this solution for one week BD.

Patient was followed up after one week which gave a promising result.



Figure-2

Post operative

DISCUSSION

The exact etiology and mechanism of dry socket are not exactly known but several factors have been associated. Careful analysis into the pathophysiology of dry socket stated that poor oral hygiene, vasoconstrictors, and reduced blood supply are important factors but reports have placed emphasis on trauma from difficult exodontias causing fibrinolysis and release of pain inducing chemical substances. There were more females that presented with dry socket than males

Normally, a blood clot forms at the site of a tooth extraction. This blood clot serves as a protective layer over the underlying bone and nerve endings in the empty tooth socket. The clot also provides the foundation for the growth of new bone and for the development of soft tissue over the clot. Exposure of the underlying bone and nerves results in intense pain, not only in the socket but also along the nerves radiating to the side of your face. The socket becomes inflamed and may fill with food debris, adding to the pain

Dry socket is the most common postoperative complication after tooth extraction. The combination of hydrogen peroxide and betadine has a synergistic bactericidal effect against pathogens. The comparative combination showed a reduction in

duration of treatment, this treatment is safe and reliable.

Hydrogen peroxide being a strong oxidising agent releases oxygen and removes/kills these trouble causing anaerobic bacteria's. It produces a foaming action causing oozing and bubbling out of food debris along with anaerobic bacteria from the extraction site resulting in better cleansing in a short period of time.

Betadine or povidone-iodine is a mixture of Povidone and iodine with short acting but wide-spectrum bactericidal effects, sporicidal, fungicidal and virucidal activity as well, in addition hemostatic and antiinflammatory used as an antiseptic for infected wounds and also preparing skin and mucous membranes before surgeries. As povidone-iodine solution slowly releases iodine, it is weaker than other products containing free iodine but also less toxic. Betadine leaves no stain, does not cause allergy or tissue irritation and has the longest effect among other antiseptics. Hence in our study, a combination of hydrogen peroxide and betadine mouthwash had given an excellent result in treating dry socket.

CONCLUSION

Despite many years of research, little progress has been made in addressing this commonly encountered and unpleasant postoperative condition in patients. Although there are a plethora of studies on treatment of dry socket, in our study betadine mouthwash and hydrogen peroxide have given equally good and promising outcome.

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Functionally Generated Path Technique - A three dimensional dynamic registration of occlusion

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ABSTRACT

A harmonious occlusion is essential to maintain a healthy stomatognathic system. Two methods are employed to establish occlusion, namely the static/articulator method and the dynamic/functionally generated path technique. The complexity of the armamentarium involved in the static technique may not always be feasible during clinical practice. The functionally generated path technique has an advantage over the static technique in that it is easy to perform, requires simplified instrumentation and is capable of producing accurate results. This article is a review of the functionally generated path technique as applied to fabrication of different types of prosthesis.

Key words : Functionally generated path, Single complete denture, Complete denture, Fixed partial denture, Full mouth rehabilitation.

INTRODUCTION

Occlusion is the static relationship between the incising or masticating surfaces of the maxillary or mandibular teeth or tooth analogues(GPT-9). An accurate and harmonious occlusion is critical for the success of any prosthodontic treatment. Many thoughtfully designed and skilfully fabricated prosthetic restorations fail if an adequate occlusion is not developed during the treatment period.

Numerous methods have been formulated for developing occlusion. Articulation of the diagnostic casts in the same relation as in the patient's mouth is mandatory for proper evaluation of the patient's occlusion. The static/articulator method is most commonly employed for this purpose. This method involves analyzing mounted diagnostic casts, obtaining centric, protrusive, lateral excursive records from the patient and transferring the same to semi adjustable and fully adjustable articulators. This way the patient's mandibular movements are reproduced onto the articulator. However, these techniques demand more of chair side and laboratory time, skill of the clinician, usage of complex instruments and may not always be feasible in a regular clinical setup. The pursuit of simpler methods led to the development of functionally generated path technique. Functionally generated path relies on

recording in a simple, yet precise manner the pathways travelled by the cusps during border movements of the mandible. It basically refers to registration of the paths of movement of the occlusal surfaces of teeth of one dental arch, to the teeth or occlusal rims of the opposing arch, recorded with the help of a plastic medium.

This technique helps in achieving harmonious relationship between the occlusal and cuspal paths, the condylar paths, and the neuromuscular system. [1] Meyer[2] first introduced this method in 1933 as a means of obtaining the "functional occlusal path" for bridges and for dentures. Pankey and Mann[3] adapted this technique for use in complete occlusal rehabilitation. Kafandaris used metal framework of the FPD as the recording base by extending the occlusal surface with auto-polymerizing acrylic resin.

Hammed and Nourall[4] developed functionally generated path on wax, added onto the occlusal surface of the prepared teeth. Guinn III and Loren Christensen advocated embedding of a long shank in the recording tables for bilateral stabilization.[5] There are certain prerequisites before starting with the procedure. In case of partially edentulous mouths, remaining teeth should be healthy, harmonious occlusion, no evidence of temporomandibular joint dysfunction and with good neuromuscular control.

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When the procedures are being performed in edentulous patients the denture base needs to be table (partially/ completely).[5]

METHODS OF RECORDING :

Single completely edentulous and partially edentulous situations :

The pathways of the natural teeth opposed to the edentulous space during all functional movements of the mandible are recorded on a wax occlusal rim. This pathway is a negative imprint of movement of each opposing tooth(Fig 1). The pathway is poured in stone to produce the cast. The artificial teeth are arranged in intimate contact with the stone pathway mounted on an articulator. The articulator need not be moved to protrusive and lateral excursions because these positions are already incorporated in the pathway. The artificial teeth will remain in harmonious contact during all movements.



Fig 1 : Functional chew in record [6]

the upper denture teeth are reduced thereby keeping them out of contact with the opposing natural teeth. The channels are filled with impression compound. The remainder of the denture teeth are built with hard wax on the articulator. Upon placing the denture in the patients mouth, functional movements are recorded. Functional core is obtained by pouring plaster into the indentations. The hard wax and compound is removed and is replaced with the casting wax. The casting wax is sprued and casted in gold alloy. The castings are polished and then attached to the denture with EBA (Orthoethoxybenzoic acid) cement to obtain gold occlusal denture teeth(Fig 2).



Fig2 : Final gold casting created using functionally generated path

Completely edentulous arches :

Once the tentative jaw relations are recorded and mounted on an articulator, about 4-5mm of occlusal rim height in total is reduced, and a mixture of abrasive material and pumice is built to a tentative recorded height and the patient is asked to make functional movements namely centric, protrusive, left lateral and right lateral movements till the abrasive material is ground to the correct vertical height to achieve balanced curve. A functional core index is achieved by pouring the maxillary indentation with plaster(Fig 3). The maxillary functional core index is mounted on the articulator against the mandibular rims and mandibular teeth are arranged.

This can be treated like a single complete denture and the maxillary teeth are arranged against the mandibular teeth.[2]

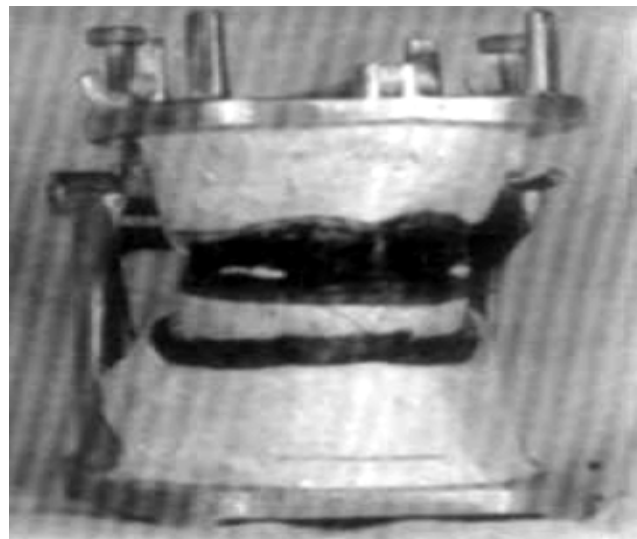


Fig 3 : The stone path on the lower occlusion rim is the counterpart of the upper occlusal wax path^[2]

One of the methods as given by J. Bryan McLaughlin, where lithium disilicate onlays are luted onto the occlusal surfaces mandibular complete dentures, is used to obtain functionally generated path.[7]

Procedure: Following acrylization of complete dentures, the occlusal surface of mandibular posterior teeth was reduced by about 1-1.5 mm and the pattern resin was coated on to it. Functional movements were achieved by making excursive and protrusive movements in the semi adjustable articulator. The wax pattern was then contoured and polished. The wax pattern was invested and casted using pressable lithium disilicate and was bonded onto the prepared artificial teeth surface of mandibular posteriors using dual cure resin cement (Fig 4a-4d).

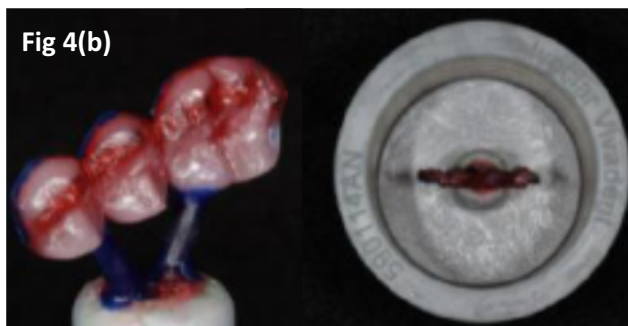


Fig 4(a):Functionally generated path recorded on pattern resin on the mandibular posteriors[7]

Fig 4(b): Wax pattern invested and cast using lithium disilicate[7]

Fig 4(c): Lithium disilicate onlays[7]

Fig 4(d): Onlays bonded onto the artificial teeth surface using dual cure resin cement[7]

Fixed partial denture[1]

Following occlusal reduction, functional tracings are made by tacking pattern resin onto the occlusal surface(Fig 5). The patient is guided into centric relation and functional movements are recorded. The procedure is carried out prior to axial reduction so that the larger occlusal table provides better stability during movements. A creamy mix of stone is poured onto the wax and the functional core is obtained. The rest of the tooth preparation is completed and an impression of the quadrant containing the prepared tooth is made. The restoration is fabricated using the functional core for an opposing model.



Fig 5 : Functional tracing made by placing wax onto the occlusal surface^[8]

Full mouth rehabilitation[9]

The technique was adapted for use in complete occlusal rehabilitation by Pankey and Mann. It is based on the Spherical theory of occlusion. Calipers are used to locate a center of rotation. The occlusal plane is established using a Broadrick's plane analyzer. The mandibular teeth is reduced or built back to the established plane. After the mandibular teeth in the mouth have been corrected and subsequently restored to an ideal plane, a functionally generated recording of the mandibular cusp path is generated. A smooth creamy mix of stone is jiggled on to the functional wax to obtain a functional core or index against which the maxillary restoration are fabricated.

ADVANTAGES: [1,2,5]

1. Records all dimensions of border movements at the correct vertical as they are directly influenced by both condylar guidance and incisal guidance.
2. Accuracy with fairly simple instrumentation.
3. Can be used in combination with almost any laboratory method for waxing posterior restorations.
4. Eliminates the need for adjusting articulator with interocclusal records or a tracing device.
5. The excursive movements produced in the mouth are more accurate than those in an articulator
6. It eliminates the need of facebow transfer
7. It is simple and can produce excellent results

DISADVANTAGES:[1,2,5]

1. The occlusion in one of the arches must be complete before functional generated path can be developed.
2. Cannot be effectively utilized for CD opposing RPD
3. The movement of distal extension base carrying wax occlusal rim is common.
4. Difficulty in verification of record in the mouth.
5. Demands great care and meticulous attention to detail.

CONCLUSION:

Intraoral adjustments seem to inevitable post insertion even after following cumbersome procedures involving fully adjustable articulators. The functionally generated path technique is a simple

method that records the pathways travelled by the opposing cusps directly in the mouth during function and reduces the adjustment time during delivery. It is less time consuming, less expensive, technique sensitive and the articulator is merely used as a cast relater. Accurate results can be achieved if performed with great care and attention to detail.

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Variations in the Internal Anatomy of Permanent Maxillary Second Molar Teeth – a Review

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Dr. Pradeep P.R⁴, Dr. Deepthi. M⁵

ABSTRACT

Introduction: The complexity of the root canal system presents a challenge for the practitioner. This systematic review evaluated the papers published in the field of root canal anatomy and configuration of the root canal system in permanent maxillary second molars.

Methods and Materials: All articles related to the root morphology and root canal anatomy of the permanent maxillary second molars were collected by suitable keywords from PubMed database. The exhaustive search included all publications from 1981 to 2020. The articles relevant to the study were evaluated and data was extracted. The author/year of publication, country, number of the evaluated teeth, type of study (method of the evaluation), number of roots and the canals, type of canals and the morphology of the apical foramen was noted.

Results: The highest studied populations were in Brazil and United States. A total of 145 related papers were found, which had investigated 12949 teeth in total. Across all the studied populations, the three-rooted anatomy was most common, while the four-rooted anatomy had the lowest prevalence. The presence of the second mesiobuccal canal ranged from 11.53 % to 93.7%, where type II (2-1) configuration was the predominant type in Brazil and USA and types II and III (1-2-1) in Chinese populations. In 8.8-44% of cases, fusion was observed. The main reported cases were related to palatal root. The major method of anatomical investigation in case reports was periapical radiography, and the chief method in morphological studies was CBCT.

Conclusion: The clinicians should be aware of normal morphology and anatomic variations to reduce the treatment failure.

Keywords: Maxillary Second Molar; Root Canal Anatomy; Root Morphology

INTRODUCTION

The Maxillary second molar teeth have three roots and three canals (Mesio-buccal, Distobuccal and Palatal canal).¹ It is important to visualize and to have a thorough knowledge of internal anatomy of tooth and its variations, for successful root canal therapy, if not detected, are a major reason for endodontic failure. Anatomical variations are possible in every tooth, and the second maxillary molar is no exception.¹ Variations in its root anatomy have ranged from a single root with single canal to as many as 5 roots. The copious number of articles was published regarding

the root canal anatomy of the second maxillary molar most of which, studied populations and the number of examined teeth make the result interpretation difficult and time-consuming.

MATERIALS AND METHODS

An exhaustive search was undertaken to identify published literature related to the root anatomy and root canal morphology of the permanent maxillary second molar via PubMed database from the year 1981 - 2020. The searched keywords included maxillary second molar, root morphology and its variations and root canal anatomy. The anatomy of

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maxillary second molars has been the focus of many studies in different countries. (Fernandes et al., 2014; Han et al., 2012; Neelakantan et al., 2010a; Pecora et al., 1992). The anatomical variations in maxillary second molars have a higher incidence than those in first molars (Rwenyonyi et al., 2007).

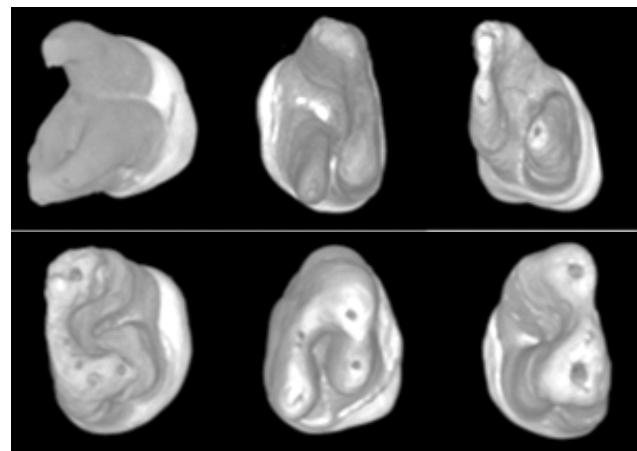
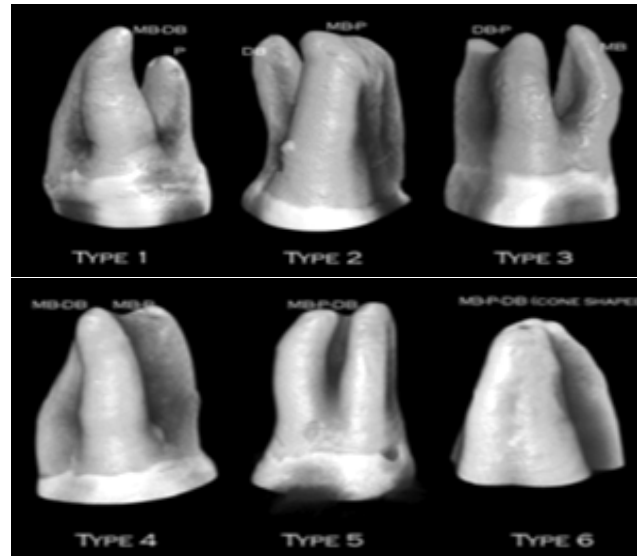
ANATOMICAL VARIATIONS

A. FUSION

Fava et al reported one single root with single canal. Most maxillary second molars exhibit three separate roots, with root fusion being the most common variation (Kim et al., 2012; Peikoff et al., 1996; Plotino et al., 2013; Zhang et al., 2014). It is more common in the third molars, followed by second molars, and then first molars, in both arches. Fusion can occur in the apical, middle, or cervical one third.²

- Complete root fusions are more common than partial root fusion.
- The Mesio-buccal root fuses with the palatal roots more often (mesial fusion) (16.4%)
- The distobuccal and the Mesio-buccal roots (buccal fusion) (11.9%)
- The distobuccal and the palatal roots (distal fusion) (7.5%).
- ORDINOLA-ZAPATA et al. The root canal system of fused-rooted maxillary second molars may have a high incidence of merging canals, isthmuses, apical deltas and C-shaped configurations.³
- 3-root fusion showed more canal merging than those with 2-root fusion.
- Canal configuration based on Fan's classification for fused roots (C-shaped) The most commonly observed root canal morphology of mandibular second molars with fused roots was C2 (9.26%), followed by C1 (3.86%) at the coronal level; C2 (8.25%), C3a (3.76%), and C1 (1.11%) at the middle level; and C3b (3.96%), C4 (3.57%), C3a (2.45%), C2 (2.03%), and C1 (1.11%) at the apical level.⁴

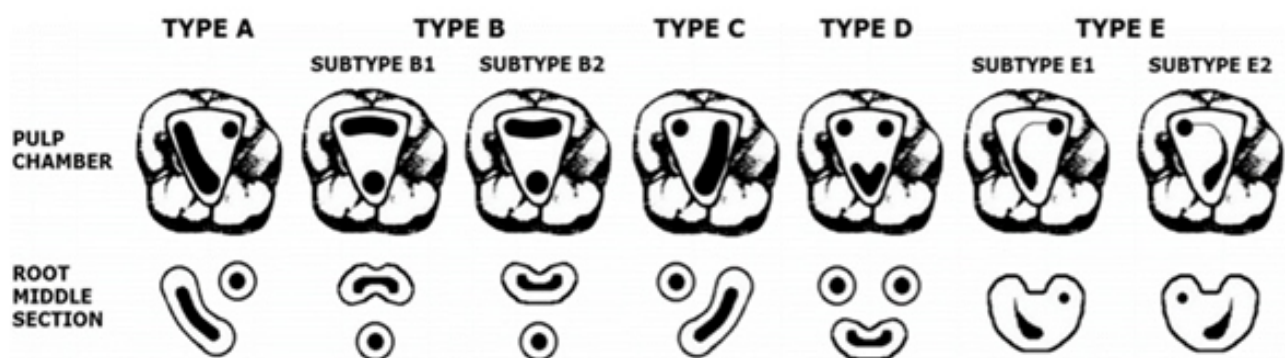
AUTHORS	FUSION
VERSIANI ET AL	44%
KIM ET AL	10.71%
ZHANG ET AL	42.25%
ROUHANI ET AL	8.8%
RWENYONYI ET AL	13.1%



B.C- SHAPED CANAL

- Maxillary C-shaped second molars have low prevalence 3.8% but high anatomic complexity. There is a higher prevalence in females. Five different types have been found depending on the position of the fused canal system. A high incidence of C-shaped canals has been reported in the Chinese, Japanese, Lebanese, and Hong Kong Chinese populations (14–52%).⁵ The high prevalence of C-shaped root canal systems and type IV canal configurations in the mesial roots of mandibular second molars have been referred to as a Mongoloid trait. Also, many studies report a high prevalence of C-shaped root canals in the Asian population (10–44.5%)⁶

AUTHOR	C-SHAPED CANAL
ZHANG ET AL.	4.9% Chinese maxillary second molars. Canals corresponds both mesial and distal C-shapes.
SINGLA M ET AL	C-SHAPED PALATAL ROOT CANAL.
ORDINOLA-ZAPATA R, ET AL	22% C-shaped configuration was observed in the confluence of the canals at the middle and apical thirds of the fused roots; however, this configuration was located at the cervical and middle thirds.



C. TAURODONTISM

Taurodontism is a continuous and rare trait with various modes of expression, and the morphologic characteristics of these teeth are the result of polygenic inheritance. In German population, the prevalence of taurodontism and pyramid-shaped molar was reported to be 18/800 and 15/800.⁷

AUTHOR	TAURODONTISM
SERT ET AL	Hypertaurodontism
RADWAN and KIM ET AL	10 taurodents in a patient with no specific syndromes and endodontic treatment of a hypertaurodont maxillary second molar

D. IN THE PALATAL CANAL

- Peikoff et al. reported a 1.4% incidence of four separate roots and four separate canals including two palatal roots. The frequency of reports on two palatal roots with two canals is low.⁸

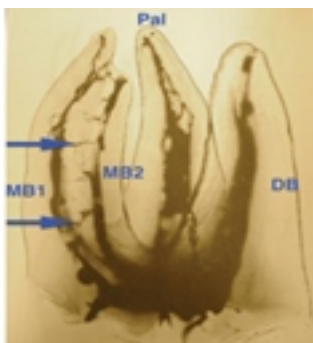
AUTHOR	2 PALATAL ROOT
PAUL ET AL	2 INDEPENDENT PALATAL ROOTS
ZHU AND ZHAO ET AL	2 PALATAL CANAL

Benenati FW et al. reported Detecting a palato-gingival groove on the lingual surface of the crown and the root can be another possible sign of two separate palatal canals.^{2,9}

AUTHOR	2 CANALS IN PALATAL ROOT
PRASHANTH ET AL	2 CANALS IN PALATAL ROOT
SCARPARO ET AL	2 CANALS IN PALATAL ROOT
SHOJAEIAN ET AL	2 PALATAL CANALS, ENAMEL PEARL
FAKHARI AND SHOKRANEH	2 CANALS IN PALATAL

E. MB-2 CANAL

- ❖ Variations mostly could be seen in the Mesio-buccal roots and particularly in the Mesio-buccal canal in 30-80% of the cases than the distobuccal or palatal roots.^{9,10}
- ❖ Martin JN et al reported Prevalence of MB2 canal in maxillary second molars was 39.0 %, higher prevalence of MB2 in males.
- ❖ Traditionally, the maxillary second molar has been described to have 3 roots with 3 or 4 root canals, with the fourth canal commonly being found in the mesiobuccal root (MB2).^{11,12}
- ❖ Variations often occur in the mesiobuccal roots, the most common finding being the occurrence of 2 canals.
- ❖ An extremely rare variant reported is the presence of 3 canals in the mesiobuccal root.
- ❖ MB2 can be detected under a thick dentin shelf mesial to or directly in a line between the mb1 and the palatal orifices.¹²



AUTHOR	PREVALENCE OF MB 2
XOSHIOKA ET AL	48 %
SILVA ET AL	34/32%
NEELAKATAN ET AL	50%
GILLES AND HEADER	70%

ADD-ONNs

Junior B P et al reported three palatal canals, two Mesio-buccal and one Disto-buccal canal in maxillary second molar.^{12,13} Zhu and Zhao et al reported 5 root canals in maxillary second molar with two palatal root canals, two Mesio-buccal root canals and one Disto-buccal canal. Fahid Ahmad et al reported Three Buccal Roots i.e., two Disto-buccal and one Mesio buccal root and one palatal root.^{11,12,13} Kim et al reported a case in which the palatal canal had a single canal orifice but a bifurcation was seen in the apical third which ended in 2 separate foramina.^{2,12,13,14} Moringa et al, crincoli et al - dens invagination. Weinstein et al- gemination. Hans et al -microdontia. The most common type of Vertucci's classification was type II (53.1%), followed by type I. Type IV was the most common in Mesio-buccal roots of maxillary molar. The majority of maxillary second molars have Vertucci type I canal system (simple, single canal) with palatal canal.¹⁵

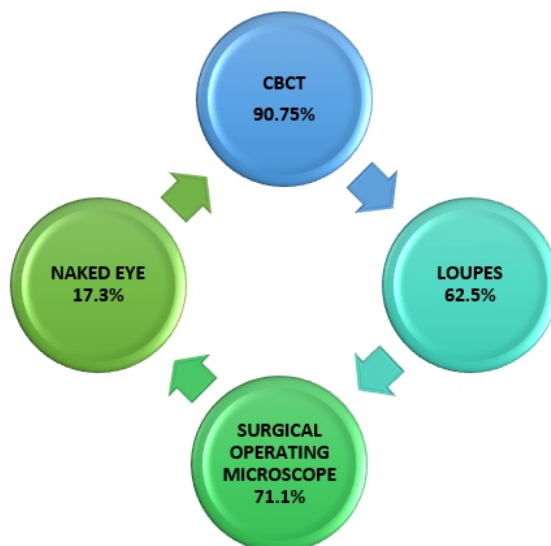
BASIS OF VARIATIONS

- ✓ Variations occur due to the failure of invagination of Hertwig's epithelial root sheath at a proper spatial plane, odontoblastic deficiency during root dentin formation, and disruptive developmental homeostasis.
- ✓ It is also known to be associated with genetic or developmental disorders.^{11,12,14,15}

EVALUATION OF THE ROOT CANAL ANATOMY OF TEETH

• IN VITRO STUDIES	• IN VIVO STUDIES
<ul style="list-style-type: none"> • SECTIONING TECHNIQUE • (Eskoz and Weine, 1995) 	<ul style="list-style-type: none"> • OPERATING MICROSCOPE • (Sempira and Hartwell, 2000),
<ul style="list-style-type: none"> • CANAL STAINING & CLEARING TECHNIQUE • (Vertucci, 1984) (Neelakantan, P., 2010) 	<ul style="list-style-type: none"> • CONE-BEAM COMPUTED TOMOGRAPHY (CBCT) • (Robinson et al., 2002). • (Patel et al., 2015).
<ul style="list-style-type: none"> • MICRO-COMPUTED TOMOGRAPHY • (Ordinola-Zapata et al., 2017) 	

COUNTLESS OPTIONS FOR EVALUATING THE VARIATIONS



RESULTS

The highest studied populations were in Brazil and United States. A total of 145 related papers were found, which had investigated 12949 teeth in total. Across all the studied populations, the three-rooted anatomy was most common, while the four-rooted anatomy had the lowest prevalence. The presence of the second mesiobuccal canal ranged from 11.53 % to 93.7%, where type II (2-1) configuration was the predominant type in Brazil and USA and types II and III (1-2-1) in Chinese populations. In 8.8-44% of cases, fusion was observed. The main reported cases were related to palatal root. Thirty three papers were related to palatal root, most of which involved reporting the presence of two separate palatal roots. The major method of anatomical investigation in case reports was periapical radiography, and the chief method in morphological studies was CBCT. Moreover, CBCT technique was the most utilized method in these studies.^{12,14,16,18,19}

DISCUSSION

The second maxillary molar has a complex root canal system and one of the reasons of failure in endodontic treatment is lack of locating and cleaning of the entire root canal system.

The complexity of the root canal system of the second maxillary molar is largely related to presence of the second mesiobuccal canal.^{15,16}

The first report published on the existence of excess canal in the mesiobuccal root of the second maxillary molar is related to the study by Hess and Zurcher in 1925.

In this review study, having investigated the papers related to the second mesiobuccal canal, it can be concluded that age is an important factor and has a significant effect on the number of found canals. As the age increases by one, the chance of finding canals drops dramatically 0.98 times, related to calcification and morphological changes occurring by ageing. Further, in a decayed tooth, the possibility of finding an extra canal is 1.4 times greater than in non-decayed teeth. In vitro studies, compared to in vivo examinations, as well as in retreatment compared with primary treatment, report a higher chance of finding extra canals. Increased chance of finding extra canals with the help of magnification, especially microscope is a common finding across all of the investigated studies.¹⁷

It should always be noted that it is still a valuable technique which is accurate, simple and applicable in vivo. In some other studies, typical radiography was used, presenting a two-dimensional image of a three dimensional object. There is a chance of distortion and superimposition, diminishing the possibility of complex morphological examinations. The CBCT technique, as a variation of computer tomography, provides the possibility of three-dimensional understanding of morphology and high resolution with a low radiographic dose. Cone-beam computed tomographic (CBCT) imaging provides three-dimensional (3D) images with a reasonable radiation dose, and numerous studies have reported its usefulness to diagnose root canal anatomy. However, few studies have thoroughly evaluated the root and canal anatomy of mandibular second molars in ethnic populations using CBCT images.¹⁸

Anatomical landmarks, the dimensions of the pulp chamber together with the thickness of root walls, presence of isthmus and peripheral canals, as well as the size and position of the apical foramen have also been taken into consideration in a limited number of studies. These studies were valuable because of reducing the probability of perforation and gouging during treatment and enhancing cleansing the entire pulp system.

To have a successful canal treatment in the second maxillary molar, cleaning should not focus only on the second mesiobuccal canal and mesiobuccal root. Investigation of the studies published on the morphology of this tooth indicates that anatomical variations are also present considerably in palatal root, where presence of two canals has been the most reported case. However, the distobuccal canal should not be overlooked.^{18,19}

CONCLUSION

Endodontic treatment in maxillary second molars can be challenging and Compassionate. The complexity of the canal system is influenced by genetics and this factor should be considered before interpreting and comparing the results of various morphological studies, in addition to factors like age and gender. The clinicians should be aware of normal morphology and anatomic variations to reduce the treatment failure. **"IF YOU FAIL TO PLAN YOU ARE PLANNING A FAILURE"**

- BENJAMIN FRANKLIN

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Low Level Laser Therapy in Orthodontics - A Step Ahead

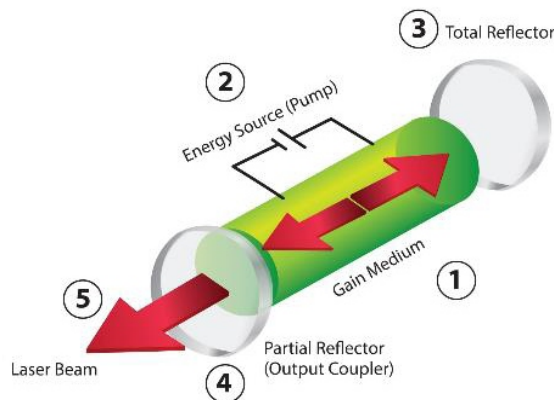
AUTHORS: Dr Gopal Krishna¹, Dr T Rohini²

ABSTRACT :

Laser, a widely accepted technology, is slowly making a mark in the mainstream clinical orthodontic practice. It has offered a wide range of applications in the field of dentistry and now has also proven to be of great advance in orthodontic practice. It exhibits multiple advantages over the current methods of practice. In orthodontics, LASER application includes pain reduction, alternate to routine etching and bonding techniques, accelerating tooth movement, debonding of brackets, numbering of brackets, increase implant stability a, bracket mesh designing, reduction in rate of demineralization and soft tissue procedures namely, frenectomy, gingivectomy, exposure of impacted teeth, operculectomy, papilla flattening, etc. Like any other technique, LASERS have their own disadvantages. This review article is about the use of Low Level Laser Therapy in orthodontics and its effects.

INTRODUCTION

A laser is a device that emits a beam of coherent light through an optical amplification process. There are many types of lasers including gas lasers, fiber lasers, solid state lasers, dye lasers, diode lasers and excimer lasers. All of these laser types share a basic set of components.



Laser Components

1. Gain medium capable of sustaining stimulated emission
2. Energy source to pump the gain medium
3. Total reflector to reflect energy
4. Partial reflector
5. Laser beam output

The gain medium and resonator determine the wavelength of the laser beam and the power of the laser.

A laser beam is produced within the laser machine when the pump source stimulates the laser media

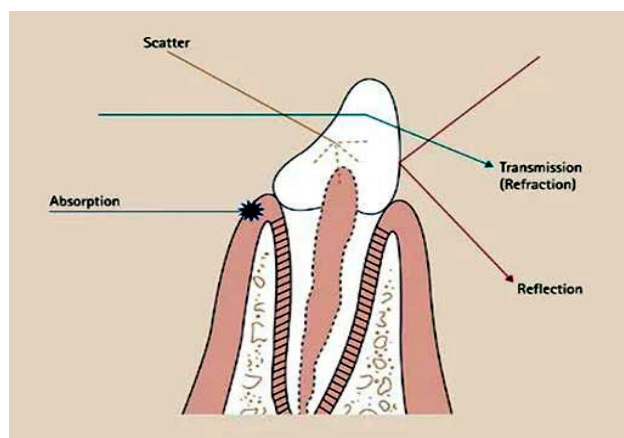
releasing light energy which amplifies as it travels through the optical cavity.

The amplified light energy released from the machine is what we refer to as the laser beam.

When light energy enters the target tissue it transforms into heat – a process known as photothermal effect resulting in the vaporization of the target tissue cells.

LASER INTERACTION WITH BIOLOGIC TISSUES

When radiant energy is absorbed by tissue, four basic types of interactions or responses can occur.



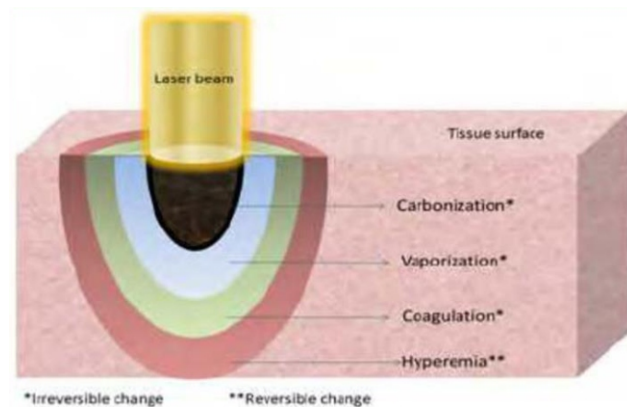
LASER INTERACTION	APPLICATION
1. SCATTER	biostimulation in LLT
2. TRANSMISSION	diagnosis of caries
3. ABSORPTION	tissue ablation

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1. Hyperthermia – below 50 degrees C
2. Coagulation and Protein Denaturation – 60+ degrees C
3. Vaporization – 100+ degrees C
4. Carbonization – 200+ degrees C

When a laser heats oral tissues certain reversible or irreversible changes can occur:



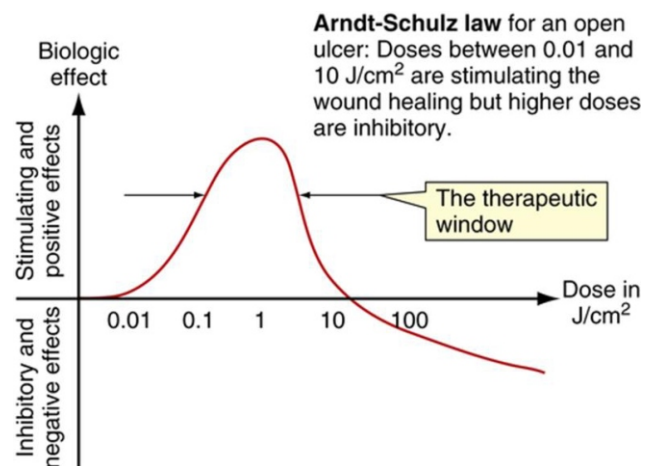
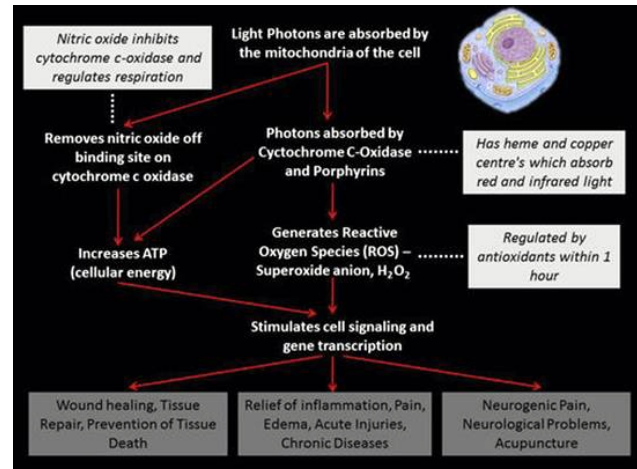
PHOTOBIOMODULATION

Also known as photo biostimulation, is a process of providing of low-level laser therapy (LLLT) that penetrates or scatters into tissues, stimulates tissues and promotes periodontal wound healing of the adjacent tissues. As a desired effect a LLLT generates an array of extremely transient biochemical intermediates that result in cascading biological reactions in favour of tissue healing.

MECHANISM OF ACTION

At the cellular level

1. At the cellular level, light (visible red and near-infrared light) energy is absorbed by the mitochondria producing ATP. PBM Healing light targets the mitochondria with this light to create more energy in the cell.
2. Photobiomodulation also works to stimulate Reactive Oxygen Series which leads to gene transcription and then to cellular repair and healing.
3. Additionally, photobiomodulation triggers a molecule called nitric oxide, and this helps to dilate the blood vessels and improve blood circulation.



EFFECT OF PHOTOBIOMODULATION ON FOUR PHASES OF WOUND HEALING

HAEMOSTATIC PHASE : promotes platelet aggregation and activation

INFLAMMATORY PHASE: promotes proliferation and degranulation

PROLIFERATIVE PHASE: promotes proliferation of fibroblasts, keratinocytes, osteoblasts and chondrocytes as well as induces matrix synthesis

MATURATION PHASE: improves reorganisation and remodelling of wounds, aids improved tensile strength and restoring functional architecture of repaired tissue.

Side Effects and Contraindications

1. Doses of laser energy near the therapeutic window will not cause negative effects.
2. The worst result with PBM is that nothing happens. There are few absolute contraindications to PBM, but a few caveats follow.

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3. Presence of **known malignancies is a contraindication**, because PBM stimulates cell growth (this issue is based largely on legal considerations).
4. The literature also discusses **pregnancy as a contraindication**, although dentists work exclusively in the oral and head-neck regions.
5. Also, although sometimes listed as a contraindication, **pacemakers are electrical and not influenced by light**. Some traditional safety regulations and contraindications seem to have been transferred from electrosurgical and other therapies to surgical lasers.
6. A contraindication especially relevant to dentistry is irradiation over **the thyroid gland**, located within the dental treatment area. Dentists generally are not informed about possible thyroid conditions; direct irradiation over this area, therefore, should be avoided, because it could stimulate a hyperthyroid condition with a low dose or inhibit a hypothyroid condition with a high dose. However, PBM for thyroid disorders has been studied.

POWER AND TIME

- For musculoskeletal conditions and pain therapy, high-output lasers may be useful
- for processes such as wound healing and bone regeneration, use of lower power over a longer time is more effective.
- The 500-mW laser would work better for pain but might be less effective for treatment involving tissue regeneration.

CLINICAL APPLICATION OF LLLT IN DENTISTRY

General

- Desensitizing teeth¹
- Enhancing healing after pulpotomy

Orthodontics

- Reducing pain during orthodontics
- Accelerating orthodontic tooth movement
- Enhancing the stability of orthodontic mini screws
- Bone regeneration

Oral and periodontal surgery

- Accelerating wound healing
- Accelerating wound healing on the palate after harvesting connective tissue for grafts
- Reducing post-extraction pain

- Reducing pain after orthognathic surgery
- Enhancing nerve healing after inferior alveolar or lingual nerve iatrogenic injury
- Attenuating the effects of bisphosphonates on bone healing & improving outcomes after surgical treatment of MRONJ

Periodontal and implant surgery

- Enhancing bone formation around newly placed implants
- Enhancing bone formation in periodontal defects when used as an adjunct to GTR
- Reducing pain and swelling after sinus lifts

TMJ

- As an adjunct in the treatment of TMJ disorders
- Deactivation of myofascial trigger points

Oral medicine

- Reducing pain from recurrent herpes simplex infection and burning mouth syndrome
- Reducing pain in trigeminal neuralgia
- Reducing pain from mucositis and reducing xerostomia during chemo and radiotherapy
- Phototherapy treatment of oral lichen planus lesions

APPLICATIONS IN ORTHODONTICS

Effects of Low Level Laser Therapy on Tooth Movement

1. it is assumed that LLLT is dose-dependent and can stimulate or inhibit biological processes of target tissue
2. Many studies evaluated the influences of LLLT with the various mediators such as the receptor activator of nuclear factor kappa B (RANK)/RANK ligand (RANKL) with a role in accelerating the process.

Pain Relief by Low Level Laser Therapy

1. Pain during orthodontic therapy is a common clinical symptom, as well as a reason for patients to discontinue to treatment.
2. To eliminate the patient complaints and have a comfortable orthodontic treatment process, it is necessary to find new methods for pain control.
3. Side effects of the use of analgesics including reduction in amount on tooth movement led the clinicians to find other methods

4. LLLT, is claimed as an efficient method to relieve pain in orthodontic therapy. Mechanisms of pain reduction by the effect of LLLT during orthodontic treatment have been explained by several hypothesis;
5. such as suppression of cyclooxygenase-2 mRNA expression,
6. an alteration in the transmission,
7. induction of stimulating action potentials in peripheral nerves stimulate a reduction in endogenous endorphins.
8. A wide range of laser types (GaAlAs diode, HeNe, CO2 lasers) with different wavelengths and energy doses to reduce pain during orthodontic treatment are described in literature.

Bone Regeneration in the Midpalatal Suture

1. Expansion of the midpalatal suture, a common procedure in orthodontic practice produced an increase in the transverse width of the maxillary basal bone.
2. In the literature, it is emphasized that the velocity and quality of new bone formation in the midpalatal suture affect post-expansion relapse.
3. Histological studies on animal and human subjects with maxillary expansion procedures demonstrated that LLLT stimulated the increased fibroblast proliferation and amount of osteoid tissue, faster ossification and increased bone mineral density.
4. According to most studies that evaluated the effects of low level laser treatment on the expansion of a midpalatal suture, LLLT stimulated the regeneration process based on the total amount of irradiation, frequency, and duration of application.

Effects of Low Level Laser Therapy in Distraction Osteogenesis

1. Over the last few years, distraction osteogenesis (DO) has become an effective treatment method for facial bone reconstruction, for the patients with several congenital (hemifacial macrosomia) or acquired dentofacial deformities (oncologic surgery).
2. The aim of DO is to generate new bone on the treated side where adjacent bone segments are separated by distraction.
3. The distraction devices (distractors) necessary to perform osteodistraction are also crucial for

stabilization after accomplishing the distraction needed.

4. The rather complicated distraction appliances can become uncomfortable and unpleasant for the patients functionally, esthetically and psychologically.
5. The use of LLLT seems to have a positive effect on osteoblastic activity, the repair of bone and soft tissues in this way reducing the retention time.
6. In the literature, several studies with different designs evaluated the effect of LLLT on animal subjects (51-54). Miloro et al. (51) aimed to determine the effects of LLLT (820 nm, 400 mW) for acceleration of bone regeneration and diminish the length of the consolidation phase of DO. They concluded that LLLT advanced the bone regeneration process during the

Conclusion

Low level laser therapy may be effective especially in orthodontic clinical practice in order to reduce total treatment duration and increase patient comfort during treatment. Although laser systems have higher costs and require intensive safety instructions, Low Level Laser Therapy in turn will be frequently preferred in future by converting disadvantages into advantages.

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IDA Bengaluru Branch Activities : 2021-22



New Office Bearers for year 2020 & 21



Distribution of PPE kits in the month of May 2020 during COVID pandemic





Celebration of National Dentist Day on Dec 24th



Flag hoisting on Independence Day at Dantha Bhavan, Bangalore



IDA Bangalore Branch New office bearer's for 2022



EC meeting at Dantha Bhavana



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