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Editorial

The Editor of the " UPDATES IN DENTISTRY" had the audacity to publish my views from dentistry. As I write this column, we are living under the shadow of the corona-virus pandemic. The morbidity and mortality statistics are truly frightening at this point and are supposed to get much worse. Amidst this pandemic, this journal continues its normal publication schedule, thanks to the production team they are doing right now in the face of this global crisis.

With the concern of infection control in health care settings, personal protective equipments (PPE) have been given to many individuals. American Dental Association advised all the dental practices to cease non-emergent in-person care to reduce the infection rate and started to rebuild stockpiles of PPE for health care providers.

Many people today enjoy excellent oral health and are keeping their natural teeth throughout their lives. But for some, caries are still the most prevalent chronic disease of childhood. Too many people mistakenly believe that they need to see a dentist only if they are in pain or something is wrong.

Dentistry promotes continuity of care that is comprehensive, convenient, cost effective and efficient. Their responsibilities include diagnosing of oral diseases and promoting oral health and its prevention. Even the routine procedures such as tooth extractions, preparing and placing fillings, carry potential risks of complications such as infection, temporary or even permanent nerve damage, prolonged bleeding, pain etc. Dentists can spot early warning signs in t he mouth that may indicate disease elsewhere in the body. Regular dental visits and care will help maintain and improve optimal health throughout their lifetimes.

With people around the world wondering what the future will hold after this pandemic, I remain confident that our profession will not only survive but thrive. My confidence is even deeper, with a passion for symmetry, perfection and beauty to unlock each patient's epitome of a perfect smile.

Going forward with the most rewarding thing, the patient's happiness and satisfaction and the stability of the results.

Dr. Sandeep Kumar
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Original Article

CLINICAL KNOWLEDGE OF DENTAL GRADUATE IN INDIA- A QUESTIONNAIRE BASED STUDY

Dr. Manjot Kaur, Dr. Dileep CL, dr. Manu Batra, Dr. Deeksha Gijjwani, Dr. Mandeep Singh Matta, Dr. Ankita Panghal

ABSTRACT

The number of dentists in a population cannot give insight to the quality dental care. The clinical knowledge of the dental graduates can give a fair idea of the quality dental care. In the present study, the clinical knowledge of the dental graduates from different dental institutes of India was assessed with self administered questionnaire containing 40 questions, 10 each from clinical subjects of Endodontics (Group A), Oral and maxillofacial surgery (Group B), Prosthodontics (Group C) and Oral medicine and radiology (Group D). Statistically significant difference was found between the values of each group when compared with group C. The results obtained in this study revealed that the questions from the subject of Prosthodontics were most answered correctly (83%) than all other subjects, Endodontics (52%), Oral surgery (47%) and Oral Medicine and radiology (47%).

Keywords: Dental Graduates, dental care, clinical knowledge, Questionnaire

INTRODUCTION

Thousands of dental graduates pass every year from various dental colleges in India. Dental education in India is monitored by dental council of India. Number of dentists in a population cannot be a criterion of quality dental care. The inefficient dental care can lead to more short term and long term complications for the patient. Ultimately patient ends up spending more on treatment. If patient is not able to spend more on treatment, then patient loses sound tooth structure and even life due to wrong dental treatment.

Quality dental care is always derived from sound clinical knowledge. Hence, if clinical knowledge of dental graduates is assessed, quality of dental care can easily be assessed in a population. Currently dental education system is discussed all over the world with view to the changes of curriculum[1-4]. Ministry of education in Brazil proposed new curriculum guidelines for dental course[5].

To improve the quality of dental care, learning deficiencies must be assessed. A proposal can then be made for methodological strategies to improve the course.[6]

The aim of the present study was to assess the clinical knowledge of the dental graduates from different dental institutes of India that can provide insight to the quality of dental care in India.

MATERIALS AND METHODS

This cross sectional study was conducted in 3 Dental Institutes in the Tricity vicinity of Chandigarh, Panchkula and Mohali in states of union territory Chandigarh, Haryana and Punjab respectively. Its design received full approval from local Research Ethics Committee. The participants were 70 dental graduates passed from various dental institutes of India and working as demonstrators in these institutes at one point of time.

All were given self administered questionnaire containing 40 questions, 10 each from clinical subjects of Endodontics (Group A), Oral and maxillofacial surgery (Group B), Prosthodontics (Group C) and Oral medicine and radiology (Group D). Questions were answered with 'Yes' or 'No' response. Unattempted question was entered as wrong response (Table 1).

Table 1: Questionnaire with answers considered correct.

Question	Correct response
• Do you do recapitulation and irrigation after each file size during BMP in root canal treatment?	Yes
• Do you use inter-appointment dressing in abscessed tooth during root canal treatment?	Yes
• Do you prescribe antibiotics during endodontic therapy of a tooth with irreversible pulpitis?	No
• Do you take master cone x-ray before obturation during endodontic therapy?	Yes
• Do you sterilize gutta-percha before obturation?	Yes
• Do you check the consistency of root canal sealer before obturation during endodontic therapy?	Yes
• Do you always recommend crown after endodontic therapy in incisors?	No
• Do you condition the tooth surface before Glass ionomer Restoration/Miracle restoration?	Yes
• Do you consider catch with an explorer confirmatory diagnostic test for dental caries?	No
• Do you apply topical anaesthetic before regional block administration?	Yes

• Do you check for Local Anaesthetic allergy in the patient requiring endodontic treatment in teeth with irreversible pulpitis but is visiting dentist for the first time?	Yes
• Do you always administer a block in maxillary posterior firm tooth extraction?	No
• Do you luxate the firm tooth with elevator before extraction?	Yes
• Patient comes with severe pain in mandibular molar extraction socket after 48 hours. Will you pack the alveolar socket with zinc oxide /eugenol dressing?	No
• Can you manage a patient of anaphylactic shock all alone?	Yes
• Can you manage a patient of hypoglycaemic shock all alone?	Yes
• Can you manage a patient of syncope?	Yes
• Do you know how to use Sphygmomanometer?	Yes
• Do you know the complete list of emergency drugs to be kept in the dental operatory?	Yes
• Do you know the complete list of emergency equipment to be kept in the dental operatory?	Yes
• Do you check for the complete healing of the alveolar ridge before fabrication of complete dentures?	Yes
• Do you give relief in the custom trays before final impression?	Yes
• Do you check the occlusal high points at the time of denture delivery?	Yes
• Do you check for undercuts in the diagnostic cast before fabrication of removable partial dentures?	Yes
• Do you temporize the tooth in every case of the crown and bridge?	Yes
• Do you apply the alginate to the prepared tooth before taking alginate impression in a stock tray?	Yes
• Do you check for high occlusal points before insertion of the crown and bridge?	Yes
• Do you check for protrusive and lateral excusion contacts before insertion of the crown and bridge?	Yes
• Do you check for adaptation of the crown margin before luting of the crown or bridge?	Yes
• Do you check for flash of cement at the crown margins after luting?	Yes
• Do you always wear lead apron during X-ray exposure?	Yes
• Do you know how to take bitewing radiograph?	Yes
• Can you differentiate between cyst and granuloma on radiograph?	Yes
• Do you allow the patients to wear ornaments during x-ray exposure?	No
• Do you keep the x-ray film in developer for prolonged period to achieve better contrast?	No
• Do you refer a patient for periodontal treatment if there are 3mm deep probing depths around most of the teeth?	No
• You took an IOPA of 45 and found radiolucency around the apex of 45. Will you go for endodontic treatment of 45?	No
• Can you differentiate between healing periapical pathology and a progressing periapical pathology while diagnosing periradicular lesions of endodontic origin?	Yes
• A patient wearing Complete Dentures came to OPD with angular chielitis lesions resembling Herpes. Will you prescribe acyclovir?	No
• There is a solid fixed mass measuring 3cm in buccal mucosa adjoining mandibular molars. Will you take excisional biopsy?	No

Table 2: Intergroup comparison using Chi Square Statistics

Group	Correct	Incorrect	P value
A (%)	52	48	0.5717
B (%)	**47**	**53**	
A (%)	**52**	**48**	**0.0001***
C (%)	**83**	**17**	
A (%)	52	48	0.5717
D (%)	47	53	
B (%)	47	53	0.0001*
C (%)	83	17	
B (%)	47	53	1.0
D (%)	47	53	
C (%)	83	17	0.0001*
D (%)	47	53	

*Significant at 0.05 level

Table 3: Overall correct response percentage compared with each group's correct response percentage using chi square test

Group	Correct	Incorrect	P value
Total (%)	57.2	42.8	0.5702
A (%)	52	48	
Total (%)	57.2	42.8	0.2026
B (%)	47	53	
Total (%)	57.2	42.8	0.0001*
C (%)	83	17	
Total (%)	57.2	42.8	0.2026
D (%)	47	53	

*Significant at 0.05 level

The data was dichotomised into correct and incorrect answers. The correct and incorrect frequencies were tested in relation to four clinical subjects using Chi-square test. Significance level was set at 5%.

RESULTS

The overall response rate was 85.7 %(N=60) and final sample composed of 60 respondents. The percentage of correct and incorrect responses to the questionnaire of each group was calculated from the total number of responses. Chi square test was applied to the percentage values and statistically significant difference was found between the values of each group when compared with group C (Table 2). Overall correct response percentage was also compared with each group's correct response percentage using chi square test. Statistically significant difference was found in comparison to Group C (Table 3).

DISCUSSION

This study was designed to investigate the extent of Indian dental graduate's clinical knowledge. India has dentist to population ratio of 1:10000 in urban areas and 1:500000 in rural areas. The deficiency of undergraduate dental education is found in many countries of the world. India is not an exception. Most of the population in India is catered by non government organisations and private practitioners in absence of dental insurance where quality of dental treatment suffers.

In this study clinical knowledge of dental graduates was evaluated by self applied questionnaire, a methodology used for many similar studies[7-9]. The questionnaire used had been validated according to the protocol in the literature[10]. The quality of dental treatment invariably depends on the clinical knowledge. Dental graduates passing from various dental institutes in India pass through course curriculum prescribed by Dental Council of India, the governing body of dental education in India. The academic curriculum at undergraduate level is for 5 years including 1 year of rotating internship.

Basic clinical knowledge for rendering quality dental treatment involves good understanding of the clinical subjects like Oral Medicine and radiology, Oral surgery, Endodontics and Prosthodontics. The academic curriculum in India has Oral Medicine taught for 2 years, Operative dentistry and Endodontics for 3 years, Oral surgery for 2 years and Prosthodontics for 4 years including dental materials.

The results obtained in this study revealed that the questions from the subject of prosthodontics were most answered correctly (83%) than all other subjects, endodontics (52%), oral surgery (47%) and Oral Medicine and radiology (47%).

Although thorough knowledge of various clinical subjects and their applications is necessary for ethical and efficient practice of dentistry, only the subject of Prosthodontics was found to be well understood among the dental graduates. The education systems worldwide are undergoing remarkable changes as course programs are designed in new ways, moving away from passive teacher- centered learning to active learner-centered learning[11].

The present study evaluated not only theoretical knowledge but also practical knowledge of the graduates. It is important to emphasize that this was a cross-sectional study, which evaluated only 3 dental colleges in certain geographic domain of Indian Territory which means that the obtained results refer to a group of previous students who took part in the survey. Hence, further longitudinal investigations involving other dental colleges are recommended to provide more data for discussion on dental education quality in India[6].

We believe that other clinical subjects like restorative dentistry and endodontics, oral surgery, oral medicine and radiology must also be reinforced in the present undergraduate curriculum for dental sciences in India. This will ultimately improve the quality of dental treatment rendered in India.

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Case Report

ANOTHER TIE AFTER TONGUE TIE SURGERY

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ABSTRACT:

AIM- Tongue tie which is not a very common dental problem commonly called as ankyloglossia. Tongue tie affects movements of tongue which leads to impairment in speech, occlusion of teeth. During past few decades, ankyloglossia/ tongue tie has been treated by various techniques such as scalpel, Laser and electrocautery associated with their own advantages and disadvantages. It has been reported in literature that ankyloglossia treated with electrocautery and lasers do not need suture post surgically as the main objective of the suture is to stop bleeding at the operated site which is absent in both the above-mentioned procedures.

CASE REPORT- In the present case suturing was done after electrocautery assisted lingual frenectomy. This was done to avoid the rebound/ reattachment of the frenum in a 16-year-old male patient who exhibited speech difficulty with restricted tongue movements due to ankyloglossia.

CONCLUSION- The outcome of the frenectomy in this case using electrocautery followed by suture placement showed good healing with no reattachment in 3 months of follow-up. The clinical outcome achieved following the electrocautery assisted frenectomy with the suture placement for this case is safe and predictable method.

Key words- tongue tie, ankyloglossia, electrocautery, suture.

INTRODUCTION:

The term ankyloglossia is derived from Greek word ankylos- "crooked", glossia- "tongue". Ankyloglossia or partial tongue tie happens when the lingual frenum is short or it is attached too close to the tongue tip restricting its free movement which commonly observed in infants with an incidence rate of about 5%.[1] A rare variant of ankyloglossia is also present where tongue is completely attached to the floor of the mouth. Tongue tie complicates talking, feeding (or breast feeding in newborn), oral hygiene maintenance which hampers the physiological and psychological life. [2]It can be removed (frenectomy) at or after 6 months of age. Tongue tie also occurs as a clinical feature with syndromes such as Smith-Lemliopitz syndrome, Orofacial digital syndrome, Beckwith Weidman syndrome, Simpson-Golabi-Behmel syndrome and X-linked cleft palate.[3]

According to Kotlow's classification tongue tie is classified as Class I (Mild Ankyloglossia: 12-16mm), Class II (Moderate Ankyloglossia: 8-11mm), Class III (Severe Ankyloglossia: 3-7mm) and Class IV (Complete Ankyloglossia: Less than 3mm)[4]. According to this classification our case was of Class II moderate ankyloglossia with tongue protrusion of 9 mm. (approx.).

Ankyloglossia causes specific speech and food intake difficulties in certain individuals. It does not prevent or delay the onset of speech, but it hampers to pronounce few letters and words such as "t", "d", "l", "th", "s", "Ram", "drum".2 In our case also the patient was unable to pronounce few letters and words starting with these letters.

Surgical techniques for the therapy of tongue-ties can be classified into three procedures. Frenotomy is a simple cutting of the frenulum (of neonates). Frenectomy is defined as complete excision, i.e., removal of the whole frenulum (at or after 6 months of age). Frenuloplasty involves various methods to release the tongue-tie and correct the anatomic situation.[5] Several studies have considered frenectomy as an effective treatment for ankyloglossia, without any serious complications post operatively. It has been acknowledged that frenotomy could be of great use as a safe and effective early intervention for problems attributed to ankyloglossia.[6]

Here we reported a case of tongue tie which was performed using electrocautery along with placement of sutures. In addition to electrocautery, surgical intervention, LASER is also being used for treating ankyloglossia. Though electrocautery gave bloodless field in our case, placement of suture was done only to prevent re-attachment of the treated site. So many studies have been done regarding the same but very few of those mentioned about the prevention from the rebound effect after the surgery.

CASE REPORT:

A 16-year-old male patient came to the dept. of periodontics of Surendera Dental College and Research Institute with the chief complaint of restricted tongue movement, difficulty in speaking

and difficulty during the intake of food. On extraoral examination there were no significant findings noted. On intra oral examination there was restricted tongue movement due to the presence of fusion of lingual frenum to the tongue with tongue protrusion measuring 9 mm only (Fig. 1,2) and diagnosed with class II ankyloglossia by utilizing Kotlow assessment.[4] On taking family history there was no such case reported in patient's family members. A complete hemogram was done with all the values within normal limits. After taking consent with patient's parents and discussing all the post-operative complications a treatment plan of partial frenectomy with electrocautery was made.

Fig. 1 Protruded Tongue

Fig. 2 Protrusion was less

Under local anesthesia with 2% lignocaine and l: 80000 adrenaline, electrocautery (ART electrosurgery unit, cutting electrode was set with 4 RF/2MHz, power supply of 230±10% 50/60 Hz, 0.9A 210 VA) assisted frenotomy was performed by holding the tip of the tongue with finger, vertical strokes and brushing motion on the frenum and removal of partial lingual frenum followed by 3-0 silk suture placement was performed, the area was continuously irrigated with normal saline. After performing partial frenectomy (removal of frenum till it moves freely without removing the complete frenum) there was an immediate tongue protrusion of 20 mm (Fig. 3,4) which was comfortable with the patient. The speaking ability of the patient was improved and was kept on antimicrobials (500 mg Amoxicillin) along with NSAIDs (Aceclofenac 100 mg, Paracetamol 325 mg, Serratiopeptidase 15 mg) to relieve pain for 5 days with instructions to do tongue exercises (to stretch out the tongue up and then down repeatedly, open the mouth widely and touch the front teeth with the tongue, for 3-to-5-minute bursts, once or twice daily for 3 or 4 weeks post-operatively)3 to avoid recurrence. The patient was followed up for 1 week (Fig. 5) for suture removal, 1 month (Fig. 6) and 3 months (Fig. 7) with no recurrence and difficulty in speaking, and during intake of food. The post-operative period was uneventful with good healing and no scar formation.

Fig. 3 Tongue Tie

Fig. 4 Tongue Tie

Fig. 5 Treated Tongue tie

Fig. 6 Electrocautery Machine

DISCUSSION:

Ankyloglossia is a congenital anomaly considered by the abnormal attachment of tongue to the floor of the mouth with lingual frenum. It occurs due to failure in cellular degeneration leading to longer anchorage between tongue and floor of the mouth.[3] Lalakea recommended measuring lingual mobility and tongue elevation to document and define the degree of restriction and ankyloglossia. Mobility is measured in millimeters the tip of the tongue extended past the lower dentition, while elevation is measured by recording interincisal distance with the tongue tip maximally elevated and in contact with the upper teeth. If there is ankyloglossia the protrusion and elevation values of 15mm or less will be recorded and 20 to 22mm for normal individuals,[7] which is applicable for our case also.

The case presented in this paper were treated with electrocautery

which resulted in good treatment outcome and patient satisfaction with improved tongue movements and correction of speech problems.

Using electrocautery for the removal of lingual frenum takes less time and bleeding at the surgical site, also patient's discomfort level. Though electrocautery gives a bloodless surgical field, the post-surgical site ended up with a large open wound which might cause discomfort, pain to the patient post operatively also that may lead to rebound (re-attachment) of frenum. Here in this case, placement of suture has been planned so that the post-operative area will heal with primary intention and moreover the chances of reattachment during the healing period can be minimized.[8] Giving a tie with suture placement to prevent the rebound effect was an excellent attempt can be concluded after observing postoperatively in the follow-up period of the patient. Though further studies are needed on this behalf.

The purpose of post-operative exercise after surgery is to develop new muscle movements particularly those involving tongue tip elevation and protrusion, inside and outside of the mouth. It also increases aesthetic awareness of the full range of movements the tongue and lips can perform. Moreover, it encourages the tongue movements related to cleaning of oral cavity including sweeping the insides of the cheeks, fronts and backs of the teeth and licking around both lips.[9,10,11]

CONCLUSION:

Ankyloglossia in adults causing restricted tongue protrusion, elevation causing speech problems, could be improved by surgical intervention. The clinical outcome following electrocautery assisted frenectomy in the case presented here shown better healing and tongue movement and for 1 month and 3 months follow-up no signs of reattachment were noticed. With the limitation of this case reports, it could be concluded that electrocautery assisted frenectomy remains one of the best and cost-effective technique for the management of tongue tie also placement of suture reduces the chances of rebound effect of frenum. Though further studies with large sample size should be done to support the beneficial outcomes of this technique.

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Case Report

CONSEQUENCE OF A SIMPLE NEGLECT IN DIABETIC PATIENT, OSTEOMYELITIS OF MAXILLA

Dr. Manisha Solanki, Dr.Puspadip Kharel, Dr. Hemlata Solanki , Dr. Abhishekh Kumar, Dr. Smita Sutar

ABSTRACT

Osteomyelitis of the maxilla is now a rare event with the advent of antibiotics. The two predominant causes are odontogenic infections and sinusitis. Immunocompromised states such as Diabetes, HIV and Malnutrition increase the risk of osteomyelitis. It is important to recognize this early as it is a difficult entity to treat with potentially serious consequences. We report an unusual case of left sided maxillary osteomyelitis in a man with poorly controlled diabetes in rural Rajasthan. Biopsy of the left maxillary bone showed features of acute osteomyelitis. The treatment modality opted was pre operative intravenous Antibiotics, Sequestrectomy and curettage followed by systemic antibiotics Amoxycillin+ Clavulanic acid, Metronidazole and oral Clindamycin was given. The wound healing was uneventful. After 1 month of post op follow up, prosthetic management was done with Acrylic Obturator.

Keywords: Osteomyelitis, Hyperglycemia, Immunocompromised, Antibiotic, Sequestrectomy

INTRODUCTION

Osteomyelitis is inflammation of the bone which begins as an infection of the medullary cavity with rapid involvement of the haversian systems and extension to the periosteum[1]. Osteomyelitis was a common disease before the advent of antibiotics. Today, osteomyelitis of the facial skeleton is a rare condition. It tends to occur more commonly in the mandible than in the maxilla as the maxilla has a significant collateral blood flow, thin cortical bones, and bone marrow with struts which make it less prone to infection[2].

Maxillary osteomyelitis can be classified based on the following causes: traumatic, rhinogenic, and odontogenic[3]. Factors which contribute to osteomyelitis are systemic diseases which compromise the immune system of an individual such as diabetes mellitus, HIV, malnutrition, and use of chemotherapeutic agents4. We hereby report a case of maxillary osteomyelitis in an adult male diabetic patient who had undergone extraction of tooth at hyperglycemic state.

CASE REPORT

A 50-years-old male patient presented to our OMFS department complaining of foul smell from mouth and unhealed extraction site since 5-6 months. He had a past medical history of Diabetes mellitus. Patient gave history of extraction of tooth at uncontrolled diabetic state. The extraction socket did not heal and lead to bare yellowish bone at the extraction socket site. On examination, there was denuded yellowish bone (Figure 1, 2) in the left maxillary first molar region. The lesion was suppurative (Figure 3). There was no diplopia, nasal symptoms, or epistaxis. His cranial nerve examination was unremarkable with no lymphadenopathy. His throat and nasal examination was normal.

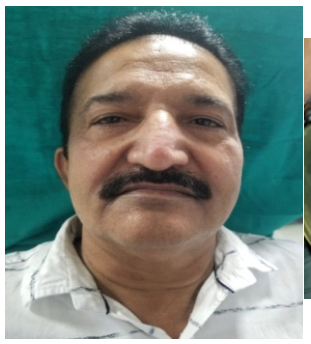

Fig 1: Front profile pic

Fig 2: (Mirror image) intraoral view

An IOPA, OPG and CT scan was performed (Figure 4,5) which showed bony destruction in the lateral wall of the right maxillary antrum with appearance of bone erosion and thickening. He was provisionally diagnosed with Osteomyelitis of Maxilla.

Fig 3: Suppuration of of Maxillary jaw

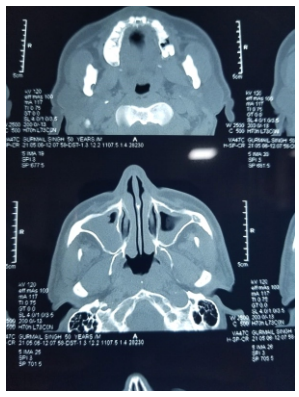

Fig 4: Coronal CT showing Maxillary Sinus obliteration

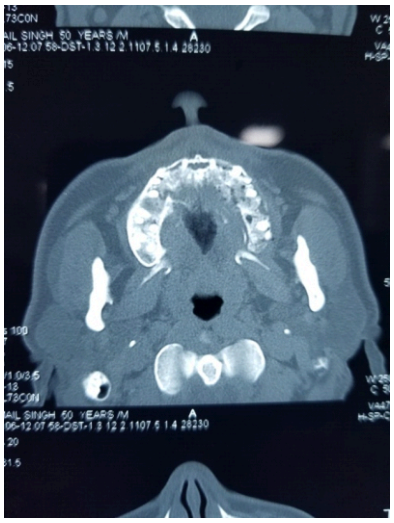

Fig 5: Coronal CT

Coronal section CT (Figure 4 & 5) image showing bony destruction of alveolar bone crossing midline, the lateral wall of the maxillary antrum with some erosion and thickening. Bony dehiscence seen on left maxillary molar alveolus region. He was treated with preoperative antibiotics, surgical management and post operative systemic antibiotics with a good response. He is kept under regular follow-up. Pre- op Antibiotics given were Amoxycillin+ Clavulanic acid, Metronidazole

Surgical management: Sequestrectomy and curettage was done, all the visible necrotic and discolored bones were removed using bone rongeur (Figure 6,7,8). Affected sinus lining were removed and whole the maxillary sinus contents were curetted. All the teeth associated were extracted. The anterior nasal spine and bone of midline were preserved and the defects were packed with Iodoform dressing and suturing was done to secure the pack. The specimens were sent for Histopathological Examination (Figure 9,10).

Post operative Systemic Antibiotics (Amoxycillin+ Clavulanic acid, Metronidazole) were given along with oral Clindamycin and kept on follow up. Patient was recalled and reviewed on 3rd, 7th, 10th, 20th and 30th postoperative days. The surgical wound healed uneventfully.

Fig 6: Intra operative picture

Fig 7: Defect after removal of necrotic bone

Fig 8: Debrided Necrotic bony Specimen

Histopathology report of soft tissue specimen (sinus lining) showed hyperplastic stratified squamous epithelium and pseudostratified ciliated squamous epithelium overlying the connective tissue stroma consisting of dense collagen fibers with endothelial lined blood vessels and sheets of chronic inflammatory cells chiefly consisting of lymphocytes gave impression of inflamed oral respiratory epithelium. Histopathology report of necrotic bone (H&E) stained section showed dense mass of lamellar trabeculae bone with empty osteocytic lacunae. The trabeculae showed little interstitial marrow tissue. The interstitial soft tissue is fibrotic with small number of inflammatory cells chiefly consisting of lymphocytes and plasma cells. The osteoblastic lining of bony trabeculae was absent, gave the impression of chronic osteomyelitis.

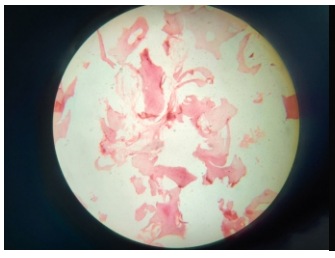

Fig: 9 (H & E Section)

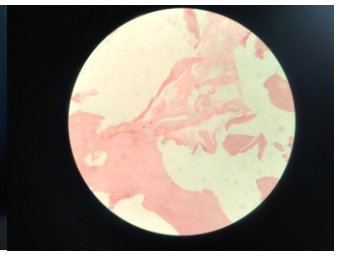

Fig: 10 (H & E Section)

After 1 month follow up the rehabilitation was done with Acrylic Custom made Obturator with bulb (Figure 11,12) from Department of Prosthodontics. Patient is under regular follow up.

Fig 11: 10th day post op.

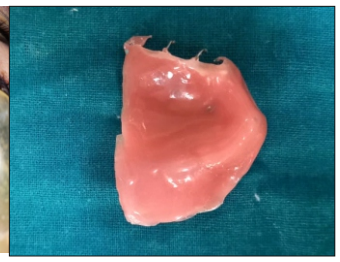

Fig12: Obturator with Bulb

DISCUSSION

Osteomyelitis of the maxilla is a rare entity with the widespread use of antibiotics, early diagnosis, and intervention guided by new imaging modalities[5-7]. It has been reported extensively in literature, primarily in the form of case reports[4,8]. It is important to consider the diagnosis in immunocompromised patients as it remains one of the most difficult to treat infectious diseases. In the past, osteomyelitis was encountered frequently and dreaded given its prolonged course, uncertainty of outcome, and possible disfigurement resulting from loss of teeth and bone[8]. Factors predisposing to osteomyelitis of the maxilla include dental infections, maxillary sinusitis, trauma, and radiation. The two main causes are dental infections and sinusitis[4]. When caused by sinusitis, it more frequently involves the frontal bone and rarely the maxilla due to its relatively well developed vascular supply and thin bone structure[9]. In this case, the main risk factor was poorly controlled diabetes mellitus and the patient had recurrent maxillary sinusitis which eventually progressed to involve the maxillary bone. According to Peravali et al., 68% of cases of maxillary osteomyelitis are related to diabetes mellitus as hyperglycemia weakens the immune system by altering the blood flow distribution to the maxilla.

The treatments for maxillary osteomyelitis range from a noninvasive approach to a more invasive radical treatment[10]. A combination of antibiotic treatment with surgery has shown to be effective in treating the condition. Surgical treatment involves removal of loose teeth and sequestra, debridement, decortication, resection, and reconstruction[8]. In our case, the patient was treated with a prolonged course of amoxicillin and clavulanic acid along with Clindamycin making a good recovery.

As it was the Covid-19 pandemic days, initially we suspected as Mucormycosis. There was no history of Covid-19 infection to the patient. Patient was immunized with both the dosages of Covid-19 Vaccine. On examination there was no multiple draining sinus and clinical presentation was not as of Mucormycosis hence was ruled out for Black fungus. Same concluded the Histopathology.

In this case Control of Diabetes, Surgical management by Sequestrectomy and Curettage along with prolonged systemic antibiotics resulted the good healing. The Oral Clindamycin in Diabetic patient foe the treatment of Osteomyelitis showed good evidence of recovery in literature so did in our patient.

CONCLUSION

It is important to consider osteomyelitis in immunosuppressed individuals as it is a difficult entity to treat. It may progress to involve infection of the cranial cavity and brain. It is imperative to suspect the diagnosis early and offer treatment with antibiotics. Optimal glycemic control in diabetics is mandatory to prevent such infections. A simple mistake of extracting tooth at hyperglycemic state lead to such a debilitating disease and defect. Hence thorough history and all the indicated blood investigations can never be neglected before Extraction of a tooth.

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Case Report

ENMASSE RETRACTION WITH TADS

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ABSTRACT

Correction of a severe bimaxillary protrusion with critical anchorage can be challenging. This case report describes the treatment of a girl with a bimaxillary protrusion with critical anchorage with TADs. Orthodontic treatment included extraction of all 4 first premolars. His dental proclination and facial appearance was significantly improved.

INTRODUCTION

Bimaxillary protrusion is a condition characterized by protrusive and proclined upper and lower incisors and increased procumbency of the lips.[1] The etiology of bimaxillary protrusion is multifactorial. The goals of orthodontic treatment of bimaxillary protrusion include the retraction and retroclination of maxillary and mandibular incisors with a resultant decrease in soft tissue procumbency and convexity. In a case report on the use of four premolar extraction for the corrections of bimaxillary protrusion, Kurz found that the upper and lower incisors became more retroclined and retrusive, resulting in a greatly improved facial profile.[2]

DIAGNOSIS AND ETIOLOGY

A 29 year old male patient reported to Department of orthodontics with chief complaint of forwardly placed upper front teeth and irregular arrangement of lower front teeth. On clinical examination he had convex profile with increased lower facial height with normodivergent growth pattern, average nasolabial angle, incompetent lips (Fig 1) On intraoral examination, teeth present 1-8 in all four quadrants. Class I molar and canine relation with overjet of 8mm and overbite of 6mm. patient had undergone restoration wrt 21 and 37 three years back. Proclined upper incisors and crowding in the lower anterior region was present (Fig 2)

On dental radiographic examination all teeth were present and no bone loss was present. The cephalometric analysis revealed class II skeletal pattern with retrognathic mandible with ANB 7° normodivergent growth pattern 31°. The patient had proclined maxillary and mandibular incisors with UI-NA 6 mm/26° and L1-NB 9.5 mm/28°,IMPA- 102°(Fig 3)

On bolton's analysis mandibular excess was present.

Fig 1-Pretreatment extraoral photographs

Fig 2-Pretreatment intraoral photographs

Fig 3-Pretreatment Lateral cephalogram

TREATMENT OBJECTIVES:

1)To correct the proclination of upper incisors; 2) To correct the crowding of lower anteriors; 3) To maintain class I molar relation; 4) to achieve ideal overjet, overbite and achieve canine guidance 5) obtain a balanced facial profile, and 6) improve smile esthetics.

TREATMENT PLAN:

The patient was skeletal class II and dental class I bimaxillary protrusion with crowding of 15 mm in lower arch. So the patient was treated as class 1 bimax case. The treatment plan was retraction of the maxillary anterior teeth and alignment of lower anterior teeth. Therefore, all first bicuspids were extracted with critical anchorage. This option is commonly used to reduce the patient's lip procumbency.

TREATMENT PROGRESS:

MBT appliance 0.022 × 0.028″ slots was used. A lingual arch in mandible was placed on banded 1st molars to enhance the anchorage. Extraction of premolars was done. Alignment and levelling in upper arch was done. In lower arch, bonding was done by bypassing incisors, passive lacebacks were given with 0.016″nickel-titanium arch wires for retraction of canines for alignment of lower anteriors. 0.016″stainless steel ligated and retaction was done with E-chain. Anchorage was conserved in the upper with the help of temporary anchorage devices, thus constantly monitoring the already existing Class I molar relationship bilaterally. Retraction and closure of existing spaces was done with the help of Elastomeric chains delivering light continuous forces from hook soldered Enmasse Retraction with between lateral incisor and canine and replaced after every 4 weeks due to force decay and reduction in its activity. Lower incisors were bonded for alignment and alignment. Retraction with the help of inter-radicular implants enabled getting the incisors from Class II Division 1 relationship to a Class I incisor relationship (Fig 4).

Fig 4- Post retraction intaoral photographs

DISCUSSION:

Bimaxillary proclination is characterized by severe proclination of anterior teeth of both the arches. According to Drobocky and Smith[3] the patients treated with first premolar extraction show an average reduction of 3.4 mm and 3.6 mm in upper and lower lip procumbency in relation to Rickett's E-line. Group A anchorage has been considered effective in such cases. Absolute anchorage may be provided by various means including headgear and implants, etc. In our case, we used TADs as it is considerably economical and the most reliable method to augment anchorage.[4,5] The patient's chief complaint was forwardly placed upper and lower front teeth and excessive show of upper front teeth and seeked treatment for the same. extracting all four 1st premolars was planned as the patient presented with severe maxillary and mandibular proclination and crowding in mandibular arch, hence the case could not be managed without extractions.[6] The treatment after closure of extraction spaces improved the patients profile changing the Nasolabial angle from acute to average after retraction. There was a significant decrease in the lip strain and lip fullness with increased competency of lips. Lower anterior crowding was unraveled, an ideal overjet and overbite was achieved, smile arc was consonant and the pretreatment excessive show of upper front teeth was corrected. Successful results were obtained after the fixed appliance therapy within a stipulated period of time.

CONCLUSION:

This case report illustrates how a case with bimaxillary dentoalveolar protrusion with lower anterior crowding can be managed with Extraction of 4 premolars with efficient conservation of anchorage with TADs. The planned goals set in the pre-treatment plan were successfully attained. Treatment of the proclined and forwardly placed upper anterior teeth included the retraction of maxillary and decrowding of mandibular incisors with a resultant decrease in soft tissue procumbency and facial convexity. Patient had an improved smile and profile. The correction of the malocclusion was achieved, with a significant improvement in the patient aesthetics and self-esteem. The patient was very satisfied with the result of the treatment.

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Case Report

NONINFILTRATING ANGIOLIPOMA OF LIP

Dr. Tayyeb Sultan Khan, Dr. Manish Sharma

ABSTRACT

Lipomas are the most common soft tissue benign neoplasm arising from adipocytes. Angiolipoma, a subtype of lipoma, most commonly occurs in extremities and trunk. Occurrence of angiolipoma in oral soft tissues is very rare. Angiolipoma has two variant infiltrating, an unencapsulated form and noninfiltrating with thin capsule. Here we described a case of noninfiltrating angiolipoma of lower lip in a 24 year old male patient. The lesion was removed by surgical excision and histopathological evaluation confirmed the diagnosis of angiolipoma. Ten months follow up showed no recurrence of the tumor.

Key words*:* Lipoma, Angiolipoma, Lower lip, Mucocele

INTRODUCTION

Lipomas are most common soft tissue benign neoplasm arising from adipocytes. Clinically they are slow growing; soft, palpable and asymptomatic mass but histologically they may show various subtypes like angiolipoma, spindle cell lipoma, myelolipoma, chondrolipoma and myxolipoma etc.[1] Angiolipoma, a subtype of lipoma most commonly occurs in extremities and trunk especially in the forearm; however oral angiolipomas are very rare. Oral angiolipoma has two variant infiltrating, an unencapsulated form and noninfiltrating with thin capsule.[2] In two large retrospective study of lipoma 6-17 % cases were angiolipoma.[3,4] The differential diagnosis includes benign and malignant lesions including hemangioma, lipoma, Kaposi sarcoma and angiosarcoma. This report describes a case of oral angiolipoma of unusual location with its clinical & histopathological features in a 24 year old male patient.

CASE REPORT:

A 24 year old male patient presented with a diffuse tender swelling of the right lower lip mucosa near the corner of the mouth. Patient had noticed a small swelling two years earlier. Clinical examination of present swelling revealed a soft, mobile, approximately 2x2 cm mass that could be palpated. The overlying skin was normal and lesion was free from superficial and deep structures. (Figure 1) There were no abnormalities of color and thickness of the overlying labial mucosa. There were no neurologic defects, but mass was tender. No fluctuation and bruits were present.

Physical examination showed a good build and a good nutritional status, with no abnormalities in the trunk and extremities. Regional lymph nodes are normal on palpation. Lipoma was suspected from the ultrasonographic imaging. The mass was removed with an intraoral approach. Surgical excision was performed under local anesthesia. The excised mass was multilobulated, brownish -yellow and surrounded by thin capsule (Figure 2). The case was diagnosed as angiolipoma which was confirmed by histopathologic evaluation. Microscopically, the H& E stained section showed mature adipose cells intermixed with scattered vascular elements. The dilated vessels showed no atypia (Figure 3). The patient showed no evidence of recurrence during 10 months follow up period.

Fig 1 Submucosal swelling with normal overlying mucosa

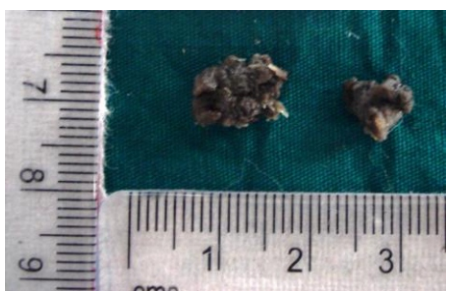

Fig 2 Multilobulated excised mass with capsule.

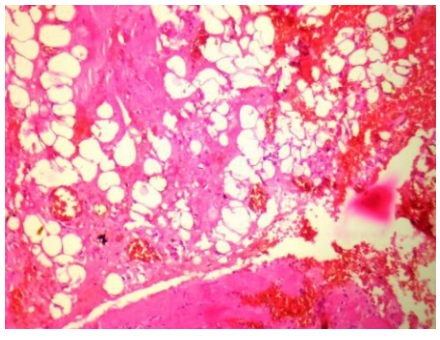

Fig 3 Mature adipose cells intermixed with scattered vascular elements

DISCUSSION:

Angiolipoma was first described by Bowen in 1912 as a subtype of lipoma. Subcutaneous, tender, firm and movable nodules are characteristic features for angiolipoma which is usually found on trunk and extremities.[5] Angiolipoma usually has two variants, infiltrating and non-infiltrating angiolipoma. Pain and neural deficit are classical features for infiltrating type of angiolipoma. Infiltrating angiolipomas are non capsulated benign tumors

extended into the surrounding tissue. Noninfiltrating angiolipomas are well encapsulated tumors without any recurrence potential.[6] Adolescent is most common age group affected. Males are predominantly involved than females. Microscopically noninfiltrating angiolipoma shows mature adipocytes intermixed with vascular elements without any malignant features.[3,4]

Davis et al. were credited with the first description of angiolipoma of the oral cavity.[7] Angiolipomas of oral cavity are very rare. Angiolipoma occurs within age limit of 1- 81 years with a mean incidence of 32 years. Therefore, angiolipoma occurs at an early age than usual lipoma which has age incidence of 51-60 years. Males show slightly higher predilection than females.[2,7]

The common sites of involvement were cheek, tongue, palate, mandible and the lip. Patients were commonly presented with a complaint of swelling and associated tenderness.[7-12] Family history and systemic involvement of angiolipoma is not clearly described in literature. Mean diameter of tumor was noted as 3 cm (range 0.5-8 cm), the other lipomas of oral cavity were in the range of 0.8-2.2cm in size.[2] The present case was found as a swelling on the lower lip with associated tenderness and size of 2.5x1.5 cm. The surface mucosa was normal in appearance.

The reported review showed most angiolipomas of oral cavity were noninfiltrating type. Infiltrating type has more tenderness than noninfiltrating type of angiolipoma. However, tenderness may be the characteristic of angiolipomas of oral cavity because other common lipomas are painless. [13]

Microscopically noninfiltrating angiolipoma is usually well encapsulated mass consist of mature adipocytes and interspersed vascular elements lined by elongated endothelial cells [14,15] Fibrous septa course through the tumor stroma. Signs of malignancy such as pleomorphism and mitotic figures are rare. Characteristically, vascular channels containing fibrin and calcified thrombi are found.[6,7,11] Present case is an example of noninfiltrating angiolipoma due to its encapsulation and clinical and histopathological features.

The pathogenesis for angiolipoma is unclear. The possible causes include trauma, fatty degeneration of hemangioma, and hyperplasia of adipose tissue with associated vascular proliferations.[8] The most suggestive theory is angiolipoma originated as congenital lipoma and further incidence of trauma/hormonal stimulus cause vascular proliferations. [3]

The differential diagnosis includes hemangioma, lymphangioma, lipoma, organized mucocele, Kaposi sarcoma and angiosarcoma.[9] Hemangioma is a pure vascular neoplasm without any adipose tissue and CT finding of phlebolith, fluctuation and pulsation rule out angiolipoma. Lipoma is common painless nodule with less or no vascular component. Kaposi sarcoma is exophytic mass usually found on palate and tongue. It shows marked vascular channels with malignant features. Organized mucocele is immovable and firm soft tissue lesion. Fine needle aspiration showed mucous cells rather than adipocytes.[10]

The treatment modality for noninfiltrating angiolipoma is surgical excision while recommended treatment for infiltrating angiolipoma is surgical excision including surrounding tissue.[11,14,15] There is no reported recurrence and malignant transformation for noninfiltrating angiolipoma. The recurrence rate for infiltrating angiolipoma is high and about 35%-50%. The overall follow up period is ranging from 3-36 months.4,11 Our case has a follow up period of 10 months without any sign of recurrence.

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Case Report

TREATMENT OF CLASS II MALOCCLUSION WITH A STANDARD TWIN BLOCK APPLIANCE

Dr Rachna Jangu, Dr. Seema Gupta, Dr. Eenal Bhambri, Dr. Kailash Gorchhia, Dr. Rachakonda Charan

ABSTRACT

Class II malocclusion with mandibular deficiency is characterized as the most common skeletal problem and it occurs in about one third of the population. A variety of functional appliances are available to correct Class II malocclusion. Twin block is the most common functional appliance used successfully in the correction of class II relationship1. A 13-year-old male patient reported to the department of orthodontics with a chief complaint of forward placement of upper front teeth. The case was diagnosed as Skeletal class II due to retrognathic mandible with normodivergent growth pattern and it was treated with twin block appliance.

INTRODUCTION

Class II malocclusion with mandibular deficiency is characterized as the most common skeletal problem in orthodontics[1,2]. Although many methods for its orthodontic correction has been described in the literature. However, when conducive growth is available, with respect to the timing of treatment and growth vector, growth modulation is the most favored modality of treatment[3]. The standard twin block appliance is preferred by many clinicians due to the ease of management of the appliance. Twin block was first introduced by Clark in 19883,[4,5] and it mainly consists of two separate upper and lower removable acrylic blocks with are trimmed at an angle of 700 . This makes the twin block appliance less bulky as compared to the other removable functional appliances. As it also leads to more patient acceptance to the appliance[6].

CASE REPORT

A 13-year-old prepubertal male reported to the department of orthodontics and dentofacial orthopaedics with a chief complaint of forwardly placed upper front teeth. On clinical examination, patient had convex profile, obtuse nasolabial angle, incompetent lips with 5mm interlabial gap, deep mentolabial sulcus, everted lower lip and positive VTO. The patient had Skeletal Class II pattern with normo towards hyperdivergent growth pattern. Intraoral examination revealed class II molar relation bilaterally, class II canine relation on right side and end-on on left side, class II incisor relation with 12mm overjet. The pretreatment intraoral and extraoral photographs are shown in (Fig 1)

Fig 1- Pretreatment Extraoral & Intraoral Photographs

The case was diagnosed as Skeletal class II due to retrognathic mandible with normodivergent growth pattern. The cephalometric analysis confirmed a skeletal Class II jaw relationship with a retrognathic mandible. The lateral and handwrist radiograph of the patient are shown in (Fig 2) Evaluation of patient's cervical and handwrist radiographs indicated considerable amount of growth remaining (CVMI 2, SMI III).

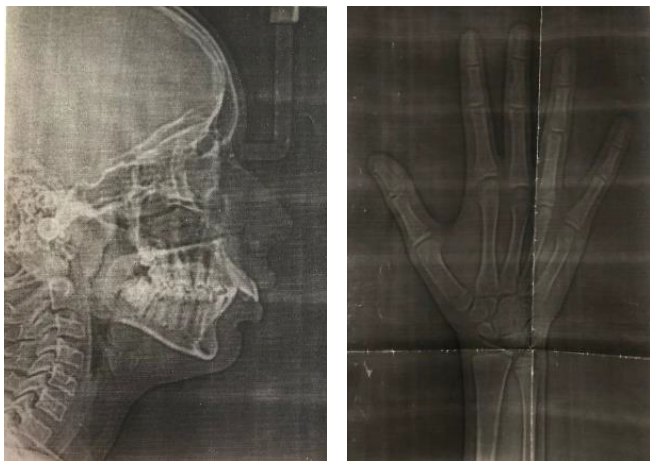

Fig 2-Pretreatment Lateral Cephlogram and Handwrist radiograph

Treatment Objectives

- Correction of Skeletal Class II jaw relationship
- Reduction of convexity of profile
- Achievement of class I molar and canine relationship
- Achievement of normal overjet and overbite
- Achieve optimal balance and facial esthetics

TREATMENT PLAN

Since patient was skeletal class II and was prepubertal, therefore to correct skeletal dysplasia, to enhance the growth of mandible, growth modification was planned with functional appliance. Twin block appliance was given for the advancement of mandible. The Twin block appliance was worn for a period of 10 months and was scheduled for full time wear. Bite registration with 4mm vertical and 6mm horizontal advancement was taken.

Treatment progress There was a remarkable correction in sagittal dysplasia along with achievement of class I molar relationship bilaterally with significant reduction in overjet and overbite. Post functional intraoral and extra oral photographs are shown in (Fig 3). Pre& Post functional cephalometric analysis are shown in Table 1.

Fig 3- Postfunctional extraoral and intraoral photographs

Parameters	Pretreatment	Postfunctional
SNA	83^0	83^0
SNB	75^0	80^0
ANB	8^0	3^0
Wits	5mm	3mm
Go-Gn-SN	33^0	35^0
Upper incisor-NA (mm)	8mm	7mm
Upper incisor-NA (degree)	31^0	27^0
Lower incisor – NB (mm)	8mm	8mm
Lower incisor-NB (degree)	32^0	33^0
Angle of inclination	100^0	98^0
Basal plane angle	35^0	30^0
S line to Upper lip	5mm	1.5mm
S line to lower lip	4mm	2mm

Table 1 Ceph analysis

DISCUSSION

Early treatment of class II malocclusion aims to correct the sagittal relationship, modify the pattern of facial growth, and improve both hard- and soft-tissue profile[6]. Twin Block appliance is designed to encourage adaptive skeletal growth by maintaining the mandible in a corrected forward position for a sufficient period of time[7]. Many

studies have investigated the effect twin block appliance on the dental and skeletal variables for the correction of skeletal class II malocclusion[8].

In this case, when pretreatment and postfunctional cephalometric parameters are compared, skeletal and dentoalveolar changes are appreciated well with decrease of ANB, SNB, angle of convexity, reduction in proclination of upper anteriors. The twin block appliance resulted in sagittal correction of the mandible.

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Case Report

FIBRO EPITHELIAL HYPERPLASIA IN A 12 YEAR OLD CHILD

Dr. Kumari Jyotsana, Dr. Suruchi Juneja , Dr. Harleen Narula, Dr. Shital Dalvi

ABSTRACT:

Gingival enlargement is one of the frequent features of gingival diseases. This condition finds a unique place in literature, because it has been associated with a variety of local and systemic factors. In some cases where gingival enlargement could be the primary sign of potentially lethal systemic diseases, a correct diagnosis of these enlargements could prove life saving for the patient or at least initiate early treatment and improve the quality of life. A 12 year male patient reported with a chief complaint of swelling in the gums. Gingival enlargement removal was done employing surgical technique. Gingivectomy was carried out in anterior segment of both maxillary quadrants. The importance of patient motivation and compliance during and after therapy is the success of treatment.

Keywords: Gingival hyperplasia, gingival overgrowth, gingivectomy.

INTRODUCTION

Gingival fibromatosis, gingivomatosis, fibro epithelial hyperplasis, familial elephantiasis, idiopathic fibromatosis, hereditary gingival hyperplasia, gigantism of gingiva, and hypertrophic gingiva are slowly progressive fibrous enlargements of the maxillary and mandibular gingiva.[1]

These lesions may manifest as either generalized or localized. Fibro-epithelial hyperplasia, a histological variant of fibroma is a proliferative fibrous lesion of the gingival tissue that hinders function and aesthetics.[2] Gingival hyperplasia produces conditions favorable for the accumulation of plaque and materia alba by accentuating the depth of gingival sulcus and by interfering with effective hygiene measures. The secondary inflammatory changes further increase the size of the pre-existing gingival hyperplasia.[3] This case report describes surgical management of inflammatory bilateral fibro-epithelial hyperplasia in a 12 year old child.

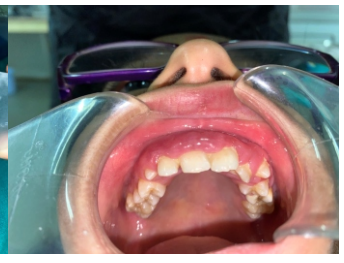
CASE REPORT

A 12-years-old male patient reported to the Department of Paediatric and Preventive Dentistry, Surendera Dental College and Research Institute, Sri ganganagar, Rajasthan with a chief complaint of swelling in the gums in the upper jaw region. The swelling was painless and was present since 1 year. He also gave a history of treatment for the same 5 years back. It was associated with unesthetic appearance and food lodgement. There was no systemic, family and drug history reported. On extraoral examination, no gross facial asymmetry was noted. The lymph nodes were non- palpable and non-tender. (Fig 1)

Fig 1-Front Facial Profile

On intraoral examination, diffuse enlargement of gingiva extending from central incisor to first premolars on both side of maxillary arch was seen gingival enlargement was seen involving attached, interdental and marginal gingival. The teeth were partially visible as the gingival tissue was significantly overlapping them. The color of the gingiva appeared to be reddish pink. Bleeding on probing was noted. On Palpation it was non-tender and soft in consistency. (Fig 2a) Dental caries wrt 15, 46 and 75was noted. (Fig 2b)

Fig 2a-Maxillary arch view showing gingival overgrowth esp on the anterior region



2b- Dental caries wrt 46 and 75

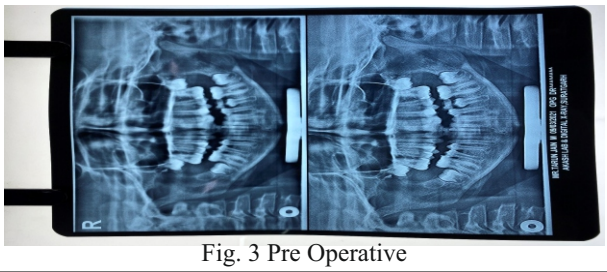


Fig. 3 Pre Operative

The patient was subjected to panoramic radiograph with no radiographic evidence of any pathology (Fig.3). However, dental caries wrt 15, 46 and 75 was noted. Based on the history, clinical examination and radiographic findings a provisional diagnosis of gingival hyperplasia was made.

Fig. 4 Pseudo Pockets

A thorough debridement was performed in the affected area to reduce the inflammatory component as much as possible. After a week patient was recalled for the surgical approach. Prior to surgery complete blood investigations were carried out, the results of which were within normal limits. Bilateral infraorbital nerve block was given to achieve profound anaesthesia. Depth of the pseudo pockets were marked with pocket marker. (Fig 4)

Fig 5a Gingivectomy procedure done with electrocautery

Fig 5b Post-operative front occlusal view.

External bevel gingivectomy procedure was planned using electrocautery and simultaneously betadine irrigation was done to reduce the heat generated by electrocautery (Fig 5a). The gingival tissue was excised maintaining the contour of gingiva (Fig 5b). Post-operatively coe pack was placed for proper wound healing.

Fig 6a-Post-operative front occlusal view.

Fig 6b-showing coe pack placement

The excised tissue was sent for histopathological examination which was suggestive of inflammatory fibro epithelial hyperplasia. Patient was recalled after 7 days for removal of coe pack and healing was uneventful. The patient was advised to maintain oral hygiene and was advised to come for regular checkup. The patient was reviewed after four months.

DISCUSSION:

Gingivitis is a common occurrence in children due to the lack of importance and time given by children for maintaining the oral hygiene. Gingival hyperplasia, with its potential cosmetic implication and tendency to provide niche for further growth of microorganism, possess a serious concern to patients and clinicians The gingival enlargement can be solely present or can be associated with some clinical manifestation. Usually local conditions such as poor oral hygiene, food impaction, or mouth breathing are the contributory factors for the condition. Inflammatory gingival hyperplasia results when gingival enlargement is accompanied by edema, vascular engorgement, and inflammatory cell infiltration. When the enlarged gingival tissue consists of dense fibrous tissue as a result of chronic inflammation, it is referred to as fibrotic gingival hyperplasia.[4] In our case report chronic inflammatory gingival enlargement was present in relation to maxillary arch causing esthetical and masticatory problem to the patient. Clinically, the involved gingiva appeared to be soft. There are some reports that apart from local irritation, certain drugs can induce fibro-hyperplastic gingival over-growth but patient did not give any history of drug intake.[5] Furthermore, the term fibro-epithelial hyperplasia needs

to be differentiated from focal epithelial hyperplasia which is caused by human papilloma virus. In focal epithelial hyperplasia, all changes occur in the epithelial layer of the mucosa with virtually no alteration in the underlying connective tissue.[6] Gingivectomy and gingivoplasty helps in removal of excessive gingival overgrowth giving harmonious gingival contour and also facilitates in maintaining good oral hygiene.[7] Management of gingival hyperplasia depends on the cause of the condition.[8] For the present case, electrocautery was used for gingivectomy in maxillary arch under local anaesthesia. Healing was uneventful and patient was satisfied. Patient was told about recurrence and was instructed to follow routine oral hygiene measures strictly to prevent recurrence.

CONCLUSION

A Pedodontist must have knowledge regarding the clinical presentation of most common oral lesions in children, which helps in early diagnosis and early management with minimal surgical intervention. The gingival enlargement in children should be investigated further to rule out systemic diseases. The parent and paediatrician should be aware of gingival enlargement as they play a vital role in the detection of this condition.

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Case Report

ENDODONTIC MANAGEMENT OF MANDIBULAR PREMOLAR WITH TWO ROOTS

Dr. Gautam Kumar Tiwari, Dr. Neetu Jindal, Dr. Renu Aggarwal , Dr. Monika Choudhary

ABSTRACT

Mandibular premolars usually have single root with single root canal system. However anatomic variations of mandibular premolar have been reported. The clinician should be aware of the configuration of the pulp system for the successful endodontic treatment. The incidence of two roots in these teeth is quite rare. This report presents the clinical management of mandibular premolar having two roots bifurcated at the mid-root level.

Keywords: Mandibular premolar, root canal configuration, anatomic variation

INTRODUCTION

Knowledge of basic root and root canal morphology as well as possible variation in anatomy of the root canal system is important in achieving successful nonsurgical root canal treatment (NSRCT). This is followed by negotiation, cleaning and shaping, and obturation of the entire canal system in 3 dimensions.[1]

Mandibular premolars may show wide variations in root canal anatomy and morphology (ElDeeb 1982). Studies reported by Green (1973), Hess (1925), Kerekes & Tronstad (1977), Mueller (1933), Pineda Kuttler (1972), and Vertucci (1978), dealing with the number and form of roots and root canals of mandibular premolars have revealed that in most instances they have only one root canal, although teeth with two or more root canals do exist. Vertucci in his series of studies conducted on extracted teeth, reported 2.5% incidence of a second canal1. Zilich and Dawson reported 11.7% occurrence of two canals and 0.4% of three canals.[2,3] According to Ingle, mandibular second premolars have only 12% chance of a second canal, 0.4% of a third canal and Harty has reported 11% possibility of second canal. In most instances they have had one canal, but teeth with two or more canals have also been reported. Consequently, awareness of the possible existence of these anatomical variations would be important during endodontic treatment of mandibular premolars.[4]

The literature has been shown mandibular second premolars to have wide variation in their

root canal anatomy. This case report described the endodontic management of mandibular second premolar having two roots and two canals.

CASE REPORT

A 22 year old female patient reported to the Department of Conservative Dentistry and Endodontics, Surendera Dental College and Research Institute, Sriganganagar, Rajasthan with the chief complaint of pain in right lower back tooth region since more than 15 days. History revealed that the patient had experienced sensitivity to cold and reported pain for the past 15 days. Pain was spontaneous in nature and aggravated on chewing. Extra-oral examination revealed no gross facial asymmetry, no bilateral lymphadenopathy. Intra-oral examination revealed deep class II cavity irt 45 and tender on percussion. Vitatily - Cold test showed that the patient experience mild discomfort and hot test showed immediate and lingering response. The tooth was subjected to routine clinical tests and a provisional diagnosis of acute apical periodontitis. The periapical radiograph revealed caries approaching the pulpal space and root bifurcation in the middle third with distinct outline of the buccal and lingual root without any periapical pathology (Fig.1). The final diagnosis was Acute irreversible pulpitis with apical periodontitis irt 45. So, the treatment advised was RCT followed by crown wrt tooth no 45.

Fig.1: Pre-Operative IOPA i.r.t 45 showing caries approching pulpal space

Access was gained with Endo Access bur to the pulp chamber by using loupe (Zumax 2.5x magnification) after administration of local anesthesia (2% lignox A), under rubber dam isolation. To gain sufficient access to the canals, the conventional access opening was modifed into one that was wider bucco-lingually as the roots were bucco-lingually oriented. Orifice location was not easy as the coronal pulp chamber was unusually long and the separation of the roots was from the middle third of the root. After

careful inspection, two canal orifices were located and patency was ascertained using a small size K-file. To distinguish between the two roots and canals, K-file was inserted into each of the canals, before radiographic exposure. Then the working length was established apex locator (E-pex) which was confirmed with digital radiograph (Digora Optime) (Fig. 2).

Fig.2: Working Length Determined

Gates-Glidden drills 4,3,2 with a brushing motion, in a crown down fashion were used to enlarge the orifices to achieve a straight line access to the apex. After working length determination, biomechanical preparation was carried out up to 25/0.04% rotary file system (Neoendo flex file). Copious irrigation of the root canal was intermittently done with 5.25% sodium hypochlorite and normal saline. Then the canal was dried with absorbent point and calcium hydroxide intracanal medicament was given. Patient was recalled after 3 days and calcium hydroxide medicament was removed using copious irrigation and mechanical instrumentation. Then, the canal was dried with absorbent paper point and master cone was selected. (Fig. 3)

Fig.3: Master Cone Selected

Then the tooth was obturated with gutta percha points and AH plus sealer (Dentsply) using the lateral compaction technique followed by post endodontic restoration with GIC (Fig.4)

Fig.4: Obturation and Post endodontic restoration

DISCUSSION

The presence of extra roots or canals in mandibular premolars is undoubtedly an endodontic challenge. A collection of previous studies have been tabulated for better understanding [Table 1].[5]

Authors	1 Canal 1 foramina	1 Canal 2 foramen	2 Canals 1 foramina	2 Canals 2 foramina	3 Canals
Pineda and Kutler et al.	98.8	1.2	-	-	-
Green et al.	92	-	4.0	4.0	-
Zilich and Dawson et al.	87.9	-	0.9	10.8	0.4
Vertucci et al.	97.5	2.5	-	-	-
Goswami et al.	88	-	8	4	-

Table 1: Incidence of variations in mandibular second premolar root canal morphology.

Recognition of the aberrant anatomy requires thorough knowledge of the root canal morphology critical interpretation of the diagnostic aids, appropriate assessment of the pulp chamber floor and operative skills of the clinician. The case report presented here refers to the management of endodontic challenge of mandibular first premolars having two roots which are bifurcated at the mid-root level.[3]

For the management of branched canal configuration wherein the clinician encounters difficulty in locating and preparing the canal, the use of magnification was necessary. One of the common reasons for having difficulty in identifying the second canal was inadequate access which leaves a shelf of dentine over the second canal.[4] The second canal generally leaves the main canal at a sharp angle nearly at a right angle. Slowey recommends the visualization of such canal configuration as a lowercase letter 'h' where the main canal would be the straight line portion of the 'h' and the second canal exists about mid-root at a sharp angle from the straight canal.[6] Also an important step needed in such canal was a modification in access which required an adequate flaring of the canal coronal to the bifurcation for unobstructed passage of instruments into the second canal. Careful manual exploration of the bifurcated canal should be done with a pre curved 10K-file which will provide a tactile sensation as the instrument moves in an eccentric direction on deeper penetration into the canal and also prevents the instrument separation. The obturation of the branched canal configurations are challenging task. These can be

obturated by two step technique either by using the thermoplasticized gutta-percha techniques or by the use of single cone obturation till the level of bifurcation.[7-9]

CONCLUSION

The clinician should be astute enough to identify the presence of unusual numbers of roots and their morphology. A thorough knowledge of root canal anatomy and its variations, careful interpretation of the radiograph, close clinical inspection of the floor of the chamber and proper modification of access opening are essential for a successful treatment outcome.

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Case Report

AN AGGRESSIVE AMELOBLASTOMA OF MANDIBLE

Dr. Manish Sharma

ABSTRACT

Ameloblastoma is a benign locally invasive epithelial odontogenic tumour comprising 1% of all tumours and cysts arising in the jaws. It is commonly found in the third and fourth decade in the molar ramus region of the mandible. Among all types of ameloblastoma, multicystic ameloblastoma is believed to be locally aggressive lesion that has the tendency for recurrence. This case report described 21 year old female patient diagnosed with extensive ameloblastic lesion involving right mandibular body, ramus and condyle with CT scan.

INTRODUCTION

According to the World Health Organization, ameloblastoma is a locally invasive benign epithelial odontogenic tumour without ectomesenchyme that has a high recurrence rate. It accounts for 11 to 18% of all odontogenic tumours, with the majority of cases affecting the posterior mandible.[1,2] Cusack was the first to describe this neoplasm in 1827. "Cystosarcoma," "adamantine epithelioma," "adamantinoma," and eventually "ameloblastoma," have all been used to describe this tumour over time.[3,4] They are thought to develop from embryonic remnants of an odontogenic cyst's epithelial lining, dental lamina or enamel organ, stratified squamous epithelium of the oral cavity, or dislocated epithelial remnants.[5]

Ameloblastomas are classified into four subtypes by the World Health Organization (WHO) in 2005. Solid/multicystic ameloblastomas are the most frequent, accounting for 91 percent of all ameloblastomas. The unicystic type accounts for 6%, extraosseous or peripheral ameloblastoma accounts for 2%, and desmoplastic type accounts for 1%. The most benign type is unicystic, which is further divided into intraluminal and intramural subtypes.[6]

Ameloblastoma in a clinical sitting considered as a rare, locally aggressive tumour that can enlarge to enormous proportions and cause significant facial deformity and functional impairment if left untreated.[7]

Radiographic findings in odontogenic tumors are not pathognomic and must therefore be confirmed with histological examination. Ameloblastomas are classically an expansile lesion on radiographs, with thinned cortex in the buccal and lingual planes. Multilocular cystic lesions with a soap bubble or honey comb pattern are common. Unilocular ameloblastomas, which resemble dentigerous cysts or odontogenic keratocysts on conventional radiographs, are detected. Odontogenic keratocyst, odontogenic myxoma, central giant cell granuloma has to be ruled out with the help of advanced radiodiagnostic tools.[8] Computed tomography (CT) may be useful in the assessment of the extent of the tumour, cortical destruction and extension into the neighboring soft tissues.[6]

Follicular, plexiform, acanthomatous, spindle, basal cell-like, desmoplastic, and granular cell are amongst the microscopic patterns of ameloblastoma. Patterns might be mixed or uniform. These patterns do not appear to have any clinical significance ibid.[4,6]

Ameloblastomas are usually treated with surgery. "Conservative" or "radical" surgery is the two surgical alternatives. The use of simple enucleation for unicystic ameloblastomas, the intraluminal subtype, has shown recurrence rates of 60–90%. The current standard of therapy for ameloblastoma is a "radical" surgical procedure that comprises en bloc resection with 1–2 cm bone margins and rapid bone repair to aid speech and swallowing.[9] Preoperative MRI describes the extent of soft tissue involvement, with surgical margins limited by potential morbidity due to vicinity or involvement of critical structures such as the orbit, skull base, cranial nerves, and/or carotid artery.6 Prognosis is determined by the patient's age, tumour size, extent of disease, tumour site, and histological type. In terms of disease extent and recurrence, maxillary ameloblastoma is more aggressive. They are rarely thought to have spread metastatically. The term "metastatic ameloblastoma" refers to lesions that have spread beyond their original location despite having a benign appearance. Ameloblastic carcinoma, on the other hand, refers to lesions that have both ameloblastoma and carcinoma histological traits.[10,11,12] This case report presented a destructive swelling of mandible in a 21 year old female patient.

CASE STUDY

A 21 years old female patient with normal vital statistics reported to the Department of Oral Pathology at Surendera Dental College & Research Institute, Sriganganagar with a massive diffuse swelling on the right side of the face. The patient gave a history of progressive, diffuse, non-tender, bony hard swelling for 7 months (Figure 1). Extraoral extension of the lesion was from the lower border of the mandible to the middle 3rd of the face with overlying skin normal in appearance. There was no sign of pus discharge or rise in the temperature of the skin. Intraorally, lesion caused thickening of the lower alveolus associated with loosening and displacement of mandibular premolar and molars. The patient had difficulty during chewing food. The right buccal vestibule was obliterated with proliferative lesion extended from canine to the third molar. There was no cervical lymphadenopathy. CT scan (Figure 2) of facial bones showed a lytic expansile lesion involving the right side of the mandibular body, ramus, and condylar area. Cortical plates were expanded with the widening of trabeculae. An incisional biopsy was taken from the lesion and sent for further investigation. Microscopic examination of the lesion showed ameloblastic odontogenic epithelial islands or follicles in mature connective tissue stroma (Figure 3). Some follicles showed central keratin formation suggestive of acanthomatous changes in stellate reticulum like cells. Stroma of the lesion showed a discrete distribution of vessels and inflammatory cells. A diagnosis of follicular ameloblastoma with acanthomatous changes was given. Wide local excision with preservative margins was suggested as the treatment of choice.

Fig 1- Patient having massive swelling on right side of face. Diffuse, bony hard and non tender swelling in lower jaw.

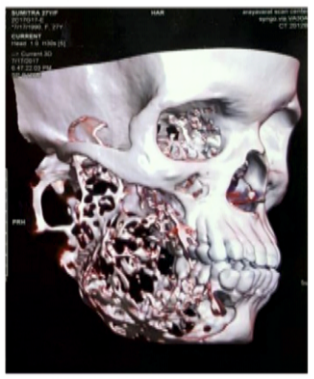

Fig 2- CT scan of right mandibular jaw show destructive pattern of bone in body, ramus and condylar area.

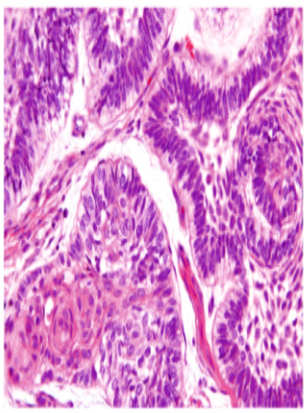

Fig 3- Micoscopic study shows a follicilar pattern of odontogenic epithelium in a mature conntective tissue stroma. Islands of epithelum shows a classic pattern of follicular ameloblastoma.

DISCUSSION:

Ameloblastoma is a benign epithelial odontogenic tumour often aggressive and destructive with the capacity to erode bone and invade adjacent structures [13], as the present case denoted a massive destructive pathology which extended to the nearby structures of facial origin. It occurs with the equal frequency in both sexes and has its peak incidence in the third and fourth decade of life, but present case study showed an extensive growth of lesion in 21 years old female which is progressive and causing destruction of mandibular bone. There was no sign of draining sinus which rules out any inflammatory abscess. On palpation, lesion was bony hard with crackling sound suggestive of intraosseous pathology. Associated symptoms like painless & non tender swelling and absence of cervical lymphadenopathy were suggestive of odontogenic tumor. S K Subudhi in 2013 also described the invariable features of ameloblastoma, which often persists as a slow growing, painless swelling, causing expansion of the cortical bones, perforation of the lingual or the buccal plates and infiltration of soft tissues.[7]. According to Gardener 1996,

amelobalstoma represents 11 to 18 % of all odontogenic tumors primarily affecting the posterior mandible similar to present case where lesion was located in posterior mandible.[2,14] They may originate from odontogenic epithelium and/or ectomesenchyme with varying degrees of inductive tissue interaction.[15,16] Ameloblastomas are classified into unicystic, multicystic, peripheral, and malignant subtypes, whereas conventional ones are solid or multicystic (86 % of cases), unicystic (13 % of cases), and peripheral or extra-osseous (about 1 % of cases) . Such distinction is important, as it aids treatment selection.[17] Present case falls into the category of solid multicystic ameloblastoma based upon the features guided by WHO. Conventional ameloblastoma tends to infiltrate the bone trabeculae of cancellous bone in the periphery of the lesion, prior to bone resorption being visible radiographically. Therefore, the true tumor margin often extends beyond the apparent clinical or radiographic margin.[18] In the present case, CT scan played a pivotal role in defining the resection margins for treatment purpose.16

Microscopically, the case depicted a classical pattern of conventional follicular ameloblastoma with few acanthomatous changes. Stroma of lesion is mature and without ectomesenchyme.[6,16] There were no inductive changes and signs of malignancy. Destructive nature of lesion depends on the reactivity of cellular component of ameloblastoma. Without any sign of malignancy it shows a locally invasive pattern, a prominent feature of solid multicystic type of ameloblastoma.

Surgeons use preoperative imaging to match the tumor's boundaries to palpable surgical landmark. The mandibular body and ramus area have been extensively destroyed in the present report.[6,9] CT scan results can be used to calculate a definitive margin for radical bone resection. Extensive loss of bone structure may necessitate en bloc resection and titanium plate replacement during reconstructive surgery. As a margin, the healthy mucosa above the cortical perforation is frequently excised. In a large series reported from South Korea, the follicular, granular cell and acanthomatous types had a relatively high likelihood of recurrence, while the desmoplastic, plexiform and unicystic types showed a relatively low potential for recurrences.[12]

CONCLUSION

Although ameloblastoma is a benign odontogenic tumor of epithelial origin, the destructive nature of lesion is of concern to the clinician. This case represented a detrimental form of solid multicystic type of ameloblastoma. CT scan was helpful in determining the extent of lesion. Treatment of choice can be dependent on the histological type of ameloblastoma, as this case of acanthomatous ameloblastoma required a radical resection with margin of 1.5-2 cm and reconstructive surgery.

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A Review

ADVANCED PLATELET RICH FIBRIN (A-PRF): A REVIEW

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ABSTRACT:

The natural healing process starts as blood coagulation leading to fibrin/platelet clot and matrix in any wound. Platelets, leukocytes, fibrin, growth factors and other cells are the primary active players in the physiological wound healing process. To reinforce this natural wound healing process, platelet concentrates were introduced. With the knowledge of the biological features of concentrates, the initial protocol evolved from the platelet concentrates of first generation that include platelet rich plasma (PRP), and platelet rich in growth factors (PGRF) to the second-generation concentrates including leukocyte -platelet rich fibrin(L-PRF) and advanced platelet rich fibrin (APRF). Of these platelet concentrates, A-PRF has evolved to a more refined concept for wound healing and tissue regeneration which is enhanced by the concentrated cells and growth factors contained in platelet concentrates. Studies have revealed APRF alone or in combination with other biomaterials seems to have several advantages and indications both for periodontics and implant dentistry. Thus, the following review summarizes the relevant literature of using A-PRF, focusing on its preparation, advantages and disadvantages of using it in clinical applications.

INTRODUCTION:

Wound healing is a complex process, which involves cellular organization, chemical signals, and the extracellular matrix for tissue repair.[1] The development of bioactive surgical additives, which are being used to regulate the inflammation and increase the speed of healing process, is one of the great challenges in clinical research. The understanding of healing process is still incomplete, but it is well known that platelets play an important role in both hemostasis and wound healing processes. Platelets' regenerative potential was introduced in the 70's,[2] when it was observed that they contain growth factors that are responsible for increase collagen production, cell mitosis, blood vessels growth, recruitment of other cells that migrate to the site of injury, and cell differentiation induction, among others.

Recently ample evidence has established the role of monocytes on the vessel's growth and bone regeneration. Monocytes play an important role in vascularization, bone growth and production of Vascular Endothelial Growth Factor (VEGF). Monocytes are known to have bone morphogenic protein (BMP) receptors and recently it was discovered that they also produce BMP-2. In an attempt to incorporate the monocytes within the PRF, Choukroun introduced an advanced PRF called A-PRF. They have discovered earlier soft tissue growth, more release of BMPs, greater and faster vascularization and more cytokine release than conventional PRF.[3]

The present review clarifies all the concepts of Advanced platelet rich fibrin(A-PRF) including preparation, recent advances and its various clinical applications.

PREPARATION

In this Choukroun second-generation platelet concentrate A-PRF, the fibrin mesh is obtained using lower G forces (1500 rpm/14 minutes) that clinically translate in an increased concentration of growth factors and neoangiogenic potential. They also use glass tubes for centrifugation, and according to Dohan Ehrenfest et al, the changes in the speed and time in the centrifugation protocol result in a shorter membrane, lighter, and narrower with the increased capacity of cell imprison. Changing the centrifugation protocol to Choukroun's PRF translated in the change of the leukocyte pattern in the fibrin-rich clot, the number of neutrophils increased.[4,5] (Fig 1,2)

Fig 1

Fig 2

ADVANTAGES

Change in the centrifugation protocol in terms of centrifugation time and speed of A-PRF helps in distribution of neutrophilic granulocytes results in better functionality of the transplanted (but also resident) monocytes/macrophages and lymphocytes and their deployment to support tissue regeneration. It is also advantageous as it is obtained by autologous blood sample, easy preparation with minimum blood manipulation. Also, it does not require the addition of external thrombin because polymerization is a completely natural process, without any risk of suffering from an immunological reaction. It has a natural fibrin framework with growth factors within that may keep their activity for a relatively longer period and stimulate tissue regeneration effectively.[6,7]

DISADVANTAGES

The success of the PRF protocol depends directly on the handling, mainly, related to blood collection time and its transference for the centrifuge. There may be possible refusal of treatment by the puncture required for blood collection.[6]

CLINICAL APPLICATIONS

The main clinical applications of A-PRF include tissue regeneration in oral and maxillofacial surgery (alone or with bone grafts). In regenerative medicine and dentistry, several clinical studies showed better outcomes with A-PRF than open-flap debridement, in intrabony periodontal defects. Furthermore, its use together with bone substitutes such as nanohydroxyapatite had a therapeutic effect compared with the substitutes alone.[8]

It can also act in the treatment of ulcers/skin necrosis, plastic surgery, and even musculoskeletal lesions. In A-PRF, the release of TGF-β-1, PDGF, and VEGF and the presence of monocytes/macrophages facilitate wound healing and tissue regeneration. All the biological factors of platelet concentrates are associated with a high success in periodontal reconstructive surgery, sinus lift, and implants. Furthermore, A-PRF can be used with freeze-dried bone allograft improving bone osteogenesis and alveolar stability in the use of implants. Current clinical trials are evaluating the use of A-PRF in periodontal angular defects. There are studies focusing the treatment of intrabony defects with PRF, but minimal evidence is present of the benefit of A-PRF in the similar patients.[9,10]

CONCLUSION

A-PRF appears to be an ideal provider of autologous cells (especially neutrophils and macrophages), thus enabling mutual stimulation, thereby creating a synergistic relationship in the interest of tissue regeneration. Studies in the recent past have shown that APRF alone or in combination with bioactive materials have shown promising results in tissue regeneration in the field of periodontology, implantology and maxillofacial surgery.

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Review

CLEAR ALIGNER THERAPY

Dr. Rachakonda Charan, Dr. Seema Gupta, Dr. Eenal Bhambri, Dr. Kailash Gorchhia, Dr. Rachna Jangu

ABSTRACT

Orthodontic treatment involving clear polyurethane aligners has started dominating the market. Although it has existed for almost two decades now, it is not indicated for all type of patients. Controversies exists in the aligner's treatment indications. Some indicate that they should be used in orthodontic cases without skeletal disharmonies with mild crowding, whereas others have suggested that Invisalign may be suitable for even moderately complex orthodontic cases. In this review, a basic idea of the aligners and recent advances are discussed.

Key words: aligners, esthetics, effectiveness

INTRODUCTION

With the increase in adult patients seeking orthodontic treatment, the demand for more esthetically pleasing treatment modalities have also increased. Conventional orthodontic methods have been associated with a general compromise in facial appearance. Hence, esthetic materials and techniques are being introduced to improve the quality of life, oral hygiene and periodontal support. This article reviews if that is really the case.

HISTORY

In 1945, Dr. kesling reported moving teeth with flexible tooth positioners[1]. Following it, in 1964, Nahoum introduced vaccum formed dental contour appliance[2]. McNamara in 1985, talked about invisible retainers[3]. The company and the technique were the brain child of two graduate business students at Stanford University in 1997, Kelsey Wirth and Zia Chishti. They were fortunate in attracting the interest of Robert Boyd, chairman of the Department of Orthodontics, University of the Pacific. He assisted by consulting, and in doing so he and his residents provided a means to test this fledgling technology. Align technologies received FDA clearance to market Invisalign in August 1998, and began commercial operations in July 1999. Clearpath was incorporated in US in 2008 after 8 years of research and development introduced USFDA APPROVED aligners through its unique proprietary process which provides a hygienic, convenient and a clear solution for the correction of malocclusion. ClearCorrrect which was founded in 2006, received FDA approval in 2009 and introduced into Australia via osseodent in 2015. K-line was also introduced in 2008. Inman aligners, which is a unique modification of traditional spring retainer. It uses super elastic open coil springs to create light and constant forces on both the labial and lingual surfaces of anterior teeth. NIVOL with close collaboration of University of Pisa in Italy introduced Airnivol aligners. It commits in organizing certification courses since 2010. NovoAlign was conceptualised in US in 2016, after two years of R and D by a team of orthodontist, engineers, dental technicians and IT professionals. These aligners are made up of USFDA approved medical grade flexible plastic material and are designed to fit each individual's mouth. 3M oral care by St paul and Minn announced entrance of 3M Clarity aligners in clear aligner sector. Dr.Neil warshawski, applied the analysis and treatment planning tools in 3M oral care portal to treat relapse of anterior teeth using these aligners.

THE PRODUCTION PROCESS- An overview

Diagnostic records with computer aided tomography (CAT) or a polyvinyl siloxane impression and photographs are taken. Along with the doctor's instruction, it is submitted to the company. The Intra oral scan / impression create an accurate 3D digital model of ach dental arc. The teeth are then digitally sectioned, the dental arches are related to each other and the movements are staged. The preliminary plan is sent to the doctor for his approval and then the digital model is transferred to a cast and clear plastic aligner is formed over each cast. And finally, the set of aligners is sent to the doctor.

Selection criteria:

1. Fully erupted permanent teeth
2. Growth has minimal or no effect on treatment (i.e., late adolescents and adults). Mild spacing (1-3 mm), moderate spacing (4-6 mm),
3. Mild crowding (1-3 mm), moderate crowding (4-6 mm)
4. Narrow arches that are dental in origin (4-6 mm)
5. Treated cases with relapse Orthodontic movements which can be produced effectively.
6. Tooth movement following Interproximal reduction,

7. Flaring,

8. Distalization,

9. Space closure following the extraction of a lower incisor

However, based on the current literature available this critical appraisal suggests that Invisalign can be used only under specific conditions and is less effective compared to traditional orthodontic treatment.[5-7]

Factors to be considered

1. Patient cooperation is a critical factor in achieving success with treatment. The aligners should be worn at least 20 hours per day, seven days a week.

2. Successful clear aligner treatment requires considerable clinical experience with other orthodontic methods, proper implementation of diagnosis and treatment planning, and a thorough knowledge of biomechanics.

3. In any case, if the teeth tip more than 5° from the vertical axis during space closure, fixed appliances will probably be needed to upright them.

4. If tipping exceeds 10°, the clinician should either incorporate a fixed appliance segment to upright the tipped teeth or convert to full fixed appliances to finish treatment.

5. Recently, Nelson, described several advantages of the aligner software that were summarized from a meeting. "The set-up can be used for diagnosis and treatment planning - evaluate the need for IPR, expansion, extraction, distalization, or proclination" as well as:

a. Verifying that the technician has performed modifications,

b. A consultation device to show treatment limits to patient,

c. Verifying that the aligner is tracking,

d. Evaluating anchorage with the superimposition or surgical simulation tools and staging, and

e. Addressing the patient's chief concern (of anterior tooth alignment) at the beginning of the series, and applying simultaneous movements to reduce the overall number of aligners."

Advantages:

1. Unlike traditional braces, the trays can be removed for brushing, flossing, and eating.

2. The trays are clear, esthetic, comfortable - no metal brackets or wires to cause mouth irritation.

3. Better oral hygiene than fixed. Teeth can be bleached with the appliance at the beginning and during treatment.

4. Shorter appointments.

5. Decreased doctor & auxiliary time.

6. Retention facilitated.

7. Decreased occlusal abrasion from parafunctional habits during treatment.

8. Disarticulation of the teeth may be advantageous for patients with TMJ problems. Technically much easier than lingual appliances.

10. Ability to present case to patient with final result prior to treatment.

Limitations:

1. Primary among them is compliance. Because the aligners are removable, the orthodontist must rely on the patient's motivation and dependability to achieve the desired results.

2. All permanent teeth should be fully erupted for treatment using this appliance.

3. There is currently no capability to incorporate basal orthopedic change with this appliance system.

4. Lack of operator control.

5. Inability to integrate hard and soft tissues of the head into the computer treatment. Thus, the clinician has no direct indication of where teeth are in relation to basal bone or in relation to the lips or other soft tissues of the head.

ROOT RESORPTION

There is low quality evidence suggesting that,[8] Clear aligner therapy might not prevent ERR during orthodontic treatment, but both incidence and severity of ERR could be lower compared with results reported by studies in fixed appliance. Intermittent force system and less jiggling movement, which require well.designed treatment plan by orthodontists and good cooperation by patients, might help to achieve it. This result was in correspondence with another study[9] by Al-Zainal MH

Another study[10], concluded:

·a) Neither PEA nor CAT technique leads to clinically significant

root resorption (up to 1 mm) of the permanent maxillary incisors.

·b) The amount of EARR of permanent maxillary incisors is non-significant on comparing two treatment modalities (PEA and CAT), except for 12 where the PEA group has significantly more EARR as compared to CAT.

·c) CBCT shows a decreased magnitude of EARR than 2D radiographs, and that is why 2D radiographs may overestimate the amount of EARR with orthodontic treatment. High quality RCTs and considerations of more confounding factors are needed to conclude a more persuasive result.

PAIN LEVELS WITH ALIGNERS[11]

Orthodontic patients treated with Invisalign appear to report lower levels of pain than those treated with fixed appliances during the first few days of treatment. However, the type of malocclusions was not comprehensively described which may lead to controversial results. Thereafter (up to 3 months), differences were not noted. Malocclusion complexity level among included studies was mild. Based on the level of certainty, the results should be evaluated with caution, and it is suggested that studies with better methodological qualities be performed.

COMPARISON WITH FIXED APPLIANCES

According to a systematic review by Papadimitriou,[5] Invisalign might treat faster mild non-extraction cases, but it requires more time than fixed appliance treatment for more complex cases. A small inadequacy in leveling and derotation was reported in canines and premolars. Crown tipping can be easily performed. Teeth inclinations and occlusal contacts seem to be among the limitations of Invisalign®, when accuracy of planned movements achieved with aligners is concerned. Use of additional-novel attachments might be more effective for various types of movement, such as bodily expansion of the maxillary posterior teeth, canine and premolar rotational movements, extrusion of maxillary incisors, and in overbite control.

Lopaz[6] in 2019, recommended IPR especially in canines for accomplishing difficult vertical movements and derotation. The results from the study were,

· a. It is not necessary to incorporate an attachment when molar distalization is required in treatment.

· b. The expression of the programmed movement is not fully accomplished with aligners.

· c. There is better root control with fixed appliances

· d. Aligners and fixed appliances are able to alter intercanine, interpremolar, and intermolar width in the presence of crowding.

· Moderate level of evidence[7] was reported stating that most of the tooth movements may not be predictable enough with clear aligner therapy except for minor horizontal teeth movement and very low evidence that minor extrusion of anterior teeth has been increased as compared to previous SRs conclusions.

SAFETY CONSIDERATIONS:

Overall, no estrogenic or cytotoxic effect of the thermoplastic appliances could be confirmed based on limited preliminary evidence from in-vitro studies[12], while their effect on monomer or BPA release across both in-vitro and clinical evidence remains ambiguous. More high-quality studies are required before a decision can be made.

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Review Article

INFECTION CONTROL DURING COVID-19 PANDEMIC IN DENTAL PRACTICE.

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ABSTRACT

SARS-CoV-2 transmission is linked to an increased risk of dental infection. As a result, the review's goal is to collect and share information about how patients in dental clinics were managed during the COVID-19 pandemic. It is vital to schedule interventions according to their importance in order to preserve resources and avoid unnecessary exposure to infected patients. Elective surgery should not be undertaken during the pandemic's peak. Even life-threatening surgeries may be postponed if a COVID-19 patient is expected to recover in a few days. There is no time to waste when it comes to emergency measures. In order to avoid redundancy and resource loss, specialties with overlap in therapy should have well-defined arrangements among themselves about treatment spectra.

The organisation of inpatient and outpatient units must be such that the danger of cross-infection among patients is kept to a minimal. Testing patients for SARS-CoV-2 is especially crucial for detecting infected individuals early on. Personal protective equipment is essential when performing any surgery on COVID-19 patients. In the operating room, there must be negative pressure, and aerosol production must be kept to a minimum. Significant improvements in the infrastructure of outpatient units, inpatient units, and operating rooms are required to fully address the COVID-19 dilemma. In addition, there is a huge increase in the need for personal protective equipment.

The main goal is to keep the healthcare system working smoothly while protecting patients and medical workers from avoidable infection. As a result, all efforts should be made to make the required investments.

Keywords: COVID-19 pandemic, Airborne infection, Infection-control, N-95 mask, Health professional.

INTRODUCTION

SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2) and the related pneumonia COVID-19 (coronavirus disease 2019) pose a significant threat to healthcare systems around the world. The COVID-19 case fatality rate rises with age. While it is 0% for children under the age of ten, it rises to 1% in the sixth decade and approaches 20% in the ninth (Onder et al., 2020). However, even at this early stage of the pandemic, it was clear that healthcare personnel are afflicted in 29% of cases, which is disproportionately high (Wang et al., 2020). Healthcare personnel will invariably come into contact with infected patients. The virus appears to be spread mostly through respiratory droplets (Lu et al., 2020; van Doremalen et al., 2020).

Infected patients' nasal cavities have a high viral load, putting those specialties at risk for SARS-CoV-2 infection who work in this area in particular (van Doremalen et al., 2020). Oral and maxillofacial surgeons, in addition to ENT surgeons and dentists, must be mindful of the new issues that the potential of viral transmission between patients and medical staff, and vice versa, entails (Peng et al., 2020). In the field of oral and maxillofacial surgery, concepts must be established that take into account the potential requirement for triaging patients based on the degree of urgency of treatment.

As a result, the purpose of this study was to gather and examine many elements of infection management in dental inpatients and outpatients during the COVID-19 pandemic. SARS-Cov-2 is the sixth coronavirus to be discovered in humans. It's a highly contagious virus that spreads quickly from person to person via four routes:

Aerosol droplets: Tiny microscopic droplets of virus-laden aerosols are discharged into the air when an infected person coughs, sneezes, or even talks (particularly loudly while giving a speech). With each cough, millions of virus-containing droplets between 0.1 and 900 microns (99% of which are less than 10 microns and 97 percent of which are less than 1 micron) are discharged into the air at a speed of roughly 40 kilometres per hour. The larger droplets travel up to 2 metres and fall to the ground in seconds, but the finer aerosols travel up to 6 metres[1-2] and remain suspended in the air for at least 10 minutes in well ventilated areas, and it can stay suspended for several hours in enclosed spaces such as flights, buses, or poorly ventilated halls

and rooms. The sneeze also produces similar sized droplets, but they are released at a faster speed of around 160 Km/hr and the finer aerosols also travel a distance of up to 6 meters and can remain suspended in the air for a long period of time.

Physical contact: Virus-laden droplets from an infected individual not wearing a mask may land on numerous surfaces directly or indirectly by the contaminated hand touching these surfaces after coughing, sneezing, or talking. They can survive for up to 72 hours on plastic (phones, computers, bottles, stethoscopes), 48 hours on stainless steel, 24 hours on cardboard, and 4 hours on copper[3], from which they can be transmitted to other individuals.

The faeco-oral route: The SARS-Cov-2 virus is known to be shed into the feces, especially in children, from where it can reach the respiratory tract by soiled hands touching the mouth or nose. This route of transmission is however, uncommon.

Airborne route: This route of transmission is unknown, similar to the influenza virus, in which the virus is expelled from the human body during talking, coughing, sneezing, or even breathing and then remains airborne before infecting others. Airborne transmission was not[4-5] recorded in a study of over 75,000 COVID cases in China.

The only method to properly control this pandemic is to stop the SARS-Cov-2 virus from spreading from person to person. It is necessary to break the chain of transmission via aerosol droplets and personal contact. Based on previous experiences with the SARS and influenza epidemics, the WHO, National and Local Health Bodies, and the media have been constantly informing people to practise social distancing, stay indoors, wash hands regularly with soap and water for at least 20 seconds or use an alcohol containing disinfectant (at least 60%), and wear a mask. Hand washing alone reduced the risk of SARS virus transmission by 55%, wearing a mask by 68 percent, and hand-washing, wearing a mask, gloves, and protective gear all together reduced the risk of SARS virus transmission by 91 percent[6].

Wearing a mask is thus an essential method of preventing COVID-19 aerosol dispersal. However, the global and national health authorities' orders and advisories on wearing a mask have been inconsistent and unclear, with contradicting messages. Only persons who are caring for a COVID-19 patient or a suspected COVID-19 patient, or a person who has respiratory symptoms, should wear a mask, according to the WHO. A rising body of evidence suggests that asymptomatic transmission takes place in the community.[7] Even 2.5 days before symptoms appear, infected people can shed the virus via aerosol droplets. Asymptomatic transmission was found in 66 percent of Singaporean clusters (range: 45-84 percent) and 77 percent of Tianjin clusters (range: 65-87 percent)[8].

Countries with a habit of wearing masks on a regular basis, such as Hong Kong, Singapore, South Korea, and Taiwan, appear to have a flatter COVID-19 trajectory. They wear masks out of respect for others and social obligation, as well as to protect others from contracting the disease. According to the case report from China stated previously, wearing a mask protects others from contracting the virus.

WHO & GOVERNMENT OF INDIA LAUNCHED MISSION PPE:

The Government of India launched Mission PPE (Personal Protective Equipment) on April 3, 2020, with plans to buy 5 billion cotton masks, 500 million surgical masks, and 500 million gloves in the near future. Doctors, health-care providers, policymakers, and the general public know virtually little about masks. They get all of their information from the media.

As a result, many phoney masks have been launched into the market, and many people, including healthcare providers, are unintentionally using them[8,9]. Many people have no idea which mask to put on, how to put it on, or how to take it off. Doctors and nurses are not wearing the appropriate masks. In the community, this lack of awareness is causing confusion and harm. This review aims to teach readers on the various types of masks available, who should wear which mask, and the most up-to-date knowledge on the importance of masks in preventing COVID-19 transmission[10].

DUST MASK:

It is worn to protect against non-toxic nuisance dusts such as those produced by house dusting, grass mowing, gardening, sweeping, brickwork, fibreglass, and sand storms. This mask does not provide COVID-19 protection and should not be used. Unfortunately, many people believe that wearing this mask will protect them. (Figure 1)

SINGLE LAYER FACE MASK:

The single layer face mask is commonly used in the food processing industry and is made consisting of a single layer of non-woven fabric or wood pulp tissue paper. It should only be used once and should never be washed or reused. It is not recommended for usage because it provides no protection against the corona virus. Unfortunately, many people wear this mask, oblivious to the fact that it provides little protection against the Corona virus. (Figure 2)

SURGICAL MASK:

The surgical mask was never designed to protect the surgeon from contracting the patient's infection, contrary to popular assumption. The mask was designed to protect the patient in the event that the surgeon coughed or sneezed during the procedure. The surgical mask, on the other hand, protects the surgeon from blood and body fluid splashes entering their nose and mouth during surgery. (Figure 3)

Three layers make up the surgical mask. The innermost layer is composed of an absorbent material that absorbs moisture from the wearer's breath, the intermediate layer is made of a melt-blown filter, and the outside layer is built of a liquid-repellent substance. The pleats are designed to expand the surface area of the garment so that the nose and chin are properly covered. Strings loop around the ears or are fastened behind the ears to keep it in place. Surgical masks come in a variety of quality levels, and the level of protection provided is determined by the manufacturer's specifications. Surgical masks must meet the following quality requirements: bacterial filtration efficiency >98%, particulate filtration efficiency >99% for 0.1 millimetre particle size, differential pressure measuring ease of breathing of 3mm, and fluid resistance of 80 mmHg.

Surgical masks are designed to be used once and then discarded safely. It is not recommended that they be washed and reused. A surgical mask's life varies depending on how it's used, although it usually lasts 3 to 8 hours depending on the humidity, temperature, and volume of air breathed. It's critical to understand how to put on and remove a surgical mask. It's vital to wash your hands with soap and water or an alcohol-based hand massage before applying the mask. If you must touch the mask while wearing it, clean your hands with soap and water or an alcohol disinfectant. If the mask becomes damp or soiled, throw it away in a sealed container. Remove the mask from behind, without touching it, and toss it into a closed bin as soon as possible. Hands should be washed with soap and water or alcohol rub once more.

Table 1: Showing differences between different respirator masks

	N95	N99	N100	FFP1	FFP2	FFP3
% of ≥0.3 µm particles filtered	At least 95%	At least 99%	At least 99.97%	At least 80%	At least 94%	At least 99–99.95%
Breathing resistance	+	++	+++	+	+	++ to +++
Internal leakage rate permitted	-	-	-	22%	8%	2%
Utility	Protection against particulate matter pollution, bacteria, viruses, fungi	Protection against particulate matter pollution, bacteria, viruses, fungi, oil (8 hrs)	Protection against particulate matter pollution, bacteria, viruses, fungi, oil (40 hrs)	Low levels of dust, e.g. home renovation, hand sanding, drilling, cutting	Moderate level of dust, e.g. construction, agriculture, plastering, particulate matter pollution, bacteria, viruses, fungi	High level of dust, e.g. asbestos, pharmaceutical industry dust, particulate matter pollution, bacteria, viruses, fungi
Suitable for COVID-19	Yes	Yes	Yes	No	Yes	Yes
Color of headband	-	-	-	Yellow	Blue	Red

Respiratory masks: A respirator mask is a face mask with a filtration system that protects the user from harmful particles, gases, oils, and microorganisms such as bacteria, viruses, and fungus[11]. It has two distinct features: an air filtering mechanism that prevents unpleasant compounds and bacteria from entering the respiratory tract, and a tight fit that prevents air from leaking into the nose and mouth from the sides (Figure 4). Its initial medical application was in the 1990s, when it was used to protect doctors and nurses from contracting drug-resistant tuberculosis from HIV-positive patients. Following that, it was employed in the 2003 SARS outbreak.

Respiratory masks are classified as N, R, or P depending on their ability to resist oil-based particles, similar to how movies are rated

as "A" for adults, "PG" for parental supervision, and "U" for universal based on the quantity of adult material (Figure 5). These masks can only be used for particles that do not include oil, as N stands for 'not oil resistant.' P stands forstrongly oil proof,' which has a service life of at least 40 hours. R stands forsomewhat resistant to oil,' which has a service life of at least 8 hours.P and R are only employed in industrial settings, and thus have no bearing on our issue. Depending on the filtering efficiency, N is further classified into N95, N99, and N100 (See Table 1). The corona virus is successfully filtered by the N95, N99, N100, FPP2, and FFP3 masks. The only stipulation is that the mask should not leak.

The dust mask (Figure 1)

The Single Layer Face Mask (Figure 2)

Surgical Mask or Medical Mask (Fig 3)

Respirator Mask (N95, N99, N100; FFP1, FFP2, FFP3) (Fig 4).

Valve versus Non-valve N95, N99 Respirators (Fig 5).

Extended usage and limited reuse of N95 respiratory masks: N95 respiratory masks should ideally only be used once, and this should be the typical practise wherever practicable (Table 2). If N95 masks aren't available, check for FFP2 respirator masks as an alternative. Although N99, N100, and FFP3 will filter the virus, they are uncomfortable to wear for extended periods of time (making breathing difficult) and are hence not suggested. N95 and FFP2 masks are in low supply because to the recent COVID-19 outbreak[12]. Front-line healthcare providers who are treating COVID-19 patients require a N95 mask for self-protection.

Table 2: Differences between Valve and No valve N95 masks

	Valve N95, N99	Non-Valve N95, N99
Filtration system	Inside the valve	Built within the fiber
Weight	Bulkier, heavier	Light-weight
Ease of breathing out	++	+
Comfort - Sweaty/Stuffy	More comfortable	Less comfortable
Recommendation for people with Lung Disease/Heart Disease	Yes	No
Suitable for COVID-19 patient	No	Yes

So How Do We Go About Fulfilling Our Professional Obligations?

Infection prevention is always a priority for us as experts. Nonetheless, it is worthwhile to revisit our present infection control measures in order to tighten them even more. Depending on the temperature, humidity, kind of surface, and viral load, the COVID-19 can remain infectious on inanimate surfaces for 2 to 9 days. To avoid cross-infection, the entire team—staff, nurses, paramedics, trainees, and waste handlers—must work together.[13]

The leader of the maxillofacial surgery unit should take use of this opportunity to reaffirm and reinforce best practises in hospital infection control, such as hand hygiene, barrier techniques, personal protective equipment (PPE), surface disinfection, and equipment sterilisation.[14]

The proper use of disinfectants and ways of mopping surfaces, such as the triple-bucket method, should be closely monitored. The use of 0.1 percent sodium hypochlorite for 1 minute has been demonstrated to be effective against coronavirus. COVID-19 patients' infectious waste shall be collected, segregated, and transported under the supervision of the institute's Infection

Control/ Biomedical Waste Management Officer. In the Covid scenario, telescreening, telemedicine, and triaging will have to be used to their full potential. The Medical Council of India (MCI) recently issued guidelines for telemedicine practise, allowing for telephonic and online consultations.[15] These will reduce foot traffic in the departments and allow the surgeon to determine whether or not a surgical intervention is required. To safeguard our community, our patients, our employees, and ourselves, we should use our professional discretion and avoid elective operations at all costs. Only in the case of an emergency will an exception be made.[16-17]

Operative interventions should be limited to the management of maxillofacial trauma, including emergent airway management and bleeding, patients who require infection drainage (e.g., Ludwigs angina), and onco-surgery procedures where a delay in treatment would have a negative impact on the outcome or result in permanent disability. Most facilities may not have reverse transcriptase PCR employing throat/nasal swabs or serological testing for the COVID-19 test; if they do, they may take 24–48 hours. Because early care may be required in cases of serious infections or pan-facial trauma (especially in patients with bleeding, impaired sensorium, or unconscious patients), it is safer to presume they are Covid positive until otherwise established. Negative results do not rule out the possibility of COVID-19 infection, and they should not be utilised as the sole basis for patient management decisions.

During aerosol and surgical smoke-generating operations, the N 95 (FFP2) masks with face shield should be utilised as a minimum requirement when treating COVID-19 positive or suspected patients (like the use of handpieces, electrocautery, and ultrasonic instruments).[18]Povidone iodine has been demonstrated to have high virucidal action for up to three hours, and it has lately been recommended to cover the patient's mouth cavity and nasal passages, as well as the operating team's, prior to the procedure.

RADIOGRAPHIC EVALUATION IN COVID PATIENTS:

Extraoral techniques such as OPG and cone beam CT[19] should be used instead of intraoral radiographs such as IOPA or occlusal views, which might provoke gag reflexes and cause coughing. On the clinical side, conservative treatment is required to preserve shape and function. Closed fracture reduction (with IMF screws, Bridle wire stabilisation, or Eyelet wiring) should be preferable to open surgery if stability can be accomplished without ORIF. This will cut down on operating time and allow for a quicker discharge. When ORIF is absolutely necessary, a trans-cutaneous technique (followed by the use of a bio-occlusive bandage over the mouth after IMF) should be preferred to an intraoral method.

Doctors and other health careworkers should not wear a cotton mask. If you are collecting nasal swabs or throat swabs forCOVID-19 testing, it is preferable to use an N95mask and if not available, a surgical mask. Remember hand hygiene is equally important and this should not be neglected at all. Hands should be washed after seeing every patient with soap and water or a alcohol containing hand rub.[20-21]

SUMMARY

To summarize, in the current pandemic of COVID-19, everybody should wear a mask, primarily because it significantly reduces the chances of spreading the aerosol route of transmission, and also because it offers protection against catching the infection. The dust mask and the single-layered cotton masks are not recommended for use, although a large number of people in the community are inadvertently wearing them. A 3-layered surgical mask is the ideal mask for the common man to wear, but these are usually either not affordable (because they can be worn only once and during a day you may need to wear several of these) or not available. A 3-layered cotton mask is a reasonable alternative, although it is not as effective. It is comfortable, washable and reusable. If you are a layperson taking care of a COVID-19 patient in your house, you must wear a N95 mask or if not available a 3-layered surgical mask. Doctors and healthcare providers should not wear a cloth mask. A surgical mask is recommended for doctors, nurses and all paramedics in routine clinical practice. They should be worn properly and disposed properly with good hand hygiene practices. Those doctors and healthcare providers who take throat swabs/nasal swabs of suspected COVID-19patients or perform aerosol generating procedures should wear a N95 mask. Masks will do their function only if they are worn

properly. Hand hygiene is equally important and should not be neglected at all.

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Review Article

ACHIEVING PASSIVITY OF FIT WITH LASER WELDING

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ABSTRACT

The passivity of the superstructure to the abutments of implant-supported prostheses is an important prerequisite for the favourable outcomes of implant-prosthesis. To provide an absolute passive fit for implant-supported superstructures, both the clinical techniques and the lab procedures in use today are inadequate. Developments are needed in the methods of evaluating and achieving the absolute passivity. Laser welding technology has brought some hope fulfill this need as it can be performed both intra orally and extra orally on the master cast with more accuracy. This paper reviews the significance of passivity in implant supported over dentures, the repercussions of compromised fit, evaluation of the fit and use of laser welding in achieving it.

INTRODUCTION

The introduction of osseocoalescence has greatly affected the concept of implantology and improved the treatment options of many completely edentulous and partially edentulous patients. [1–3] It has also been successfully used in maxillofacial prosthetics and orthodontic anchorage. However, the aesthetic effects, especially in the anterior maxilla, is of utmost importance in patients perspective, a major precondition is healthy and stable biochemical conditions for successful long term results.[4] In order to obtain adequate functional and esthetic results, it is essential to achieve osseocoalescence or osseointegration and the ideal location of implants to act as a substructure for the final prosthesis.[5]

During the last three decades, the seriousness of the biomechanical aspect of implants has been highlighted and safety precautions[6-13] been proposed and applied to direct the biomechanical load over dental implants.[14] The long-term integrity of an implant system is affected by many factors, which includes the doctor's skills and judgments in treatment planning, design of the prosthesis, materials used, patient related factors, and local and systemic conditions and habits such as bruxism, smoking, presence of periodontal disease, and maintenance. Another important aspect of their success is passivity of the superstructure on the abutments of implant-supported prostheses. Passive fit is a condition where an inserted restoration sits without placing any stress on the supporting teeth or implants. In other words, it limits the amount of stress transferred to the bone-implant interface and ensures long term osseointegration. On the other hand, the non-passive fit or commonly referred as misfit of the framework to the osseointegrated implants, which may be clinically detectable or may be not, will generate internal stresses in the prosthesis' framework, the implants, and the bone surrounding the implant. This may further bring about unfavourable convolutions, which can be mechanical or biological in nature. Thus, reducing or vanishing the misfit and improving the passive fit should be a precondition for the survival and success of implants.[15]

In order to achieve this goal the technique of welding titanium bars on implant abutments have been proposed. 6Laser welding is preferred over conventional welding procedures as it is easy to perform because it can be done directly on the working cast as well as it can be performed intaorally.[16,17]

THE PASSIVE FIT

Although there is no actual definition to highlight the meaning of passive fit clinically, Jemt[18] defined the passive fit as a level of fit which will not produce or cause any long-term clinical problem.

Perfect passive fit is achieved when the opposing surfaces of the implants and the framework intaglio are in maximal spatial congruency, without strains in the components after tightening of all screws, provided the implant and framework surfaces are fabricated perfectly plain.

Possible hindrances in fabricating a passive-fitting superstructure

During the whole procedure of final prosthesis fabrication, gradual distortions may occur and this results in the misfit of implant superstructure and called as distortion equation, theoretically ,ie. the final fit is influenced by each step of the fabrication of a cast framework. If the summation of this distortion equation was zero, passive fit can be achieved. It includes the

following clinical and laboratory procedures:

·IMPRESSION PROCEDURE AND TECHNIQUE

A slightest discrepancy (22–100 μm) exists between impression copings and either abutment analog or the abutment and it should be reflected on during final impression making. Dimensional changes related to the use of tapered copings are relatively higher than square impression copings. It is usually recommended to join them with a pattern resin.

·MASTERCAST FABRICATION

The final fit of frameworks is also influenced by the setting expansion of dental stone but it cannot be altered. Thus, various fabrication techniques have been employed in order to overcome or minimize this discrepancy. Vigolo and Millstein have observed that the use of sectioned master casts provides superior fit in comparison to the use of solid casts.

·WAX PATTERN FABRICATION

While fabricating a pattern, two basic aspects should be evaluated. First, the final distortion will definitely be more if wax is used instead of a resin, which has low polymerization shrinkage. Second, the design and bulk should provide adequate strength for the framework. However, an increase in the volume of the pattern causes more casting shrinkage, indicating a restriction of the bulk of the pattern.

·FRAMEWORK FABRICATION

The setting expansion of investment material, investment technique, and the type of casted alloy also leads to discrepancies. 3-year clinical results of cobalt-chromium frameworks are favourable.

Also, One-piece complete-arch frameworks usually need to be sectioned and soldered (or welded) in order to improve the fit. There is a decrease in bone strains around dental implants when superstructures are soldered or laser welded.

· DEFINITIVE PROSTHESIS FABRICATION

Addition of acrylic or porcelain is a contributing factor

· DEFINITIVE PROSTHESIS DELIVERY

Machining tolerance, fit detection variability between clinicians, and the mandibular flexure may also lead to discrepancies in the final framework fit.

(7) Failure by the implant system to maintain rotational accuracy

(8) Effect of Treatment Time on Framework Fit

After three decades of research, a same-day treatment protocol has been evolved. This system provides a notable improvement in superstructure fit by having the potential of being almost passive in time to provide a compensating micro movement of the implant through applied load by the minimally compromising superstructure, and it can be undoubtedly achieved in seven hours. From prosthetic aspect, all components, like framework, are prefabricated, and implants are installed according to the framework which is made by the use of a series of accurate surgical guides. However, machining tolerance between components is unavoidable and may be compensated by incorporating features into the design.

The Significance of Passive Fit and consequences of misfit

One of the most significant prerequisites for the maintenance of the bone-implant interface is presumed to be Passive fit. To provide passive fit or a strain-free superstructure, a framework should, hypothetically, produce zero strain on the supporting implant components and the surrounding bone in the truancy of an applied external load.

The natural teeth can move in their sockets about 100 microns, whereas the implants have limited range of movement, i.e., around 10 microns. Therefore, the misfit in case of later will be more destructive in contrast to the former, which increases the need to achieve the passive fit for the survival and the successful long-term osseointegration.

In General, the framework misfit may lead to mechanical and biological complications. Mechanical problems can be presented as loosening of the prosthetic retaining screws, locking or fracturing of the abutment's screw and fracture of various components in the system. Whereas, biological complications may be manifested as pain, tenderness, marginal bone loss, and loss of osseointegration.

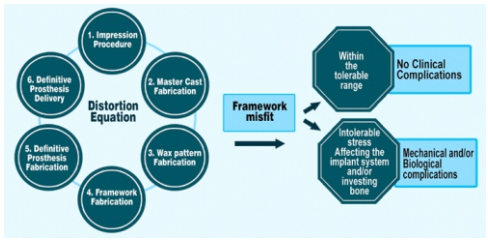

Fig. 1

Relation of several procedures involved in fabrication of framework to misfit of implant superstructure framework and it's consequences.

ACCEPTABLE MISFITS LEVEL

As per the current scientific evidence it has been seen that an absolute passive fit cannot be obtained. Therefore, it is concluded that there must exist some levels of acceptable misfits. Several studies attempted to define the misfit numerically, but there was no definite agreement to quantify the acceptable level of the misfit.

Branemark was the first person to specify the passive fit of implant framework. According to him the misfit should be not more than microns. Then, Klinberg and Murray stated that 30 micrometer gap at the implant–abutment interface will be admissible if it is not comprising more than 10 % of the circumference. Also, Jemt stated that a misfit around 150 microns is tolerable. According to Jemt, the passive fit can be gained by screwing extra one half turn. The drawback of this technique is that it can only be applied in the implant systems where the thread pitch of the abutment screw is 300 micrometer.

EVALUATION OF THE MISFIT

There are various methods to evaluate implant framework misfit.

· The alternate finger pressure test

The rocking of the prosthesis should be evaluated by applying pressure alternatively to both sides of the framework and look for any bubbling of saliva around the misfit gap.

· Direct vision and tactile sensation

the tip of an explorer is used by the clinician to verify the marginal fit. However, the limitation of this technique is the variation in size of the explorer tip used.

· Roentgenograms

They are least commonly used for evaluation of fit as they greatly depends on the angulations. Also images could be overlapped or superimposed.

· The Sheffield test or the one screw test

In this test, one screw is tightened at one end of the framework and then the difference is observed in the screw at the other end of the framework.

· Screw resistance test

Starting with the implant closest to the midline, the screws are tightened one by one until the early resistance was met at one of the screws, if that screw requires more than extra half a turn to attain the accurate screw seating, it is considered as a framework without optimum passive fit.

(6) The fit checker, pressure indicating paste and disclosing wax can also be used in the case of supragingival and subgingival margins.

(7) 3-Dimensional quantifying systems

They can be used only extra-orally, and 3-D photogrammetric that can be used intra-orally. These systems can evaluate discrepancies to the nearest 10 micrometer. Even so, it was concluded by Kan et al. [6 that none of these methods are well grounded on its own, and suggested using them in combinations.

HISTORICAL BACKGROUND OF LASERS

Gordon (1967)[19] – welded metallic portions of dental prosthesis with laser technology.

Tramonte et al.[20] - presented a case demonstrating the utilization of intraoral welding (syncrystallizer) to stabilize immediate single piece implants during osseointegration for a fixed full arch maxillary and mandibular implant retained prosthesis and concluded that intraoral welding is effective and predictable in cases of immediate loading.

Fornaini C et al. in 2010[21] conducted an in vitro study on calf jaws to evaluate the thermal increase in intraoral laser welding. q The study showed that thermal increases in pulp chamber, sulcus, root

and bone were biologically compatible and that intra-oral laser welding at the parameters used in this work, seems to be harmless to the biological structures close to the welding and thermally affected zones.

Degidi M et al.[22] conducted a 3-year prospective study in 2010 to evaluate the concept of intraoral welding as a suitable technique for the placement of a final restoration in the edentulous patient on the same day of surgery. The study was conducted on 26 patients with edentulous maxilla and 34 patients with edentulous mandible who were consecutively treated with 324 immediately loaded implants. It was concluded that on the same day of surgery it was possible to successfully rehabilitate the edentulous patient with a fixed definitive prosthesis.

In 2008 Degidi M et al. published a case series of 20 cases on immediate loading of edentulous maxilla with a final restoration supported by an intra oral welded titanium bar. They concluded that on the same day of surgery it is possible to successfully rehabilitate the edentulous maxilla with a fixed permanent prosthesis supported by an intra-oral welded titanium.

Degidi M et al. in 2012 conducted a prospective study to assess the suitability of immediate rehabilitation of the edentulous mandible using SynCone copings and the intraoral welding technique. Within its limitations, the study demonstrated that it is possible to successfully rehabilitate the edentulous mandible on the day of surgery with a definitive restoration supported by an intraorally welded titanium framework and SynCone 5-degree abutments.

ADVANTAGES OVER TRADITIONAL WELDING

· Can be carried out directly on master cast thereby eliminating risk of inaccuracies due to duplication of the model.

· Heat source – concentrated high power light beam – potential for distortion of prosthetic components minimised.

· Possibility of welding adjacent to acrylic resin or ceramic parts with neither physical cracking nor color damages.

· Reducing work load by eliminating necessity for remaking broken prosthetic appliances.

· Laser welded joints – high reproducible strength.

ADVANTAGES OVER SYNCRYSTALLISATION

· It is effective on all metals rather than only on titanium and its alloys .

· It can be applied with or without filler metal and shielding gas where as Syncrystallisation is based on creation of electric arc between two electrodes under an argon gas flux.

· It can be easily used on patients with pacemaker whereas syncrystallisation cannot be used.

· Due to extremely small spot size of the beam(0.6 mm) higher temperatures are restricted to a limited area whereas in the welding process some energy spreads to adjacent area(teeth, acrylic,ceramic).

· Cost effective – does not require a new and specific appliance – laser unit for oral treatment can be used.

LIMITATIONS

Laser welding is not without flaws and it poses a few problems. During laser welding, it is easy to generate welding defects such as cracks and increased porosity at the joints of metal frameworks. These welding defects decrease the strength and durability of the connecting area of metal frameworks. It should also be highlighted that a metal framework can subtly deform due to the shrinkage that occurs when the laser pulse melts it momentarily. To achieve precise laser welding, it is therefore necessary to overcome these problems.

LASER WELDING FOR ACHIEVING PASSIVE FIT

Laser welding is another method of connecting metal frames. It depend on the transformation of light energy into thermal energy when laser is applied to a metal surface. Laser welding is simple to execute as it can be done on both the working cast and intraorally. It also provides excellent corrosion resistance and mechanical strength because unlike soldering another type of metal is not used in this process. Investigation on the use of laser welding in dentistry began primarily because of its convenience to be used straight on the working cast. In laser welding, metals with high light absorbability and low thermal conductivity are easy to weld

because of efficient conversion of light energy to thermal energy at the metal surface. On this basis, titanium is superior to platinum, gold, or silver. The melting depth differs with the type of metal in use and irradiation conditions when using a laser welding apparatus for dentistry. In spite of that, the depth usually does not exceed 2.0 mm. During laser welding, the metal on the side of the joint that encounters the laser pulse melts and then solidifies. Hence, for quintessential results, the thickness of the metal frame joint must not be more than 2 mm. during solidification of the molten metal, only the laser-irradiated portion of the metal frame is pulled towards the joint, which then leads to a three-dimensional distortion of the structure. To reduce the vertical deformation , the joint is kept sufficiently thin, so that the metal framework melts to the bottom of the joint with one laser pulse. In addition, since laser energy can be concentrated in a very small area, there are scarcely any effects of heating on the area surrounding the spot to be welded, which means that it is safe to repair a metal plate denture without removing the acrylic resin base or adjacent artificial teeth.

Intraoral laser welding is another method to connect the abutments to the bars is represented by the laser welding. Fornaini et al. published a case report proposing that using intraorally laser welding technique is completely safe without any side effects. Silva investigated and concluded that frameworks may show a more precise adaptation if they are sectioned and laser welded.17 Laser-welded titaniumframeworks offer many advantages for the patient, clinician, and dental technician.

CONCLUSION

Distortion may occur at every step of framework fabrication in implant prosthodontics and this may lead to collocation distortion and compromised fit. This misfit may or may not lead to adverse biomechanical complications. Thus, enhancing and optimizing the distortion equation components should assist in decreasing this compromised fit of the implant superstructure. Sectioning and splinting of multiple implants and their framework with laser welding on master cast and directly in the mouth leads to a predictable stability and fixation in the early stage of bone healing with a major decrease of the micromovement problem and implants loss.

CONFLICT OF INTERESTS

There is no conflict of interests regarding the publication of this paper.

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Review Article

ORAL MANIFESTATION IN COVID-19 PATIENTS – AN OVERVIEW

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ABSTRACT

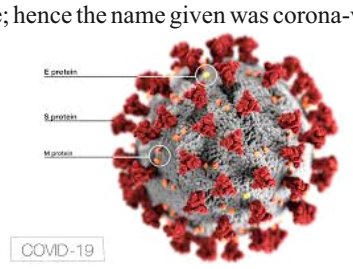
The appearance of a new virus in December 2019, has caused an unpredictable disaster to modern era of public health. And, WHO declared it as a public health emergency of international concern. The oral cavity is promptly highlighted as a potential source of transmission of virus. Oral lesions are mostly symptomatic and nearly equal in both the genders in COVID-19 infected patients. This review aims to summarize the cause – effect relationship between the COVID-19 infection and associated lesions.

INTRODUCTION

The 2019 novel corona virus (2019-nCoV) or the Severe Acute Respiratory Syndrome Virus – 2 (SARS-2), was first detected in Wuhan city in Hubei in Central China, with the unknown etiology of development of pneumonia in many patients in Wuhan city in December 2019[1]. The recorded cases had a history of exposure to Wuhan wholesale seafood market. After this, there is a rapid human to human spread from Wuhan city to other regions of China and also transmitted to other countries. Since the outbreak in December 2019 this disease has affected more than 11,301,800 people[2]. On 11th March 2020, due to the alarming transmission, WHO made the assessment that COVID-19 characterized as pandemic[1]. The disease caused by novel corona-virus and its consequences have posed a challenge for the health authorities worldwide and the healthcare workers have found themselves as unexpected targets in the fight against this COVID-19 infection. Also, the dental care professionals face a tremendous risk due to face-to-face communication, direct contact with saliva and exposure to aerosols produced by the rotary dental instruments.

VIRUS STRUCTURE

This virus was enveloped positive sense RNA-virus ranging from 60 – 140 nm in diameter, with the spike like projections on its surface, giving it a crown like appearance under the electron microscope; hence the name given was corona-virus[1].



MODE OF TRANSMISSION

The initial related source of transmission was Wuhan wholesale seafood market. The researchers supposed that the initial host was bat and that due to some genetic similarity between the SARS-2 and Bat-CoV Ra TG13[1] and was thought to be transmitted through zoonotic agents to humans. Respiratory droplets and direct contact like shaking contaminated hands, contaminated surfaces are the main source of transmission.

This virus infected more individuals of older age with some other chronic co-morbidities and impaired immune system.

Recently, few researches show that, this virus invades human cells via the receptor angiotensin-converting-enzyme-2 (ACE-2) through scRNA-seq data analysis[2]. So the cells with the ACE-2 receptor distribution may become host cells for this virus and causes inflammation in related tissues and organs like lungs, liver, kidney, GIT, epithelial surfaces of sweat glands, endothelia of dermal papilla vessels[2,4]. The expression of ACE-2 and transmembrane serine protease in salivary glands and oral mucosal epithelia, associated with a confirmed infection by SARS-CoV-2, play a role in the virus transmission via saliva, even in asymptomatic individuals[5].

DIAGNOSIS AND REQUIRED INVESTIGATION

This virus has been detected from the saliva of infected patient, and the standard test for the diagnosis of active infection is Reverse Transcriptase Polymerase Chain Reaction (RT-PCR) is considered more sensitive than nasopharyngeal test. Due to the high viral loads in lower respiratory tracts, samples are considered better from lower respiratory tracts than the upper respiratory tracts. In the early infection stage, chest x-ray may be normal but may show some bilateral infiltration. The Chest CT is considered more sensitive and specific investigation for the infected patient, that shows ground-glass opacification, with or without other related abnormalities, predicted with other viral pneumonia1. Chest CT shows bilateral abnormalities, with peripheral distribution and lower lobe involvement1. Serological testing methods such as lateral flow assay and ELISA can be done for detecting past and present infection status. Rapid tests that are

based on lateral flow immune assay simultaneously detects IgG-IgM antibodies against virus in human blood within 15 minutes1.

CLINICAL MANIFESTATIONS

The common initial symptoms include fever, headache, sore-throat, dyspnea, dry cough, abdominal pain, vomiting and diarrhea. A fatal condition when fluid fills in the lungs, referred as acute respiratory distress syndrome, that requires immediate ICU admission.

There was a finding that male patient suffers from ulcerations and symptoms of jaw bone/joint pain in female patients[4-16.]

ORAL MANIFESTATIONS

The disorders or diseases or problems associated with the sense of smell and/or taste, are referred as chemosensory disorders.

The first recognized oral symptom in infected SARS-CoV-2 patients is Dysgeusia[4]. Taste disorders in infected patients are classified as quantitative or qualitative disorders, that includes hypogeusia i.e. decreased sense of smell in 34% cases, ageusia as absence of smell in 26% cases and dysgeusia as qualitative distortion of taste perception in 33% cases5. Xerostomia, in 43% of cases, to be appear before the onset of other general symptoms in SARS-CoV-2 infected patients5. Halitosis, parotitis, sialadenitis occurs either precociously or during the clinical course5. Other oral mucosal lesions include apthous-like oral ulcer, herpes-like lesions, candidiasis, glossitis, depapillation, geographic tongue, angular cheilitis, desquamative gingivitis, lip blisters[5,1]. Risk of osteonecrosis of the jaws in the infected patients linked to a corticosteroid-related or medication-related risk of avascular necrosis[5]. Mucormycosis, a fungal infection caused by ubiquitous environmental molds, associated with COVID-19 cases, occurs during active infection outbreak in India. Immunocompromised individuals are significantly predisposed to mucormycosis, and around 80% of cases occurred in patients with pre-existing diabetes mellitus and considered as extremely morbid and deadly fungal infection, on 10th May 2021, Government of India declared mucormycosis as epidemic[6].

COVID-19 IMPACT ON DENTISTRY

The global spread of pandemic coronoavirus, leads to unpredictable challenges for healthcare workers. During most of the dental procedures, a large amount of aerosol and droplets mixed with the saliva and blood are generated and these fine droplets remain suspended in air for a long period of time. These suspended fine droplets may transmit the virus and due to this concern, most of the dental clinics across the world have been closed since late March 2020[1], expect for emergency dental care. After the reopening of dental services, the various guidelines were issued on the safety protocols.

Based on the information provided by Dental Council of India dental emergencies include emergency procedures (situations which increase the patient's death risk) and urgent procedures (situations which require priority care but do not increase the patient's death risk)[1,8.]

Based on the patient condition, if person needs to visit dental clinic for treatment; protocols has to be followed to prevent spread of infection. Patients were requested to limit their accompanying persons. Patients and accompanying persons have to undergo screening tests and are advised to wear face masks. Alcohol based sanitizers should be provided at entrance. Patients should be educated with posters at waiting room regarding COVID-19. While treating a patient dental surgeon and assistant should wear disposable/reusable personal protective equipment (PPE) and face shield that covers the front and sides of the face and a N95 mask or higher level respirator. Dental surgeon should wash their hands before patient examination, dental procedures, after touching the patient, after touching the surroundings and equipment and after touching the oral mucosa, damaged skin or wound, blood, secretions etc. And should be cautious to avoid touching their own eyes, mouth and nose. Pre-procedural mouth rinse with 0.2% povidine-iodine or 0.5-1% hydrogen peroxide mouth rinse has to be done as they reduce the load of virus in saliva. Use of disposable diagnostic instruments, syringes to prevent cross contamination. Extra oral imaging such as OPG and CBCT are considered instead of intraoral imaging. When intraoral imaging is required, image receptors either films or digital sensors must be covered and correctly disinfected (if digital sensors are used) after use to avoid cross-contamination. Use of rubber dam

during procedures is recommended as it could significantly reduce airborne particles by 70%. Powerful spray mist suction system for aerosols should be implemented along with regular suction. Emergency dental care for COVID-19 positive patients should be carried out in negative pressure rooms[1,8].

New approach of teledentistry is very helpful to prevent any cross infection includes initial screening and required questionnaire such as any exposure to person who is COVID-19 positive, recent travel history and any symptoms like cough, fever or respiratory emergencies[1].

FUMIGATION/DISINFECTION OF DENTAL CLINICS-

SARS-CoV-2 virus remains infectious from 2 hours to 9 days at room temperature, keeping a clean and dry environment in the dental office would help decrease the persistence of COVID-19. After any dental procedures, fumigation has to be carried on daily basis in clinic or high contact areas. After fumigation leave the room for 30 minutes[1].

CONCLUSION

An old age and present existing co-morbidities predict severe symptomatic oral lesions in COVID-19 infected patients, with almost equal occurrence in both the genders. Lack of oral hygiene, stress, immunocompromised state are the most common and important predisposing factors for the development of oral lesions in such patients. Oral lesions are symptomatic in most of the cases, with the most common sites of involvement in decreasing order were tongue (38%), labial mucosa (26%), palate (22%). The triad xerostomia, taste dysfunction and oral mucosal lesions are common sign and symptoms in patient with COVID-19 infection, regardless of their direct or indirect infectious nature. It is mandatory to do careful intra-oral examination in patients that were diagnosed positive with COVID-19 infection. There is risk of osteonecrosis of the jaws that too related to the medication or corticosteroid use, so recovered patients should be properly assessed before dental extractions and other required surgical procedures. Dental professionals must be aware of infectious hazards and also have to take every needed step to provide optimum dental care with proper safety protocol.

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Review Article

SILVER DIAMINE FLOURIDE: BLACK IS THE NEW WHITE

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ABSTRACT

Although there has been a decrease in the prevalence and the severity of dental caries in children over the past few decades, still children from low socioeconomical status in many industrialized or developing countries are still suffering from ill-effects of dental caries. The antimicrobial effect of silver compounds has been proven by the 100-year-old application of silver compounds for the prevention and treatment of various infections. Application of silver Diamine Fluoride (SDF) to arrest dental caries is a non-invasive procedure that is quick and simple to use. Reports of available studies found no severe pulpal damage after SDF application. However, it has drawbacks like black discoloration of the carious teeth and an unpleasant metallic taste. But, the low cost of Silver diamine fluoride (SDF) and its simplicity in application suggest that SDF is an appropriate therapeutic agent for use in community dental health projects. Thus, the availability of a safe, effective, efficient, and equitable caries preventive agent like SDF appears to meet the criteria of both the WHO Millennium Goals and the US Institute of Medicine's criteria for 21st century medical care.

Keywords: Silver Diamine Fluoride, SDF, Dental caries, children

INTRODUCTION

Dental caries is a prevalent oral disease that affects millions of people worldwide irrespective of age, races, and genders. Before the age of six, children are at a significant risk of developing caries known as early childhood caries (ECC).[1] Early childhood caries, which entails the early carious involvement of the primary maxillary incisors, followed by the maxillary and mandibular first primary molars, and the mandibular cuspids, continues to be a public health problem of global proportion.[2]

In the absence of any preventive or treatment methods, large carious lesions, early involvement of the pulp tissues, abscess formation, and pain are all expected outcomes of ECC.[3] Traditionally, surgical restorative approach is used for treatment of dental caries.[4] Young children are very much apprehensive to traditional restorative approach because of their limited coping ability, it can be an enigma for the clinician to remove all the caries and give a proper restoration. Hence, sophisticated dental equipment and well trained operators are required generally for early childhood restorative treatment. because of their limited coping ability, it can be an enigma for the clinician to remove all the caries and give a proper restoration. Arresting caries treatment has been proposed to manage untreated dental caries in children of disadvantaged communities.[5] A fluoridated agent silver diamine fluoride's (SDF) has hypothesized ability to halt the caries process and simultaneously prevent the formation of new caries.[6]

In uncooperative patients, silver diamine flouride can be effective as there is no need of excavation and it can be directly applied on the carious lesions. Due to its safety, efficiency, feasibility and effectiveness in arresting dentine caries, SDF can be considered as a useful approach to deal with such young patient. Once the carious process is slowed down or arrested, caries removal will be done at later date when child's ability to rationalize fear is increased with age. Thus, this review article explores in depth this promising agent, including its usage as caries preventing and arresting agent in primary as well as permanent tooth.

HISTORY OF SDF IN DENTISTRY

Silver diamine flouride has been used for decades in Japan, China, Brazil and Argentina at concentration varying from 10% to 38% to arrest dental caries.[7] SDF, has been accepted as a therapeutic agent by the Central Pharmaceutical Council of the Ministry of Health and Welfare in Japan for dental treatment since the 1960s.[8] In 2014, after getting approval from the "Food & Drug Administration for tooth desensitization", it initiated to be used for caries control in the USA.[9] The FDA awarded SDF the designation of "breakthrough therapy" in October 2016, based on its arrest of dental decay in children and adults, a first for an oral health therapy.

MODE OF ACTION OF SDF

Silver diamine fluoride's (SDF) has ability to halt the caries process and simultaneously prevent the formation of new caries. This ability is thought to derive from the combined effects of: silver-salt-stimulated sclerotic or calcified dentin formation, silver nitrate's potent germicidal effect, and fluoride's ability to

reduce decay.[6]

Studies have indicated that silver interacts with sulfhydryl groups of proteins and with deoxyribonucleic acid (DNA) altering cell wall synthesis and cell division of bacteria. At macro level the interaction effect bacterial killing and biofilm formation.[10] Shimizu and Kawagoe (1976)[11] described three possible mechanisms of action of SDF on caries.

First mechanism is the obturation of dentinal tubules. Dentinal caries are caused by entering of bacteria through dentinal tubules. According to Shimizu, silver ions present in SDF block the dentinal tubules. Even if microorganisms invade dentinal tubules, their growth will be inhibited by oligodynamic action of silver. Because of the obturation of the dentinal tubules, the surface area of dentin, which may be attacked by caries will decrease, and peritubular zone, which is most easily demineralized part of dentin may be covered with obturating materials (silver particles). Those factors in association with the obturation of dentinal tubules must contribute to increase in resistance to recurrent caries.

The second mechanism may be the cariostatic action of the reaction products between SDF and mineral component of the tooth. F^- ion of SDF applied to dentin under in vivo conditions penetrated to a depth of 50–100 μ. It has been reported that SDF ($Ag(NH_3)_2F$) reacts with the tooth mineral hydroxyapatite ($HA)(Ca_{10}(PO_4)_6(OH)_2$) to release calcium fluoride (CaF_2) and silver phosphate (Ag_3PO_4), which are responsible for the prevention and hardening of dental caries.

$$Ca_{10}(PO_4)_6(OH)_2 + Ag(NH_3)_2 \rightarrow CaF_2 + Ag_3PO_4 + NH_4OH$$

$$CaF_2 \rightarrow Ca^{++} + 2F^-$$

$$Ca_{10}(PO_4)_6(OH)_2 + 2F^- \rightarrow Ca_{10}(PO_4)_6(OH)_2F_2 + 2OH^-$$

The Ag_3PO_4 that precipitates on the tooth surface is insoluble. The CaF_2 formed provides a reservoir of fluoride for the formation of fluorapatite $Ca_{10}(PO_4)_6(OH)_2F_2$, which is more resistant to acid attack than HA $Ca_{10}(PO_4)_6(OH)_2$. Fluorapatite is so stable that it extremely resists decalcification by acid and chelating agent. In addition, it is known that F^- promotes calcification, and also restores lattice imperfection, and improves the crystallinity of HA.

The third mechanism may be the antienzymatic actions of the reaction products between $Ag(NH_3)_2F$ and organic component of the tooth. Its antibacterial properties arise from inhibition of the enzyme activities and dextran-induced agglutination of cariogenic strains of Streptococcus mutans. Silver ion also inhibits the colonization of S. mutans on enamel surface and offers a possible explanation for the antiplaque action of the agent.

CLINICAL APPLICATION OF SDF –

· CARIES ARREST

SDF arrest the progression of carious lesion. Caries arrest increases dramatically after re-application from 1 year post-treatment to 1.5 years, and increasingly to 2-3 years. Single application of SDF without repeat losses its effect over time in elders. Twice per year application results in more arrest than once per year. Effectiveness of SDF depends on concentration. 12% silver diamine fluoride is less effective than 30% or 38%.[12]

A study conducted by Chu CH, Lo ECM, Lin HC. (2002) reported that Silver diamine fluoride greatly outperformed fluoride varnish for caries arrest. Annual application of silver diamine fluoride prevented many more carious lesions than 4 times per year fluoride.[13]

· CARIES PREVENTION

When silver diamine fluoride was applied only to carious lesions, impressive prevention was seen for other tooth surfaces. Fluoride releasing GIC can have this effect but it is limited to surfaces adjacent to the treated surface and of short duration. Direct application to healthy surfaces in children also helps prevent caries.[12]

· ARREST ROOT CARIES

SDF treats caries by forming a layer of silver protein conjugate on a carious surface, increasing resistance to acid dissolution and enzymatic digestion. It acts directly against bacteria, outperforming other anticaries medicaments in killing cariogenic bacteria in dentinal tubules, penetrating 50 to 200 mm into dentin.[14] Epidemiological studies have shown that the incidence of root caries increases with age, and the prevalence of root caries in

elders are high.10 Zang et al. (2013) mentioned that due to its high ability to arrest dental caries, annual application of SDF is quite effective in arresting the caries on root surfaces.[15]

·TO DESENSITIZE THE SENSITIVE TOOTH

As SDF has an ability to occlude the dentinal tubule it can give promising results in patients with dentinal hypersensitivity. Kimura et al. (1971) have shown that SDF was the most effective against erosion and abrasion followed hypersensitive dentin to mechanical, cold, and heat sensation. It was also suggested that 4 times repeated application was the most appropriate and no further desensitizing effect could be obtained.[16]

·TO TREAT INFECTED ROOT CANAL

An ammoniated silver nitrate solution has been commonly used for the treatment of infected root canal. aqueous solution of AgF has powerful disinfectant and protein-coagulating actions, and also has a considerably potent action, which occludes the dentinal tubules of root canal wall in terms of the electric resistance.10 Hiraishi et al. (2010) mentioned that 3.8% SDF has potential to be used as an antimicrobial root canal irrigant or interappointment dressing, especially in locations in which potential browning/blackening of dentin by metallic silver is not a major concern.[17]

TO PREVENT SECONDARY CARIES

SDF helps prevent new caries from forming: when the treated surface is challenged by reacidification, silver is available for antimicrobial action upon release, and treated areas protect the whole mouth by causing the "zombie effect" whereby silver-killed bacteria kill living bacteria upon contact.[14]

CONTRAINDICATIONS OF SDF

The foremost contraindication is patient allergic to Silver. Additionally, teeth with evidence of pulpitis or pulpal necrosis are not appropriate for SDF treatment and require surgical treatment. And in teeth with deep lesions where the carious dentin has been excavated are not candidates for SDF, due to the ammonia content and high pH, which may create a pulpal reaction.

INDICATION OF SDF

Patients who may benefit from SDF include those with high caries risk who have active cavitated caries lesions in anterior or posterior teeth. Patients presenting with behavioural or medical management challenges which do not allow conventional restorative treatments to be carried out. Aditionally, patients with multiple cavitated caries lesions that may not all be treated in one visit is such case, SDF can be used to arrest progression of lesion. Patients belonging to any remote area where dental access is very difficult, in such cases SDF can be applied in single visit.[18]

TECHNIQUE

· Obtain written informed consent from parents or caregiver

· Assemble armamentarium: 38% SDF solution: microbrush, plastic dappen dish, and cotton rolls.

· Dispense 1 drop (25 mL) of solution. Recommended limit is 1 drop per 10 kg per treatment visit, at weekly intervals.

· Apply lubricant to lips to prevent temporary discoloration of tissue.

· Establish cotton roll isolation to minimize metallic taste.

· Air-dry lesions to be treated. Suction to avoid inadvertent swallowing of the solution

· Apply SDF to the affected root surfaces with a microbrush for 1 minute.

· Apply GIC to cavitated surfaces to restore cleansable contours if indicated.

· Instruct patient to rinse thoroughly and expectorate.

· Advise patient that there is no waiting period for eating or drinking.

· Repeat the treatment twice yearly to maintain caries arrest.[17]

FOLLOW UP

Estimations of SDF effectiveness in arresting dental caries lesions range from 47 to 90 percent with one-time application depending on size of the cavity and tooth location. Follow-up at two to four weeks after initial treatment to check the arrest of the lesions treated. Reapplication of SDF may be indicated if the treated lesions do not appear arrested (dark and hard). Caries lesions can be restored after treatment with SDF. When lesions are not restored after SDF therapy, biannual reapplication shows increased caries arrest rate versus a single application.[18]

DRAWBACK OF SDF

The inherent drawback of using SDF to arrest caries is that the lesions will be stained black. It has been suggested that when carious dentin was treated with SDF, silver phosphate was formed, and this was insoluble. Silver phosphate is yellow when it is first formed, but readily turns black under sunlight or the influence of reducing agents.[10]

SDF can be made esthetic by either doing composite restoration over it or GIC restoration over it. However, SDF can interfere with bonding procedure of composite. Hence, SMART technique (Silver Modified Atraumatic Restorative Technique) has been introduced in which GIC is done after SDF application. But the margins still remains black.

To overcome this limitation Knight et al. proposed to used Potassium iodide after application of SDF to the tooth structure remaining free silver ions in solution will react with Potassium Iodide to precipitate creamy.[19]

Furthermore, SDF can cause gum irritation and it has metallic taste.

SAFETY OF SDF

SDF has been used safely for over 100 years in the U.S., Japan, and other countries with no reports of adverse reactions. Where SDF contacts soft tissues, a small, mildly painful white lesion can occur, which resolves in 48 hours without additional treatment.14 A short-term study done by Vasquez et al.[20] found that serum concentrations of fluoride and silver after topical application of SDF should pose little or no toxicity risk when used in adults. When applied by a professional with appropriate care, SDF is likely safe. The gingiva and oral mucosa are not inflamed, ulcerated or pigmented.

CONCLUSION

The technique presented is the application of SDF to arrest root caries. Significant data are available on the effectiveness of SDF in the prevention and treatment of dental caries in children, elders, and people with a variety of medical conditions. Although not a substitute for traditional restorations, SDF is a useful agent in the medical management of disease in those patients unable to tolerate, afford, or gain access to traditional restorative dentistry.

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Review Article

ROLE OF ARTIFICIAL INTELLIGENCE IN ORAL MEDICINE AND RADIOLOGY -A REVIEW

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ABSTRACT

Artificial intelligence (AI) are machines that are able to mimic the cognitive functions of humans to perform tasks of problem-solving and learning. Although artificial intelligence (AI) has been a focus of dental research for decades, in the last decade, the field of radiology has seen tremendous innovation and also public focus due to development and application of machine-learning techniques. Artificial Intelligence (AI) involves an array of devices, solutions, and codes ranging from a simple calculator to complex machine learning devices.AI has been at the centre of discussion among radiologists. Artificial intelligence is becoming important in radiology due to its ability to detect abnormalities in radiographic images that are unnoticed by the naked human eye. Automation may help to save time and enhance the procedures. Although AI cannot substitute the position of dentist or oral-radiologist, the precise and efficient analysing of radiographic images by artificial neural networks provides interesting diagnostic possibilities for the future and would definitely be an important part of oral radiology. This article discusses the role of radiologists in imaging AI and suggests specific ways they can be engaged by considering the clinical need for AI tools in specific clinical use cases and by undertaking formal evaluation of AI tools they are considering adopting in their practices.

INTRODUCTION

Artificial intelligence (AI) is defined as the capability of a machine to imitate intelligent human behaviour to perform complex tasks, such as problem solving, object and word recognition, and decision-making[1].In terms for better understanding, Artificial Intelligence (AI) has been characterized as computer frameworks ready to perform assignments typically requiring human insight for eg. mathematical calculations, weather forecasting, speech recognition, decision making, medical diagnosis etc.[2]A subset of AI, machine learning, can be used to teach machines and computers to analyse certain types of data using various algorithms.[3] India is a technologically advancing country that has yet to reach its full potential. Among the age group of 18-60 years, 70% of people use mobile phones in India, while 87% of 1.3 billion Indians have access to an internet connection.

The clinical use of AI programs in the dental profession has gained popularity over the last few years, and its possible applications in dentistry also need proper attention. Applications of AI programs in dentistry are quite interesting, especially in radiology, and AI can be a boon for novice dental practitioners. AI programs can help in the tracing of cephalometric landmarks; in the detection of caries, alveolar bone loss, and periapical pathosis; the auto-segmentation of the inferior alveolar nerve; the analysis of facial growth, and other similar tasks.[4]

MACHINE LEARNING

Machine learning is a component of artificial intelligence (AI) that teaches computers to think in the same way as humans do: to learn and develop from past experiences. This operates through data discovery, pattern recognition and requires minimal human involvement.

The machine learning can automate almost any task that can be completed with a data-defined pattern or collection of rules.

Machine learning uses two primary techniques:

1)Supervised learning

2) Unsupervised learning

Supervised learning enables data collection or data production from an earlier ML implementation. The computer in supervised learning is loaded with a series of labelled data points called a training set.

Unsupervised machine learning helps to discover all kinds of unexplained trends in the results. Through unsupervised learning, using only unlabelled samples, the algorithm tries to learn some intrinsic structure to the results. Clustering is done to organize data points into relevant cluster such that elements within a given cluster are found.[5]

AI IN ORAL RADIOLOGY

Advances in both radiology and AI have set a more noteworthy investigation on the capacity of the radiologist as a diagnostician, which basically involves two procedures: radiographic assessment followed by interpretation.[6] Both include the capacity to physically recognize an image and the perceptual skill to apply

object detection to differentiate nor mal from abnormal.[7] It is challenging, as human perception of stimuli will sometimes miss observations as cause errors .Radiologist negligence contributes to missing and prolonged detection, which may lead to poor health outcomes.

AI IN AUTOMATED ANALYSIS

For training set, the clinical expert analyses and prepare a certain dataset from vast amount of radiographs available. The annotation of the training data is done by a oral radiologist or a experienced clinician manually following which the AI software is trained, using those datasets to create a adapting dataset. The accuracy of the adapting data set is evaluated in the testing dataset (a fresh set of radiographs not evaluated previously). Thus, AI helps in automated analysis of the dental radiographs. Tuzoff et al (2019) found a sensitivity of 0.9941 and a precision of 0.9945 for automated teeth detection whereas for tooth numbering, the sensitivity and specificity were 0.9893 & 0.9994 respectively.[8]

AI in anatomical landmarks detection

Convolutional neural networks (CNN) permit exact edge recognition, and edge-based, region-based, and knowledge-based algorithms are utilized to find cephalometric landmarks. It can help to locate landmarks which are of low contrast, overlapping or of bad quality thus making it difficult to detect for a naked human eye. CNN helps in detection of anatomical in more accurately using pixel by pixel elaboration and knowledge based algorithms.[9] Thus automated analysis of dental radiographs enables the exact confinement of landmarks and can also be utilized with CT and MRI to recognize variations from the norm in pictures that may go unnoticed.[10]

AI IN DENTAL CARIES DETECTION

AI helps to identify interproximal caries using a series of bitewing radiographs. A pre-trained deep learning network can be used for diagnosis of dental caries in bitewing, periapical and as well as panoramic radiographs.[11] Lee et al (2018) found that within 3000 dental radiographs, the accuracy of identifying dental caries in premolars, molars, and both premolars and molars are 89%, 88%, and 82%, respectively.[12]

AI IN PERIAPICAL PATHOLOGIES DETECTION

AI can help in detection of periapical pathologies such as periapical cyst, granulomas and abscess which sometimes gets unnoticed by a clinicians eye.AI can accurately locate the exact boundaries of the lesions and enable proper detection. In the future, these systems will help in the early detection of peri-implantitis with appropriate interventions.[11]

AI IN DETECTION OF BONE LOSS

ANN will help radiologists to reduce cognitive bias and diagnostic efforts and further increase the diagnostic accuracy of the periodontal pathology. Koris et al (2019) found that neural network showed higher diagnostic performance, with an accuracy of 81%, than individual clinicians, who showed an accuracy of 76%, in the radiographic detection of periodontal bone loss (P=0.067).[13]

AI IN DETECTION OF ORAL CANCER

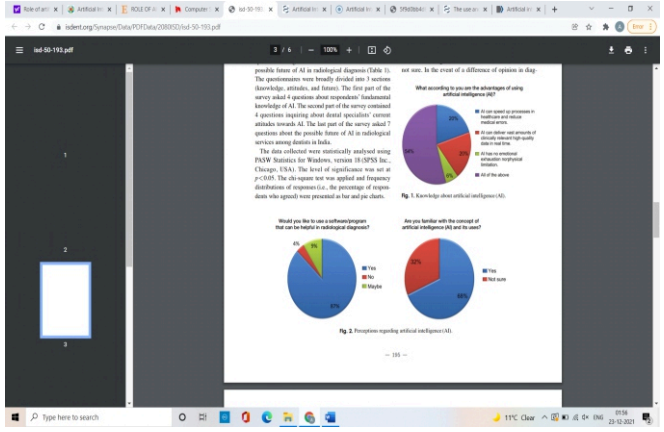
AI can also help in early diagnosis of oral carcinomas. ANN also been helpful in detection of cervical lymph node metastasis which may result in improving the prognosis of head and neck cancer. Kim et al (2019) found that deep learning improved prediction of cancer survival and helping experts in selecting better treatment options and reducing unnecessary treatment protocols. The accuracy they found of the training and testing sets were 81% and 78.1%, respectively.[14] Ariji et al (2019) mentioned the use of CNN enhanced the diagnosis of cervical lymph node metastasis. The performance of a CNN image classification system resulted in an accuracy of 78.2%, a sensitivity of 75.4%, and a specificity of 81.0%, comparable to that of experienced radiologists.[15]

CURRENT SCENARIO AND FUTURE PROSPECTS

Without doubt, AI seems to have a promising future ahead of it as a potentially 'game changing' device in oral radiology. However, this unprecedented technical progress has not come without the emergence of an aspect of uncertainty in the field of radiological research, a concern that has generated insecurity among the radiological communities around the world, as certain radiological practitioners doubt whether AI can eliminate the need for qualified radiologists. As a consequence, AI software showed

itself to be a capable second reader, still constrained by an important, although changed, false positives. However, IBM's $1 billion expenditure in its Watson Health Initiative, an algorithm already deployed in healthcare, shows faith in the potential of imaging AI. This expenditure would see Watson take 30 billion images to study from.[16]With such data tools, future AI technologies might be able to rely on algorithms that are far more reliable and effective, resolve high false positives and recall problems and identify anomalies in any imaging modality, including the detection of unusual and challenging cases that would otherwise be overlooked.

According to the survey by Jaideep Sur et al (2020)[17] of the 250 participating dentists, 68% were already familiar with the concept of AI, 69% agreed that they expect to use AI for making dental diagnoses, 51% agreed that the major function of AI would be the interpretation of complicated radiographic scans, and 63% agreed that AI would have a future in India (Fig 1-7).



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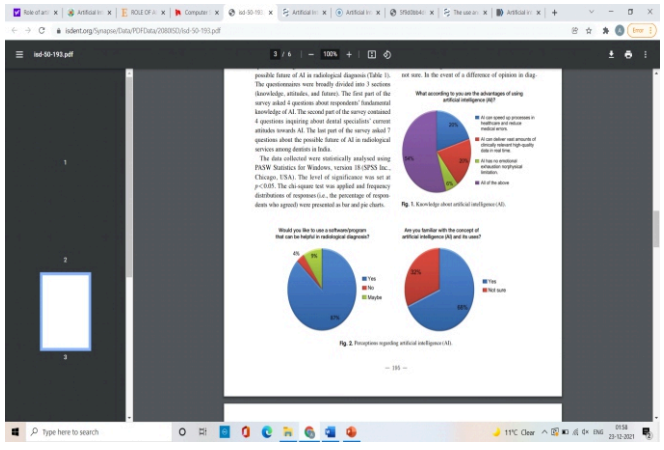

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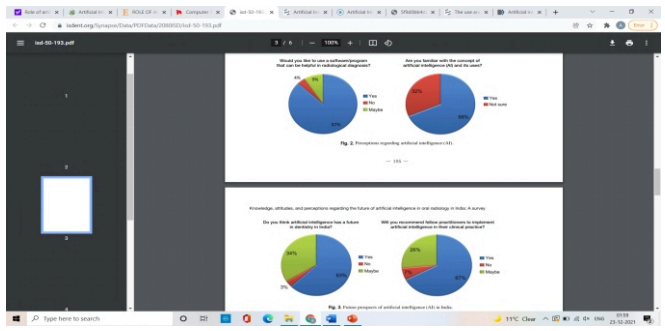

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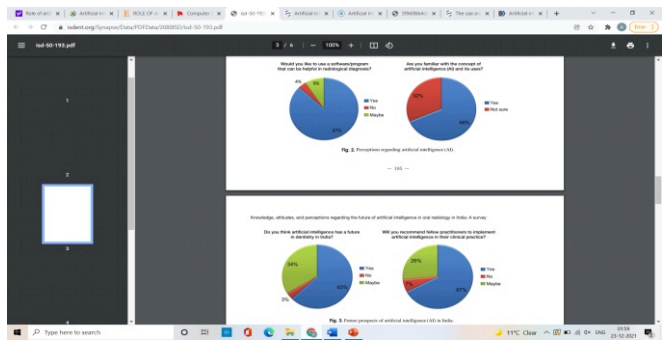

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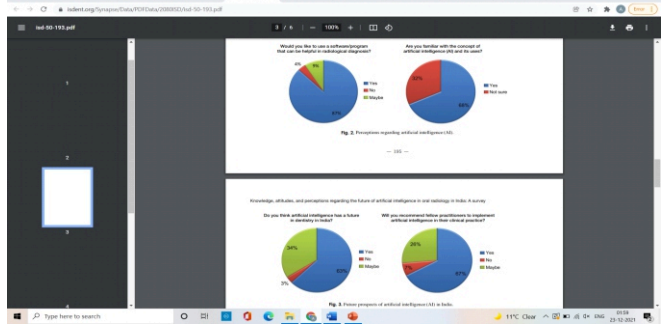

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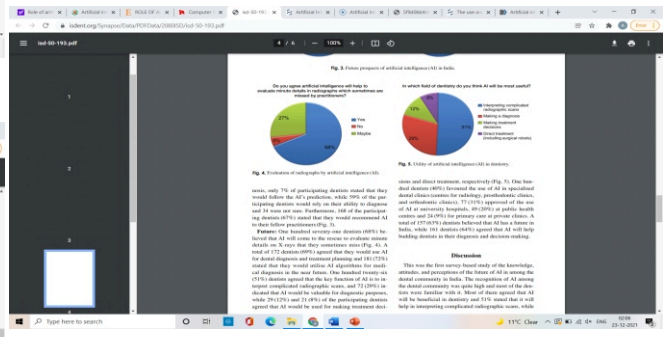

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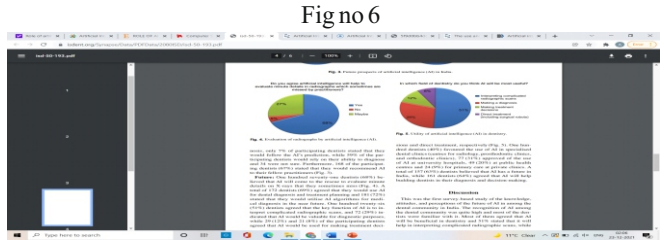

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CONCLUSION

The continual expansion of radiology in the healthcare process, the advances in imaging methods, and the volume of images they are producing, combined with the pressures of efficient workflow all create great demand for technologies that improve radiologist efficiency and reduce variation in practice without reducing accuracy. . Artificial intelligence (AI) is a breakthrough in the field of technology, which is rapidly progressing. The fact that many AI algorithms may not generalize to new data, combined with the regulatory pressures for rapid review and clearance, could cause unanticipated deleterious outcomes in clinical practice, particularly if the trade off of sensitivity and specificity of the AI tools is not optimal. Computer-aided teeth detection and numbering simplifies the process of filling out digital dental charts. Automation can help save time and improve the completeness of electronic dental records. While, AI cannot replace the role of the dentist or radiologist, accurate and fast processing of CT images by the artificial intelligence of a neural network offers exciting diagnostic opportunities for the future and will certainly be an integral part in point of care dental radiology.

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