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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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Contents

Original Article

ANTIMICROBIAL EFFECTIVENESS OF DIFFERENT ROOT CANAL IRRIGANTS ON THE VIABLILITY OF ROOT CANAL FLORA.

Rohit Sharma, John Johnson Panadan, Madhurima Sharma, Syeda Afeefa Tanweer

ABSTRACT

AIM:

The aim of this study was to evaluate and compare the antimicrobial effectiveness of various root canal irrigant solutions such as combination of 5.25 % NaOCl and 2% Chlorhexidine gluconate, 2% Chlorhexidine gluconate, Miswak extract and.Normal saline for root canal irrigation.

RESULT:

The results of this in vitro study revealed that the combination of 5.25 % NaOCl and 2% Chlorhexidine consistently disinfected infected root canals. Nearly half of the canals contaminated with E. faecalis and root canal bacteria are cleaned using Chlorhexidine Gluconate and Miswak. There was no antibacterial activity in normal saline.

CONCLUSION:

The antibacterial effectiveness of the combination of 5.25 % NaOCl and 2% Chlorhexidine gluconate was found to be higher than , 2% Chlorhexidine gluconate, Miswak extract and.Normal saline for root canal irrigation. A combination of 5.25 % NaOCl and 2% Chlorhexidine gluconate can be used as a better choice over the other three irrigants.

Key Words

Chlorhexidine,Miswak,NaOCl, root canal irrigation, sodium hypochlorite

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INTRODUCTION

Pulpal and periapical infections are initiated by bacteria.A successful endodontic treatment comes after proper disinfection and instrumentation of the root canals. The bacterial species that colonize in the root canal system is called as the root canal flora. The most prevalent bacterial species present in the root canals include diverse genera of gram negative (Treponema, Campylobacter,Vellionella,Tanerella) and gram positive (Actinomyces, Eubacterium, Strptococcus, Propionibacterium, E.faecalis). The bacterial prevalence in the infected root canals may vary from study to study with several factors such as specificity of detection, sampling technique sensitivity,difference in clinical diagnosis, identification methods geographic location and disease classification.

Gutierrez and Goldman proved that there are areas in an root canals that harbours microorganism even after biomechanical preparation. This is where the root canal irrigants has its significance. There are different irrigating solutions that could effectively reduce the bacterial load in the root canals. Irrigants enhance mechanical debridement by flushing out debris, dissolving tissue, and disinfecting the root canal system.Irregularities and fins that are present in the root canals might be missed by instrumentation.These can be effectively disinfected with the help of root canal irrigants. The various root canal irrigants include chemical agents such as NaOCl1,MTAD,Chlorhexidine,normal saline. Natural agents such as green tea, Miswak, Propolis, 2etc.The adequate usage of these irrigants is the key to successful root canal treatment. This article evaluates the anti microbial effectiveness of different root canal irrigants on the viability of root canal flora .

MATERIALS AND METHODS

Samples were collected from the infected root canals following access cavity preparation.3Once the access cavity is prepsred using sterile burs, the canals were sampled.Root canal humidification was done with the sterile saline.

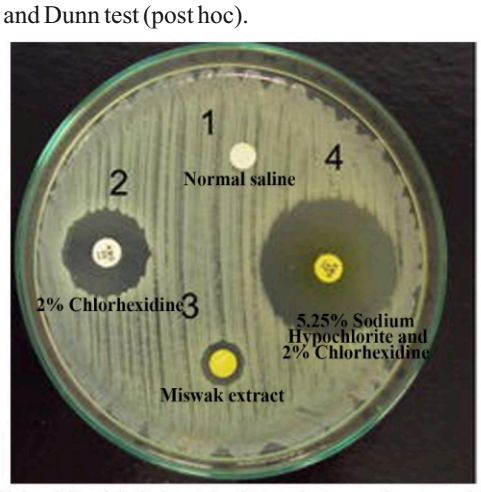
Paper points ISO 25 or 30 were inserted into the root canals for sampling.Radiographic length was estimated.Care was taken to insert the paper points 1mm short of this length.Paper point were placed inside the root canal for 60 seconds with pumping movements in order create a suspension inside the canal. Collection of the soaked paper points were done without any external contaminators.Paper points were placed immediately in a microtube with 2 ml of Reduced Transport Fluid4 (RTF). This procedure is repeated for each paper point. Microbiological evaluation was done in Goel Diagnostics Kashipur,Uttarakhand.Brain heart infusion media (BHI) was selected as the culture media.BHI was used for the propogation of pathogenic cocci and other fastidious organisms associated with infected root canals. The samples were cultured and incubated for 7 days in 37 degree celcius.Turbidity during the incubation period was indicative of positive growth. These culture plates were then treated with the following irrigants such as a combination of 5.25 % NaOCl and 2% Chlorhexidine gluconate, 2% Chlorhexidine gluconate, Miswak Extract and normal saline.The colony forming units were measured using viable A 24-hour pure culture of Enterococcus faecalis (ATCC 19433) verified by polymerase chain reaction was grown in BHI broth. Five milliliters of this culture was added to the 20-ml vial containing BHI broth. The agar diffusion method was used as a means for examining the antimicrobial effectiveness of root canal irrigants.A swab was dipped in the culture and seeded over the surface of an agar plate. The tips of a forceps were dipped in 70% alcohol, flamed rapidly and cooled. An antibiotic disc was picked and placed on the agar.The discs were pressed gently.The plates were separated evenly from each other.The plates were inverted and incubated overnight. Random sampling and Gram staining were done to confirm the viability and purity of the E faecalis culture. These discs were then microscopically evaluated for the microorganism and bacterial load.

RESULTS

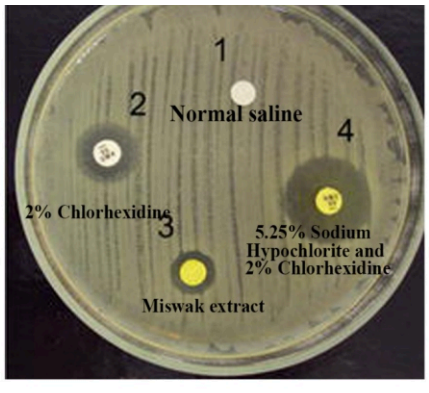
Presence of turbidity was seen all the BHI plates suggestive of bacterial growth. A tremendous distinction (p 0.01) among the whole range of CFUs of root canal vegetation and E. faecalis was seen inside the experimental groups.The culture

plates treated with combination of 5.25 % NaOCl and 2% Chlorhexidine gluconate no growth, while those treated with 2%Chlorhexidine Gluconate produced a of 0.0600×106 for root canal flora CFU/ml and 0.0004×106 E. faecalis .The culture plates treated with Miswak extract showed 2.6×106 CFU/ml for root canal flora and 1.6×106 CFU/ml for E. faecalis . The culture plates treated with Normal saline 6.0×106CFU/ml5 for root canal flora and E. faecalis.The agar diffusion method was used as a means for examining the antimicrobial effectiveness of root canal irrigants.It was seen that combination of 5.25 % NaOCl and 2% Chlorhexidine gluconat had a maximum zone of inhibition of 44mm for normal flora and 35 mm for E,faecalis, while the zone of inhibition for 2% Chlorhexidine gluconate, was 29 mm for for normal flora and 22 mm for E,faecalis,, and the zone of inhibition for Miswak extract, was 8 mm for for normal flora and 10 mm for E,faecalis.Normal saline didn't show any zone of inhibition. The study was analyzed statistically using Kruskal-Wallis test and Dunn test (post hoc).The nascent chlorine that is present in Sodium Hypochlorite is responsible for its antibacterial property.

When testing as an irrigant, we utilise freshly made sodium hypochlorite solutions, which are the most active. Significant differences in the ability of 2% Chlorhexidine Gluconate,Miswak extract, combination of 5.25 % NaOCl and 2% Chlorhexidine and normal saline to disinfect the canals was found using Kruskal-Wallis test and Dunn test (post hoc).



Antimicrobial activity of the irrigants in vitro against normal root canal flora. The zone of inhibition is in millimeter



Antimicrobial activity of the irrigants in vitro against E. faecalis. The zone of inhibition is in millimeter

Normal root canal flora	
Irrigant	**Viable count cfu/ml**
Chlorhexidine 2%	0.0600×10^{6}
Sodium Hypochlorite 5.25% and 2% Chlorhexidine	No growth
Miswak extract	2.6×10^{6}
Nomal Saline	6.0×10^{6}

E.*Faecalis*	
Irrigant	**Viable count cfu/ml**
Chlorhexidine 2%	0.0004×10^{6}
Sodium Hypochlorite 5.25% and 2% Chlorhexidine	No growth
Miswak extract	1.6×10^{6}
Nomal Saline	6.0×10^{6}

DISCUSSION

The intention of this study was to determine which root canal irrigant showed better antimicrobial efficacy towards root canal flora and E.faecalis from infected root canals. E. faecalis was selected as the test organism because it has been related to continual apical infection in scientific conditions and secondary endodontic infections. Chlorhexidine is a good final irrigating solution for E. faecalis eradication.7 8. The culture plates were cultured with E. faecalis and microbial flora for 1 week in this investigation.

Two microbial samples were collected from each tooth. When compared to the usage of 2% Chlorhexidine, Miswak, and normal saline, the results of this study demonstrated that combination of 5.25 % NaOCl and 2% Chlorhexidine gluconate dramatically reduced intracanal bacteria levels.9,10,11,12

The approach utilised in this study was designed to mimic an in vitro clinical scenario in order to assess the efficacy of combination of 5.25 % NaOCl and 2% Chlorhexidine gluconate, 2% Chlorhexidine Gluconate, Miswak extract, and normal saline on E. faecalis and normal root canal flora. In this study, the efficiency of 2 percent Chlorhexidine Gluconate,

Miswak extract, and normal saline in consistently disinfecting root canals contradicts the findings of their analysis.[13,14] The study's microbiological sampling procedure techniques may be to account for the discrepancies in the results.

Conclusion

The antibacterial effectiveness of combination of 5.25 % NaOCl and 2% Chlorhexidine gluconate was found to be higher than , 2% Chlorhexidine gluconate, Miswak extract and.Normal saline for root canal irrigation. A combination of 5.25 % NaOCl and 2% Chlorhexidine can be used as a better choice over the other three irrigants for root canal disinfection.

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Original Articles

COMPARATIVE EVALUATION OF CRESTAL BONE LOSS IN IMPLANT-IMPLANT AND TOOTH-IMPLANT SUPPORTED FIXED PARTIAL DENTURE-AN IN VIVO STUDY

Anuja Thakur, Archna Nagpal, Rajeev Gupta, Pankaj Pathania, Aroosa Ahmed ZMirza

ABSTRACT

Purpose: To compare implant connected and tooth connected implant supported fixed partial dentures in posterior mandible, clinically and radiographically.

Materials and methods: 20 partially edentulous patients with age between (25-70) years old of mandibular class II Kennedy classification were equally divided into two groups receiving a three unit fixed partial denture.

Group (I): Patients with unilateral missing mandibular molars and premolars. Implant placement was done in mandibular first premolar and first molar region.

Group (II): Patients were selected with edentulous molar and premolar region with the mandibular first premolar having periodontal health and good bone support. An implant was then placed at the mandibular first molar area and preparation of the first premolar was done. Each case was evaluated clinically and radiographically at base line (at denture insertion) and after 3, 6 and 12 months. Data obtained is then statistically analyzed using one way ANOVA test.

Results: There was no statistical significance difference between the two groups ($P > 0.05$).

CONCLUSIONS:

The tooth-implant supported prosthesis shows predictable treatment option as the totally implant-supported prosthesis concerning implant survival and loss of marginal bone.

Keywords: Osseointegration, tooth-implant supported prosthesis, implant-supported prosthesis, marginal bone.

INTRODUCTION

The objective of current dentistry is to return patients to oral wellbeing in an anticipated design. A partial and complete edentulous patient may be unable to recover normal function, esthetics, comfort, or speech with traditional removable prosthesis.[1]

Oral implantology has been forming into a specific field since the 1930s under the drive of Formiggini (the dad of current implantology in Egypt) and Zepponi.[2] However, contrasted and clinical applications, the circumstance of hypothetical concentrate in the field had stayed in its outset for a long time, which changed in 1950, when Professor Branemark from the University of Gothenburg in Sweden set forth the osseointegration hypothesis[3-7], and prompted a gigantic advancement in oral implantology. The progress of dental inserts is generally ascribed to what is known as "osseointegration," a term initially characterized by Branemark in 1952. Osseointegration infers a harbor system, by which prosthetic parts can be dependably and typically integrated into living bone, and that this jetty can endure under all ordinary stacking conditions.[8] Connecting inserts and teeth is in some cases considered for the help of prostheses in partial edentulism . The published literature demonstrates the existence of considerable controversy and debate on whether it is recommendable to splint teeth to implants.[9-15]

It is widely accepted that it is less than ideal to connect rigid ankylosed implants to relatively mobile dentition.[16-19] Nonetheless, not withstanding their restrictions, a few long haul clinical investigations didn't exhibit unfriendly impacts of connecting regular teeth to dental inserts.[20-23] The implant-tooth supported bridges function in their biological environment without adversely affecting it.[24]

Some investigates [19-21,24-29] upheld connecting teeth to inserts essentially founded on the satisfactory results of such treatment, while others [13, 14, 17, 30-34] called attention to the significance of keeping away from such worldview when conceivable because of the distinction in help at the two finishes of the framework. Belser et al.[26] proposed that "a blend of embed and tooth support for fixed incomplete false teeth is adequate." High levels of patients' fulfillment with embed and tooth upheld fixed prosthesis were accounted for. [27] Also, Lindh [34] concluded that teeth should not be extracted for the sake of avoiding tooth-implant connection and that connecting teeth and implants is a practical option for supporting fixed bridges.

Many investigations exhibited no disadvantageous impact of associating abutment teeth to inserts (implants) by fixed partial

dentures. Also, there are no harmful effects of this system to the opposing teeth[23] Fixed partial dentures supported solely by implants or by teeth and implants were reported to provide fully satisfactory function and had similar high levels of predictability.[35]

Then again, a few specialists showed that inserts would be wise to endurance rates on the off chance that they were not joined with teeth for supporting fixed partial denture. [36] They concluded that connecting teeth and implants should only be restricted for situations including anatomical limitations, implant failure, and patient economic status and preferences. [36]

MATERIALAND METHODOLOGY

The adequate number of patients with Kennedy class I or class II edentulous spaces in mandible were divided into group A and group B, who were selected for implant treatment.

Inclusion criteria:

· Patients requiring tooth- to- implant fixed prosthesis

· Patients requiring implant-to- implant fixed prosthesis

· Patients with unilateral loss of posterior mandibular teeth

· Patients with fixed or removable opposing dentitions

· Patients free from active periodontal disease

· Patients with Kennedy's class I and II

· Suitable patients under 75 years of age able to give informed consent

· Non diabetic, non hypertensive, non smokers

· Bone height of at least 10 mm in the posterior mandible

EXCLUSION CRITERIA:

· General health conditions not permitting implant surgery

· Non treated problems in the residual anterior mandibular dentition

· Radiation treatment to head and neck

· Patients with any debilitating disease which does not allow surgeries

The patients were sequentially remembered for the review as indicated by predefined standards for incorporation and avoidance.

Study was completed in different phases which are as follows-

SURGICAL PHASE:

The osteotomy was performed under local anaesthesia. After that the implant site was prepared to a final diameter of what is required, and implant of an adequate length and diameter was used .

A two stage technique was used with a 3-6 months submerged healing period prior to abutment connection. For first 10-14 days, areas of primary healing were left unloaded. After removal of sutures, the patients were fitted with the existing prosthesis temporarily.

PROSTHETIC PHASE:

The mandibular prosthetic reconstruction involves implant –implant supported prosthesis in some patients and some patients were given prosthesis supported by tooth and an implant in combination.

CLINICAL EXAMINATION:

The patients were examined within the time interval of 3, 6 and 12 months. At each recall visit, both soft and hard tissue variables, as well as complications were recorded.

RADIOGRAPHIC EXAMINATION:

The marginal bone level was measured in a uniform manner on the intra oral radiographs. The measurements of marginal bone level on the radiographs were repeated after a month to determine the precision of the procedure.

Bone level [21], probing depth [22], biomechanical complications, periapical and Panoramic X-ray films were used to measure the marginal bone loss around the

implants. The long cone paralleling technique was used. The peripheral bonelevel estimations were produced using the reference highlight the most minimal noticed resource of the negligible bone with the apparatus. The reference point for the installation was the fixture abutment interface and for the tooth was the edge of the adapting (coping). The distance was estimated to the closest 0.01 mm. only the verical bone loss was estimated.

All clinical and radiographic information were arranged for every person and gathering (group). Outline measurements (mean, standard deviation) were determined and furthermore classified for each review bunch. The ANOVA model included impacts for

treatment gathering, time and treatment bunch time communication to test the speculation that no distinction exists between the treatment bunches over the subsequent period. For each clinical measure and for the radiographic proportion of assessment, the rehashed measures ANOVA was directed between the normal of the two embeds first gathering and the embed second gathering.

Factual evaluation of the regular tooth was done independently, where a one-way ANOVA was utilized to survey the distinctions during follow up period.

RESULTS:

The normality of the data was tested by Shapiro Wilk test. The data distribution was found to be parametric. Therefore, parametric tests were opted to analyze the data.

1. Intragroup comparison is done by paired t-test.
2. Intergroup comparison was done by repeated measure one way ANOVA.

Descriptive statistics was computed as mean depicting central tendency and standard deviation and minimum and maximum values as the measure of dispersion. Data was analyzed using SPSS statistical software package version 16.0.

Table 1. Descriptive statistics for bone loss in double implant (N=10) and single implant (N=10) group at different time intervals.

Time Intervals	Groups	Mean	SD	Min	Max
Baseline	Group A- double implant	0.153	0.93	0.02	0.21
	Group B – single Implant	0.150	0.07	0.01	0.23
3 months	Group A- double implant	0.157	0.05	0.05	0.22
	Group B – single Implant	0.188	0.08	0.07	0.28
6 months	Group A- double implant	0.209	0.05	0.13	0.32
	Group B – single Implant	0.233	0.06	0.12	0.29
12 months	Group A- double implant	0.255	0.04	0.21	0.33
	Group B – single Implant	0.253	0.05	0.15	0.32

Descriptive statistics of the bone loss data for single and double implant group is presented in table 1. It appeared that for both the groups an increasing trend of bone loss was observed across the study/ follow up periods from baseline to 12 months.

For the double implant group, the mean bone loss increased from 0.153 at baseline to 0.255 at 12 months, whereas in single implant group, the bone loss increased from 0.150 at baseline to 0.253 at 12months.

The trend of bone loss at different time intervals for single and double implant group is presented in figure 1.

Figure 1: Bone loss in double and single implant group across study/ follow up periods.

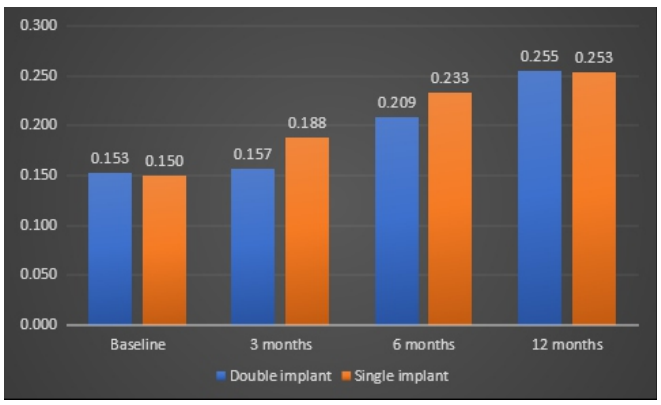
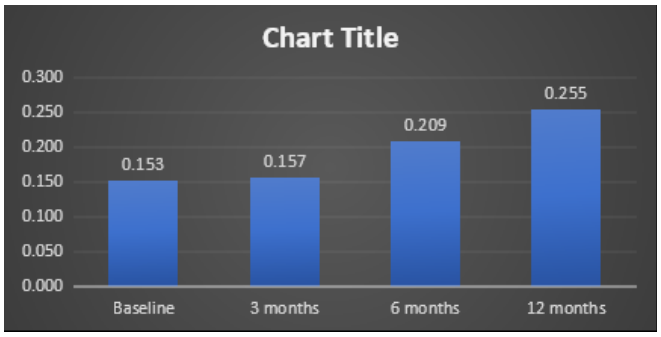


Table 2. Paired comparison of bone loss across different time intervals in double implant group (intragroup comparison)

Time pairs interval		Mean bone loss		Paired comparison				
Pair 1	Pair 2	Mean Pair 1	Mean Pair 2	Mean diff	SE of mean	Df	T	P
Baseline	3 month	0.153	0.157	-0.047	0.0291	9	-2.60	0.03
3 month	6 month	0.157	0.209	-0.052	0.011	9	-4.496	0.001
6 month	12 month	0.209	0.255	-0.046	0.01	9	-4.432	0.002

Figure 2. Bone loss in double implant group across follow up periods



The ANOVA result showed that at all time intervals a statistically significant difference is present in the mean values of bone loss across different groups.

Table 7. Multiple comparison test (post hoc Tukey Test)

Dependent Variable	Group category 1	group category 2	Mean Difference (Gr 1 – Gr 2)	Std. Error	Sig.
Baseline	Double implant	Single implant	0.00	0.06	1.00
		Tooth support	-.16400*	0.06	0.02
	Tooth support	Single implant	.16700*	0.06	0.02
3 month	Double implant	Single implant	-0.03	0.06	0.86
		Tooth support	-.15685*	0.06	0.03
	Tooth support	Single implant	0.13	0.06	0.09
6 month	Double implant	Single implant	-0.02	0.06	0.90
		Tooth support	-.14640*	0.06	0.04
	Tooth support	Single implant	0.12	0.06	0.10
12 month	Double implant	Single implant	0.00	0.05	1.00
		Tooth support	-.14050*	0.05	0.04
	Tooth support	Single implant	.14200*	0.05	0.03

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

The multiple comparison presented in table 7 show no statistically significant difference between double and single implant group groups when comparing the bone loss level across different study/ follow up points.

Table 8. Descriptive statistics for probing depth double implant (N=10) and single implant (N=10) group at different time intervals.

Time intervals	Group A- double implant				Group B - Single implant			
	mean	sd	min	Max	mean	sd	min	Max
Baseline	1.47	0.66	0.50	2.20	1.86	0.68	1.00	3.00
3 month	1.18	0.64	0.10	2.10	1.60	0.81	0.70	2.80
6 month	0.93	0.65	0.00	2.00	1.37	0.73	0.60	2.70
12 month	0.72	0.57	0.00	1.50	1.07	0.71	0.20	2.00

Descriptive statistics of the probing depth (PB) for double and single implant group is presented in table 8. The mean probing depth was found to decrease in both the groups across the study/ follow up periods from baseline to 12 months.

For the double implant group, the mean PB decreases from 1.47 ± 0.66 at baseline to 0.72 ± 0.57 at 12 months, while mean PB at 3 month and 6 month showed intermediate values with gradual decreasing trend.

Similarly, for the single implant group, the mean PB decreases from 1.86 ± 0.68 at baseline to 1. 07 ± 0.71 at 12 months, with a gradual decreasing trend. The mean PB for single implant group at all time intervals were higher as compared to the double implant group.

Figure 5. Probing depth in double and single implant group across the follow up periods.

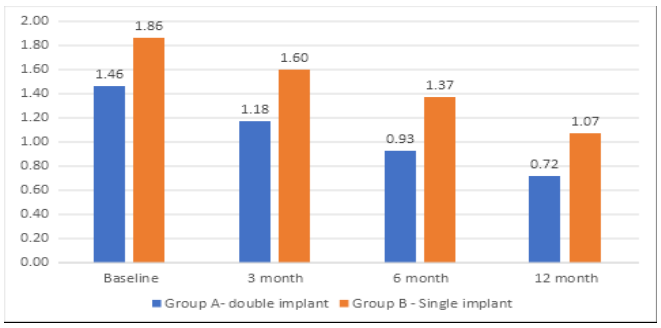


Table 9. Descriptive summary of probing depth in tooth group

	mean	SD	Min	Max
Baseline	1.46	0.78	0.00	2.50
3 month	1.37	0.53	0.70	2.30
6 month	1.14	0.65	0.30	2.20
12 month	0.93	0.59	0.10	2.10

The mean probing depth for the tooth group varied between 1.46 ± 0.78 at baseline to 0.93 ± 0.59 at 12 months showing a gradual declining trend across the study points.

current generation of dental implants was first presented to the dental profession by Dr P.I. Brånemark in 1977, but their use was restricted primarily to anterior edentulous mandible. Success of osseointegrated implants became apparent, so the use of implants expanded to include anterior and posterior regions of both arches in edentulous and partially edentulous patients.[38]

However, a controversy developed regarding whether implants should be connected to natural abutments or self-supporting (namely, not connected to natural abutments).[38] The problem with a combination of implant-to-natural-tooth–supported prosthesis originated from knowledge that the tooth and the osseointegrated embed have divergent portability designs. A characteristic tooth with a sound periodontal ligament will move 50 to 200 μm. An osseointegrated implant usually said to move only 10 μm, which is primarily because of the bone flexure. This disparity caused some investigators to caution against the connection of implants to natural tooth or teeth with rigid connectors.

Certain authors pushed unbending connectors to interface inserts and normal teeth,5,11 while some have turned around their situations over time.12 furthermore, there has been no settlement on how embed upheld prosthesis ought to be associated with regular abutments. [38] The present study was conducted to compare crestal bone levels clinically and radio graphically in two groups.

A total of 20 patients (male and female) with age group of 20 to 70 were randomly selected according to some exclusion and inclusion criteria. All subjects satisfying the inclusion criteria were informed about the nature of the study and their informed consent were taken.

Patients were equally divided into mainly two groups. Groups were formed depending upon how a 3-unit bridge is supported. In Group A (the double implant group) in which a 3-unit bridge is supported by two implants, and the group B (the single implant group), in which a 3-unit bridge is supported by a tooth and an implant. Two parameters were observed; bone loss, and probing depth.Both parameters were observed under three categories.

Further group B is divided into two groups:

1. Bone loss / Probing depth for double implant support (in group A)
2. Bone loss/ Probing depth for tooth support (in group B)
3. Bone loss/ Probing depth for implant support (in group B)

In all the above three categories, the parameters were observed across different time intervals, viz, baseline, 3 month, 6 months and 12 months. To find any change in the mean values of bone loss and probing depth across different time intervals in a category,intragroup comparison and intergroup comparison was done to evaluate in which category, the bone loss or probing depth is higher or lower.

The normality of the data was tested with the help of Shapiro Wilk test. The data distribution was found to be parametric. Therefore, parametric tests were opted to analyze the data.

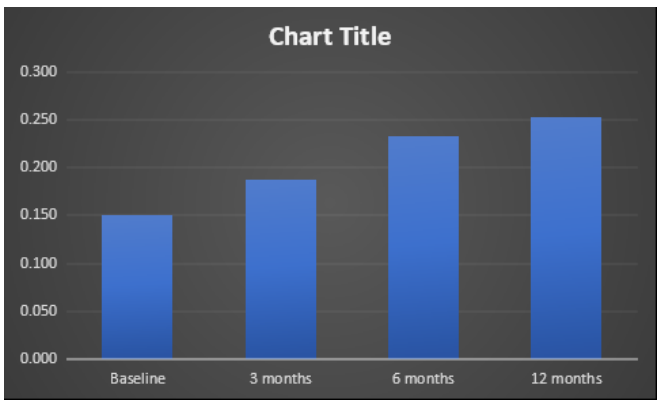
1. Intragroup comparison is done by paired t-test.
2. Intergroup comparison was done by repeated measure one way ANOVA.

Descriptive statistics was computed as mean depicting central tendency and standard deviation and minimum and maximum values as the measure of dispersion. Data was statistically analyzed using SPSS statistical software package version 16.0. It appeared that for both the groups an increasing trend of bone loss was observed across the study/ follow up periods from baseline to 12 months. For the double implant group, the mean bone loss increased from 0.153 at baseline to 0.255 at 12 months, whereas in single implant group, the bone loss increased from 0.150 at baseline to 0.253 at 12 months. The mean probing depth was found to decrease in both the groups across the study/ follow up periods from baseline to 12 months. For the double implant group, the mean PB decreases from 1.47 ± 0.66 at baseline to 0.72 ± 0.57 at 12 months, while mean PB at 3 month and 6 month showed intermediate values with gradual decreasing trend. Similarly, for the single implant group, the mean PB decreases from 1.86 ± 0.68 at baseline to 1.07 ± 0.71 at 12 months, with a gradual decreasing trend. The mean PB for single implant group at all time intervals were higher as compared to the double implant group. Bone level-

Table 3. Paired comparison of bone loss across different time intervals in single implant group (intragroup comparison)

Time interval pairs		Mean bone loss		Paired comparison				
Pair 1	Pair 2	Pair 1	Pair 2	Mean difference	SE of mean	df	T	P
Baseline	3 month	0.15	0.188	-0.038	0.0096	9	-9.43	0.003
3 month	6 month	0.188	0.233	-0.045	0.0088	9	-5.08	0.001
6 month	12 month	0.233	0.253	-0.02	0.0051	9	-3.87	0.004

Figure 3. Bone loss in single implant group across follow up periods



Results in Table 2, 3 and Fig. 2, 3 show there was a statistically significant difference in bone level within a group (single and double implant groups) across the different time points in the study follow-up period.

Table 4. Descriptive statistics for bone loss in tooth supported group at different time intervals (N=10).

Time Intervals	Mean	SD	Min	Max
Baseline	0.317	0.19	0.10	0.65
3 months	0.314	0.20	0.10	0.73
6 months	0.355	0.20	0.16	0.78
12 months	0.395	0.19	0.22	0.82

Descriptive statistics for bone loss in tooth supported group showed that the mean bone was varied between 0.317 at baseline to 0.395 at 12 months. An increasing trend is observed in bone loss across the study/ follow up period.

Figure 4. Bone loss in tooth supported group across follow up periods

Table 5. Paired comparison of bone loss across different time intervals in tooth supported group (intragroup comparison)

Time interval pairs		Mean bone loss		Paired comparison				
Pair 1	Pair 2	Mean Pair 1	Mean Pair 2	Mean diff	SE of mean	df	T	P
Baseline	3 month	0.317	0.314	0.003	0.0449	9	0.067	0.95
3 month	6 month	0.314	0.355	-0.041	0.0099	9	-4.125	0.003
6 month	12 month	0.355	0.395	-0.04	0.0056	9	-7.171	0.000

Results in Table 5show a statistically significant difference for bone level of the tooth supported group across3rd to 6th month and 6th to 12 months point. Difference for bone level across baseline to 3rd month was statistically non-significant.

INTERGROUP COMPARISON

Table 6. Repeated measure ANOVA to compare between the mean values of bone loss of different categories at different time intervals

Time intervals		SS	df	MS	F	Sig.
Baseline	Between Groups	0.183	2	0.091	5.489	0.01
	Within Groups	0.449	27	0.017		
	Total	0.632	29			
3 months	Between Groups	0.138	2	0.069	4.152	0.03
	Within Groups	0.449	27	0.017		
	Total	0.587	29			
6 months	Between Groups	0.123	2	0.062	3.851	0.03
	Within Groups	0.431	27	0.016		
	Total	0.554	29			
12 months	Between Groups	0.133	2	0.067	4.688	0.02
	Within Groups	0.383	27	0.014		
	Total	0.516	29			

Table 10. Intra group comparison of probing depth for double and single Implant Group at different time intervals

Group	Time intervals	Paired Statistics		Samples		Paired Differences				
		Mean	N	SD	SE	Mean	SE	T	Df	*P – value
Double implant group	Baseline	1.47	10	0.659	0.208	0.29	0.089	3.267	9	0.01
	3 months	1.18	10	0.643	0.203					
	3 months	1.18	10	0.643	0.203	0.25	0.069	3.617	9	0.01
	6 months	0.93	10	0.645	0.204					
	12 months	0.72	10	0.57	0.179					
Single implant group	Baseline	1.86	10	0.68	0.216	0.26	0.12	2.21	9.00	0.05
	3 months	1.6	10	0.81	0.257					
	3 months	1.6	10	0.81	0.257	0.23	0.07	3.36	9.00	0.01
	6 months	1.37	10	0.73	0.232					
	6 months	1.37	10	0.73	0.232	0.30	0.10	3.03	9.00	0.01
	12 months	1.07	10	0.71	0.223					
Tooth group	Baseline	1.46	10	0.78	0.246	0.090	0.199	0.452	9	0.66
	3 months	1.37	10	0.53	0.166	0.230	0.075	3.083	9	0.01
	6 months	1.14	10	0.65	0.205					
	6 months	1.14	10	0.65	0.205	0.210	0.096	2.188	9	0.06
	12 months	0.93	10	0.59	0.187					

Intragroup comparison of the difference in probing depth across study time points for different groups is presented in table 9. The paired comparisons between the probing depth across different study time point show that for both the double and single implant group, the mean differences across all study points are highly statistically significant, however, for the tooth group, the mean differences between the 3rd and 6th month was not statistically significant (p = 0.66)

Table 11. Intergroup comparison of probing depth in single and double implant group

Time interval	*double implant*	*single implant*	*mean diff*	*df*	*T*	*P*
Baseline	1.465	1.86	-0.395	18	-1.316	0.205
3 month	1.18	1.60	-0.425	18	-1.296	0.211
6 month	0.93	1.37	-0.45	18	-1.439	0.167
12 month	0.72	1.07	-0.35	18	-1.223	0.237

The intergroup comparison of PB between the double and single implant group showed that at all the time intervals the mean differences in PB was statistically non-significant.

DISCUSSION:

A dental embed (implant) is one of the treatment to supplant missing teeth. Dental implants have numerous advantages over conventional fixed partial denture.[37]

1. A high achievement rate (above 97% for a long time)
2. Diminished risk of caries and endodontic issues of nearby teeth.
3. Improved maintenance of bone in edentulous site
4. Decreased sensitivity of adjacent teeth

A dental implant is made of alloplastic materials implanted into the oral tissues beneath the mucosa or periosteum and/or within or through the bone to provide maintenance and backing for a fixed or removable dental prosthesis.

Implant dentistry the second oldest dental profession; where as exodontia (oral surgery) is the oldest. Around 600 AD, the Mayan population used pieces of shells with in the style of dental implants to replace mandibular edentulous areas with teeth. In 1809, J. Maggiolo used a gold implant tube to insert it into a fresh extraction site. Endosseous implant was developed by Formiggini (the father of contemporary implantology)The subperiosteal implant was developed in the 1940s by Dahl in Sweden. In 1946 Strock designed a two-stage screw implant Branemark who helped in the evolution of the concept of osseointegration.The

Results show no statistically significant difference between treatment groups when comparing the bone level for the average of the two implants in group 1 and the implant in group 2. There was a statistically significant difference in bone. level within a subject across the different time points in the study follow-up period irrespective of the treatment group However, the difference in bone level across study time points (Group*Time) was not genuinely critical for the two treatment groups.

Results show a statistically significant difference for bone level of the tooth in group 2 across different study time points.Although there was radiographically more bone loss around implant connected to teeth than implants connected together; this was not statistically significant, these findings agree with results reported in other studies after follow up period. [39]

Probing depth- The mean probing depth was found to decrease in both the groups across the study/ follow up periods from baseline to 12 months. For the double implant group, the mean PB decreases from 1.47 ± 0.66 at baseline to 0.72 ± 0.57 at 12 months, while mean PB at 3 month and 6 month showed intermediate values with gradual decreasing trend. Similarly, for the single implant group, the mean PB decreases from 1.86 ± 0.68 at baseline to 1. 07 ± 0.71 at 12 months, with a gradual decreasing trend. The mean PB for single implant group at all time intervals were higher as compared to the double implant group. Results show no statistically significant difference between treatment groups when comparing the Probing depth for the average of the two implants in group 1 and the implant in group 2 .There was a statistically significant difference in probing depth within a subject across the different point of time in the study follow-up period irrespective of the treatment group . However, the difference in probing depth across studytime points (Group*Time) was not statistically significant for the two treatment groups.

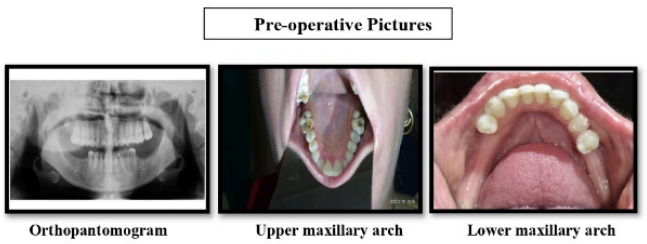
In the present study, the probing depth that is reliable diagnostic parameter in the continuous monitoring of both periodontal and peri-implant tissue.

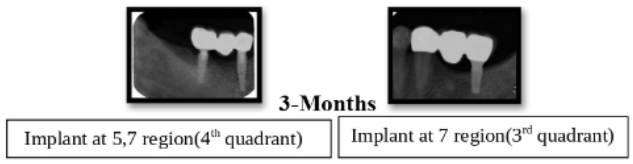
CONCLUSION:

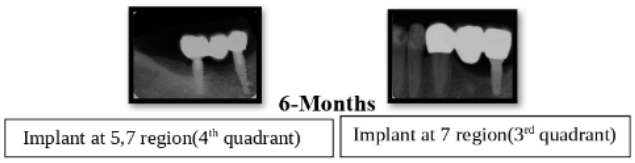
Our study suggests that the tooth-implant supported prosthesis, is an equal predictable treatment as the implant supported prosthesis concerning implant survival and loss of marginal bone in the short term evaluation. For all analyses, both groups were comparable. The amount of crestal bone level changes was within the criteria for implant success suggested by Albrektsson et al.[40]

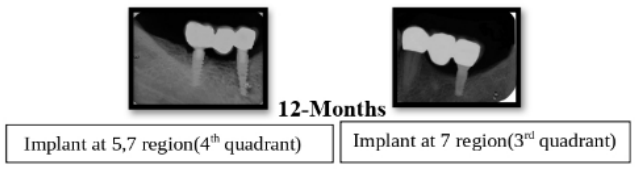
Implant -implant connection is undoubtedly the best option but in situations where that is not possible, the clinician can elect to use a combination of tooth and implant-supported fixed partial denture.

Images:









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Original Articles

PROGNOSTIC MARKERS IN ORAL SQUAMOUS CELL CARCINOMA.

Gurveen Chawla, Manish Kumar, Basavaraj T Bhagawati, Jugnu Prakash, Hitesh Vasra, Mohammed Shakeel

ABSTRACT

Introduction : Oral cancer is one of the leading causes of mortality, and its worsening impact on the society has revealed the grave danger it poses in the coming future. Several researchers proposed and investigated the prognostic implications of various clinicopathologic and histopathologic parameters. Strong correlations have been found with respect to the clinical outcome of oral cancer, but still abundant research ensues in this field to define a more concrete prognostic forum.

AIM AND OBJECTIVES :

The aim of this study was to study the significance of histopathological features like pattern of tumor invasion, stromal inflammation, angiogenesis and vascular invasion on the clinical outcome of oral squamous cell carcinoma Any possible correlations between the parameters, TNM Staging and prognosis were assessed and evaluated.

MATERIAL AND METHODS :

This study included 50 previously diagnosed cases of oral squamous cell carcinoma with a minimum follow-up of 1 year. Different groups of squamous cell carcinoma (well differentiated, moderately differentiated and poorly differentiated) were evaluated for their pattern of invasion and stromal inflammation. CD34 immunohistochemical analysis was carried out to investigate the mean micovessel density count and vascular invasion.

RESULTS :

The parameters were found to be independent of histological grade of tumor. A significant correlation was observed between the pattern of invasion and nodal stage (p=0.016), angiogenesis and vascular invasion (p=0.011), between tumor size and nodal metastasis (p=0.000).

CONCLUSION :

This study provides a significant insight on the importance of a combined histopathological analysis and clinical staging process to deliver an accurate prognostic opinion and also subsequently effect the treatment protocol.

Keywords : oral cancer, angiogenesis, TNM staging, inflammation, prognosis, immunohistochemistry, invasion.

INTRODUCTION

A neoplasm with malignant characteristics and of epithelial origin are classified as carcinomas, in which the disease progression is regulated by the well orchestrated cross talk between the malignant epithelial cells and specialized stroma.1

Several researchers proposed and investigated the prognostic implications of various clinicopathologic and histopathologic parameters. Strong correlations have been found with respect to the clinical outcome of oral cancer, but still abundant research ensues in this field to define a more concrete prognostic forum. The parameters which have been suggested include tumor size, margins, thickness, patterns of invasion, stromal contents, eosinophils, chronic inflammatory cells and many more.2

The various patterns in which tumor cells invade the stroma and infiltrate the host and tumor interface have been suggested to play a significant role in predicting the prognosis and affect the treatment plan.3 The stromal response to the invading neoplasm includes a chronic inflammatory infiltrate which has also been implicated positively in determining survival of patients.2 The growth and invasive metastatic potential of the neoplasm is largely governed by the source of oxygen and nutrients which includes the proliferating blood vessels, termed as angiogenesis.4 Anti-CD34 antibody is an antibody targeting the transmembranous sialo-protein, CD34 has been detected in precursors of (undifferentiated) endothelial cells to differentiated endothelial cells and this protein has been successfully used to demonstrate the angiogenic potential of tissues.5

A collective united assessment of the histological and clinical staging of the patients might serve as a more precise measure for predicting the outcome of the neoplasm and for determining the treatment. Hence, this study was undertaken to assess the prognostic significance of various histopathological factors including grade, pattern of tumor invasion, stromal inflammation, angiogenesis and vascular invasion in cases of oral squamous cell carcinoma.

MATERIALS AND METHODS

A total of 50 cases of oral squamous cell carcinoma (OSCC)

formed the sample, which were grouped on the basis of the histological grading. Group I included cases of well-differentiated oral squamous cell carcinoma (WDSCC, 21 cases), Group II included cases of moderately differentiated oral squamous cell carcinoma (MDSCC, 22 cases) and Group III included cases of poorly differentiated oral squamous cell carcinoma (PDSCC, 7 cases). Cases of OSCC with a minimum of 1 year follow-up were included in the study and in cases with recurrence only the sample of the primary lesion was included for histopathological examination. Those cases/ subjects with recurrence in which sample from primary lesion were unavailable were excluded from the study. The approval from the Ethics committee of the university was taken prior to collection of data.

3 tissue sections each of 4 µm thickness were obtained from paraffin embedded blocks of the tumor tissue, the tissue sections were subjected to one set albumin coated slides for Hematoxylin and Eosin staining and other two sets of poly-L-lysine coated slides for immunohistochemical staining. The sections were stained using the following staining techniques:

1. Standard Hematoxylin and Eosin staining.
2. Immunohistochemical staining using CD34 antibody (Monoclonal Mouse CD34 class II clone QBEnd 10; Dako).

The assessment of various parameters was done using standard established grading and staging systems (table 1). For evaluating the microvessel density immunohistochemical CD-34 stained sections were scanned at low magnification to identify the most vascular areas (hot spot areas). Analysis was performed under 20x objective and 10x ocular lens (x200 magnification). An average of 10 hot spots was analyzed. The selection of hotspots was done blindly. CD34 reactions were evaluated considering the cytoplasmic staining in endothelial cells. Evaluation of positive reactions was performed using the criteria defined by Weidner et al.6 For the parameter of vascular invasion on examination of the slide if there was presence of vascular invasion it was marked as positive. Data was stored and analyzed. Mean and standard deviations for the various parameters was calculated for all the three groups. Data was further examined for statistical significance (p-value) using non-parametric tests (ANOVA one way test, Post-Hoc Tukey, Spearman Correlation test)'p' value < 0.05 was considered as statistically significant; while p value < 0.001 was considered as statistically highly significant.

RESULTS

The statistical evaluation revealed no significant differences of any of the histopathological or clinical parameter with histological grading of tumor. In the current study we observed the pattern of tumor invasion in 50 cases of OSCC and we saw that, 38% cases show score 4, 30% show score 3, 26% show score 2, 4% show score 5 and only 2% show score 1 of pattern of tumor invasion (p=0.555). The stromal inflammation in all 3 groups revealed, 50% cases showing score 2, 30% showing score 3 and 20% showing score 1 of inflammatory cells (p=0.278). Angiogenesis was assessed by calculating the mean microvessel density in all the cases and the maximum MVD value was found to be 177.4, minimum MVD value was 5.9 and the mean value was found to be 84.30±38.77. In Group I the mean of 21 cases was calculated to be 89.881±6.197 with maximum and minimum values as 41.6 and 128.4 respectively. In Group II the mean of 22 cases was found to be 81.859±43.76; with minimum and maximum values of 157.5 and 5.9 respectively. In Group III the mean of 7 cases was calculated to be 75.271±51.56; with minimum and maximum values of 177.4 and 23.5 respectively (p=0.219). On assessment of invasion of tumoral vessels by malignant epithelial cells, 64% of the total cases showed vascular invasion and 36% showed absence of vascular invasion. (table 2)

In the present study undertaken, 28% cases were in T1 stage, 50% cases were in T2a stage, 16% cases were in T2b stage and 6% cases were in T3 stage (p=0.239); 42% cases showed no nodal metastasis, 58% cases show metastasis and 30% cases, 12% cases, 10% cases and 6% cases were found to lie in N1, N2a, N2b and N3 stages respectively (p=0.777). Only one case showed extra nodal metastatic spread, the case was histologically categorized as poorly differentiated, and the metastatic deposits were found in the lung of the patient. (table 3)

No statistical significant association was found between the

histological parameters of pattern of tumor invasion and stromal inflammation (p=0.112); pattern of tumor invasion and angiogenesis (p=948); pattern of tumor invasion and T-stage (p=0.403); stromal inflammation and angiogenesis (p=0.461); stromal inflammation and T-stage (p=0.714); stromal inflammation and N-stage (p=0.563); stromal inflammation and clinical staging (p=0.448); angiogenesis and T-stage (p=0.085); angiogenesis and N-stage (p=0.371) and angiogenesis and clinical staging (p=0.306).

Statistical significance was observed between pattern of tumor invasion and N-stage (p=0.009); pattern of tumor invasion and clinical staging (p=0.042); T-stage and N-stage (p=0.000); T-stage and clinical staging (p=0.000) and N-stage and clinical staging (p=0.000).

The results regarding prognosis were categorized under the heading of recurrence, no-recurrence and death. (table 3).

DISCUSSION

The last few decades have been marked with tremendous progress in the field of cancer research, treatment, management and assessment. It has been shown time and again that the most important aspect in predicting prognosis of an oral cancer patient is the identification of various significant parameters; clinical and histopathological. The foundation of carcinoma diagnosis and staging is laid down primarily by the evaluation of histopathological parameters in the tissue sections. Recurrence and metastasis are the main etiological factors which result in the collapse of the treatment plans and management strategies particularly in the case of oral squamous cell carcinoma. Thus, the recognition of histological parameters which have a positive or negative impact on the prognosis of oral cancer is of utmost importance.2,7

Two morphological and functional variants of collective migration have been identified in tumors; the first variant can be described as the result of protruding sheets and strands that have maintained contact with the primary site of occurrence and yet they show evidence of local invasion and the second variant clusters of cells (nests) which are distinctly detached from the tumor mass and extend though perineural and vascular structures (path of least resistance).8 In the present study, in group I (WDSCC) the predominant pattern of tumor invasion was by invasive islands (<15 cells/island), inclusive of single cell invasion exhibited by 42% cases; in group II (MDSCC) the predominant pattern of tumor invasion was by invasive islands (>15 cells/ island) exhibited by 40% cases and in group III the predominant pattern observed was invasive islands (>15 cells/island) along with single cell invasion exhibited by 57% of cases. A contrasting result in group I is observed, as the tumor cells are completely differentiated but still predominantly show score 4 which includes single cells invasion and tumor islands (<15 cells/island). This contradiction can be attributed to the fact that OSCC usually exhibit a heterogenous cell population with probable differences in invasive and metastatic behavior.9 Our study is in accordance with previous studies9,10,11 and pattern of tumor invasion has been suggested to be the single most important parameter in predicting survival.10

The features of suppressed immunity, invasive growth and metastasis associated with malignancies are of major prognostic importance; the inflammatory cells infiltrating the tumor along with their associated cytokines (TGF-β, IL-1, NF-κB) are thought to have a major contribution in regulating these features.12,13,14,15 71% cases of group I show an localized intense inflammatory response, 40% cases of group II show a localized intense response and 57% cases of group III show a diffuse intense inflammatory response. It has been suggested that with an increased proliferation of keratinocytes is associated with inflammatory cells, angiogenesis and inflammatory cytokines; also they have an effect on the size, shape and growth of these tumors i.e, in cases of a reduced inflammatory response the tumors would show a more aggressive clinical behavior.2,14,16

As mentioned above growth and metastasis of tumor is also regulated by angiogenic factors and inhibitors. The mechanisms of angiogenesis in tumors closely resemble the physiologic mechanisms, the only difference being its lack of regulation.4,17,18 The mean microvessel density of cases in group I was 89.881±6.197; for group II was 81.859±43.76 and for group III was 75.271±51.56. We have observed an evident but

statistically insignificant increase in the mean microvessel density with increase in differentiation of cells. Studies showing similar results19 and contradictctory results20,21, both have been published and reviewed. It was suggested that due to the profuse vascularity of the tongue and the oral cavity, carcinomas of this region might be less dependent on neovascularization for growth and metastasis.22

Owing to the weak immature basement membranes of the proliferating vascular channels in an aggressive neoplasm, we have frequently observed invasion of malignant neoplastic cells invading the vascular lumens. Many investigators have omitted this parameter in determining the prognostic implications due to the inability to identify invasion with certainty.15,23,24,25 In the current study in group I 61% cases show vascular invasion, in group II 63% cases show vascular invasion and 71% cases in group III show vascular invasion. An evident increase in comparative number of cases showing positive vascular invasion was observed with decrease in differentiation of cells. Cells showing least differentiation and more anaplastic characters are devoid of features like adhesion with an increased motility, which could explain the pattern observed in the current study.

OSCC has a great predisposition to produce metastasis in lymph nodes. In clinical practice, the treatment plan and prognosis of OSCC is mainly based on the TNM (primary tumor, regional lymph node metastasis, and distant metastasis) staging system. The most recent staging system is the AJCC TNM staging system 2002.26 In the present study, the same system was employed to record the TNM staging of the patient. The TNM and clinical staging showed no correlation with histological grading of the tumor in our study. In a previous study27, 40% of the cases with abundant keratinization showed metastases, whereas in our study a total of 61% cases of WDSCC showed lymph node involvement; thus, pointing to a relation with the maturity of these keratinizing cells and their spread into the vascular and lymphatic vessels and manifesting as lymphadenopathy. As we know that poorly differentiated cells are mostly associated with the single cell invasion pattern and they have lost their cohesive property, hence there will be an inherent increase in chances of lymph node metastasis with decrease in differentiation of cells. A strong association between the presence of extracapsular spread and clinical N-stage was found in other studies.28,29 In this study out of 50 cases of oral squamous cell carcinoma, only one case showed extra nodal metastatic spread. In accordance with other published research work,23,24,9,30,31 this case was histologically categorized as poorly differentiated, and the metastatic deposits were found in the lung of the patient. In a study of OSCC9, they found that the histologic grade reflected the aggressiveness of the individual neoplasm and that there was a clear relationship between the grade and cure rate, stage of disease and metastatic involvement. The present study failed to show any significant correlation between clinical staging and histological grading, as also observed in other publications.3,15,24,25,30

The histological parameter of pattern of tumor invasion and the clinical parameter of N-stage has show a significant correlation in our study. A possible connection between these two parameters has been previously suggested3, 32,33,34 The molecular basis of this connection has been attributed to MMP-7, MT1-MMP35, cellular motility and proteolysis36,37 involving interactions between tumor cells and extracellular matrix. Another noteworthy association was observed between the pattern of tumor invasion and clinical staging. There was a statistically significant difference between angiogenesis and vascular invasion in the current study and we can thus conclude an apparent correlation between these two entities. The cases showing vascular invasion showed a mean MVD score of 94.07±37.35 and the cases showing no evidence of vascular invasion had a mean MVD of 66.944±35.90. A highly significant difference was observed between T-stage and N-stage and a strong correlation is suggested, the cases without nodal metastasis steadily decreased as the size of the tumor increased, hence a connection between the size of the tumor and the nodal metastasis incidence was inferred. Reports in the literature showed that tumor thickness was a better prognostic parameter compared with the T stage or largest diameter in the prediction of nodal metastasis in oral cavity

carcinomas.38,39,40,41,42,43,44,45 Between the two parameters of T-stage and clinical staging a significant correlation was suggested, we observed that an increase in tumor size lead to a poorer prognosis and more advanced clinical stage of patient, as larger tumor tend to be more aggressive, invasive and damaging.

With reference to the prognosis of the patients no statistical significance was observed between the histopathological groups. Most authors have established significant correlations between lower histologic differentiation and poorer prognosis.46,47,48,49,50 but others did not find such association.51,52,53

TABLE 1

PATTERN OF TUMOR INVASION[3]	
SCORE 1	Broad pushing invasive front
SCORE 2	Broad pushing fingers/ separate tumor islands
SCORE 3	Invasive islands (>15 cells/ island)
SCORE 4	Invasive islands (<15 cells/ island), including single cell invasion
SCORE 5	Tumor satellites with >1mm distance from tumor
STROMAL INFLAMMATION[2]	
SCORE 0	Absence of inflammation
SCORE 1	Scanty inflammatory infiltrate
SCORE 2	Intense localized inflammation
SCORE 3	Intense diffuse inflammation

TABLE 2

GROUPS	PATTERN OF TUMOR INVASION	STROMAL INFLAMMATION	MEAN MICROVESSEL DENSITY	VASCULAR INVASION
GROUP I	SCORE 1- 1 CASE SCORE 2- 6 CASES SCORE 3- 5 CASES SCORE 4- 9 CASES SCORE 5- NONE	SCORE 0- NONE SCORE 1- 3 CASES SCORE 2- 15 CASES SCORE 3- 3 CASES	MINIMUM- 41.6 MAXIMUM- 128.4 MEAN – 89.881	PRESENT- 13 CASES ABSENT- 8 CASES
GROUP II	SCORE 1- NONE SCORE 2- 5 CASES SCORE 3- 9 CASES SCORE 4- 6 CASES SCORE 5- 2 CASES	SCORE 0- NONE SCORE 1- 5 CASES SCORE 2- 9 CASES SCORE 3- 8 CASES	MINIMUM- 5.9 MAXIMUM- 157.5 MEAN – 81.859	PRESENT- 14 CASES ABSENT- 8 CASES
GROUP I	SCORE 1- NONE SCORE 2- 2 CASES SCORE 3- 1 CASE SCORE 4- 4 CASES SCORE 5- NONE	SCORE 0- NONE SCORE 1- 2 CASES SCORE 2- 1 CASES SCORE 3- 4 CASES	MINIMUM- 23.5 MAXIMUM- 177.4 MEAN – 75.271	PRESENT- 5 CASES ABSENT- 2 CASES

TABLE 3

GROUPS	T-STAGE	N-STAGE	M-STAGE	CLINICAL STAGE	PROGNOSIS
GROUP I	T1- 5 CASES T2a- 10 CASES T2b-4 CASES T3- 2 CASES	N0- 8 CASES N1- 7 CASES N2a-2 CASES N2b- 3 CASES N3- 1 CASE	M0-21 CASES M1-NONE	STAGE 1-4 CASES STAGE 2-4 CASES STAGE 3-8 CASES STAGE 4-6 CASES STAGE 5-NONE STAGE 6- NONE	NO RECURRENCE- 11 CASES RECURRENCE- 7 CASES DEATH- 3 CASES
GROUP II	T1- 8 CASES T2a-11 CASES T2b- 2 CASES T3- 1 CASE	N0-12 CASE N1-5 CASE N2a-3 CASE N2b-1 CASE N3-1 CASE	M0- 22 CASES M1- NONE	STAGE 1-8 CASES STAGE 2-4 CASES STAGE 3-5 CASES STAGE 4-5 CASES STAGE 5- NONE STAGE 6- NONE	NO RECURRENCE- 13 CASES RECURRENCE- 7 CASES DEATH- 2 CASES
GROUP III	T1- 1 CASE T2a- 4 CASES T2b- 2 CASES T3- NONE	N0- 1 CASE N1- 3 CASES N2a- 1 CASE N2b- 1 CASE N3- 1 CASE	M0- 6 CASES M1- 1 CASE	STAGE 1-NONE STAGE 2-1 CASE STAGE 3-3 CASES STAGE 4-2CASES STAGE 5-NONE STAGE 6-1 CASE	NO RECURRENCE- 1 CASE RECURRENCE- 3 CASES DEATH-3 CASES

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Case Report

GINGIVAL DEPIGMENTATION WITH 940MM DIODE LASER- A CASE REPORT

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ABSTRACT

Gingival hyperpigmentation is caused by the excessive deposition of melanin in the basal and supra basal cell layer of the epithelium. The pigmented lesions of gingiva may be endogenous or exogenous. Endogenous lesions are benign and usually caused by melanin, and they are called gingival melanin pigmentations. Pigmentation of gingiva has an impact on esthetics that can create psychological negativity. Although, many procedures are available for depigmentation laser therapy stands out for being a minimally invasive procedure. This study aims to report a clinical case of the gingival depigmentation technique using a high-power diode laser in the anterior maxillary and mandibular region, for the ablation of the pigmented tissue to improve gingival aesthetics. The patient had an aesthetic complaint of the darkened aspect of the gingiva in the anterior maxillary and mandibular region. After local anesthesia, we started depigmentation with high-power diode laser and performed ablation from the attached gingiva toward the free marginal gingiva. The patient returned after 1 week days presenting healthy gingiva and absence of melanin pigmentation. Thus, we concluded that the diode laser was a good alternative for melanin depigmentation because it is a procedure with lower morbidity and satisfactory postoperative results.

CASE REPORT

In the present case depigmentatiom was done in 32 year female patient with chief complain of esthetic concerns about gingival discoloration. The procedure was done with 940nm diode laser in the anterior region for uneventful healing.

CONCLUSION

The outcome of the gingival depigmentation in this case using diode laser showed good healing with uneventful procedure after 1 week. Clinical outcome achieved following the laser assisted gingival depigmentation with coe pac placement for this procedure is safe and predictable and reliable method.

KEY WORDS- Gingival depigmentation, 940mm-diode laser,

INTRODUCTION

Gingival tissue plays major part in esthetics along with face, lip, and teeth. Gingiva participates in the harmony of smile with its color playing a crucial role. Pigmentation of gingiva is considered to be unaesthetic by patients, and it may have a psychological impact on them. This impact is aggravated in patients with "gummy smile" or excessive gingival display while smiling (high smile line).

Gingival hyperpigmentation can be defined as a darker gingival color beyond what is normally expected. Pigmentation is contributed by-products of the physiological process such as melanin, melanoid, carotene, oxyhemoglobin, reduced hemoglobin, bilirubin and iron and/or pathological diseases, and conditions. Melanin pigmentation results from melanin granules which are produced by melanoblasts. Other then that, environmental risk factors such as tobacco smoking contribute to the gingival hyperpigmentation in both active and passive form. Ethnicity and age also influence the color of gingiva and has no sexual predilection. A wide range of procedures have been advocated for the removal of gingival pigmentation such as surgical intervention, electrocautry, radiosurgery but all are associated with certain disadvantages.1,2 Thus the present case report shows the treatment of gingival hyper-pigmentation with latest technique i.e. 940nm diode lasers.

CASE REPORT

A 32 year old female patient visited the Dept of Periodontology & Oral Implantology, Surendera Dental College and Research Institute with the chief complain of unpleasant appearance of gums while smiling and speaking. On extra oral examination there was no significant findings noted. On intra oral examination there was dark coloured gingiva was seen which diagnosed as hyper pigmented gingiva. (Fig. 1) Personal history revealed no deleterious habits. Family history was insignificant.

Fig 1: PRE-OPERATIVE

A complete hemogram was done which was within the normal range. After procuring the consent from patient. After discussing all the pros and cons of the procedure, gingival depigmentation with the laser was planned. Under local anesthesia with 2% lignocaine and 1: 80000 adrenaline, 940nm diode laser assisted depigmentation was performed. For the laser therapy, the patient and the surgical team used protection goggles. Depigmentation occurred with a diode laser surgical appliance a flexible optical fiber tip emitted the laser light continuously. The laser setting consisted of energy of 215 J, power of 1200 mW, and time of 3 minutes.3 (Fig. 2) Ablation started from the attached gingiva toward the free marginal gingiva First, we performed ablation in the upper left quadrant to the first molar, then the upper right quadrant to the first molar and lastly in the lower quadrant from canine to canine. We performed circular and intermittent movements being careful not to reach adjacent and subjacent structures. We used a gauze moistened with Betadine and saline solution to remove the epithelial tissue for improved visualization. After total ablation of the pigmented mucosa, the patient received postoperative instructions and the prescription of an analgesic. On post-operative follow-up healing was uneventful and patient was highly satisfied with the results. (Fig. 3)

Fig 2: INTRA-OPERATIVE

Fig 3: After 15 days

DISCUSSION

According to Suragimath et al., the prevalence of melanin pigmentation ranges between 0 % and 89 % in different populations regarding ethical factors. Gingival hyperpigmentation is called physiological or racial pigmentation because it occurs as a genetic trait in some populations.4 The patient of the present report is a female. Other studies reported melanin pigmentation (MP) in different sexes. The literature is certain to affirm that MP affects both men and women equally or in the same proportion.5, 6, 7 Regardless of sex, Melanin pigmentation is more prevalent in black individuals. Anecdotal reports that incising oral soft tissue with a laser is less painful than using a scalpel We observed less bleeding during laser therapy compared to conventional surgical techniques. Depigmentation occurred with a surgical diode laser appliance with a wavelength of 980 nm, power of 1200 mW, and 215 J of energy. In contrast, other authors 5, 8 used diode laser with powers of 1.5 W, 1 W, and 3 W, and wavelengths of 810 nm, 808 nm, and 980 nm, respectively. There are other depigmentation techniques such as electro surgery, Nd:YAG laser, cryosurgery, scalpel removal, and rotary abrasion, addressed by Murthy et al.,8and Patil et al.9, who used high-power diode laser because of hemostasis and lower postoperative morbidity. Postoperative pain from surgical procedures has been claimed to be reduced in laser surgery.

In the present study, patient satisfaction was good. There were no complaints about pain during treatment or postoperatively. Some reports suggest that laser-created wounds heal more quickly and produce less scar tissue than conventional scalpel surgery. In our report about depigmentation treatment with laser, re-epithelization was completed after 1 week and the gingiva was similar to the normal untreated gingiva.

CONCLUSION

Using a diode laser was a safe and effective treatment modality that offered adequate final aesthetics with minimum discomfort to patients with gingival hyperpigmentation Postoperative patient satisfaction in terms of esthetics and pain was excellent. The gingiva healed uneventfully and completely regenerated with no infection, pain, swelling, or scarring.

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Case Report

MULTIPLE COMPOUND ODONTOMAS IMPEDING THE ERUPTION OF RIGHT UPPER PERMANENT CENTRAL INCISOR: A CASE REPORT

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ABSTRACT:

Odontomas are most common hamartomatous developmental malformations. They can be differentiated into compound and complex type based on the level of organization of the tissues. Compound odontoma is an odontogenic tumor of ecto-mesenchymal origin containing tooth-like structures. Majority of odontomas are asymptomatic however these lesions can cause delayed eruption, impaction, or even retention of deciduous teeth. These are common odontogenic tumors fundamentally made up of enamel, dentin, and capricious quantities of cementum and pulp material. They can cause expansion and resorption of adjacent bone but does not invade neighboring tissue which renders them treatable by curettage along with conservative surgical removal. In the present article, we report a case of rare multiple compound odontomas which obstructed the eruption of the permanent incisor. Surgically removal was done. According to scientific literature, odontomas which are completely removed does not relapse, but close observation is essential in young children to prevent eruption disturbances in the developing dental arch.

Keywords: Compound Odontoma, Impacted Maxillary Incisor, , Odontogenic tumors,

INTRODUCTION

Odontomes are mixed odontogenic tumors in which both the epithelial and mesenchymal components have undergone functional differentiation to the point that both enamel and dentin are formed. The enamel and dentin are typically arranged in an abnormal pattern because the organization of the odontogenic cells fails to reach a normal state of morpho differentiation.1 Two kinds of odontomes are recognizable, namely-compound and complex. Compound odontomes is distinguished by the presence of three separate dental tissues (enamel, dentin and cementum), while complex type has unrecognizable dental hard tissues. Radiographically, they are seen as radio-opaque masses of varying densities. The presence of odontomes is sometimes associated with several difficulties such as swelling, displacement of erupting teeth and cystic and carcinomatous transformation.2 Although idiopathic, the formation of an odontoma may be associated with a history of trauma and local infections. Odontomes occurs more frequently during the permanent dentition phase in children, adolescents, and young adults. The compound type tends to affect the anterior region of the maxilla, with a prevalence that varies between 9 to 37%, while the complex type is more common in the posterior region of the maxilla and mandible, with prevalence ranging from 5 to 30%.3 In the current article, we present a case of multiple compound odontomes hindering the eruption of the maxillary left permanent central incisor.

CASE REPORT

A 12-years-old male patient reported to the Department of Paediatric and Preventive Dentistry, Surendera Dental College and Research Institute, Sriganganagar, Rajasthan with a chief complaint of an unerupted left upper central incisor. The primary incisor was exfoliated a year ago. The patient gave a history of delayed teeth eruption for most of the permanent teeth. Family history revealed none of the parents had the similar problem. On clinical examination, the oral mucosa covering the right maxillary central incisor region was blanched (Fig. 1).

Fig. 1: Preoperative image showing blanching of mucosa

Palpation revealed a bony elevation in that region. There was no associated pain or discomfort to the patient on clinical examination. On radiographic investigation using intraoral radiograph, & occlusal radiograph, showed that there was radio-opaque structure (4-5mm) surrounding the incisal edge which

extend mesial n distal margin of the central incisor.

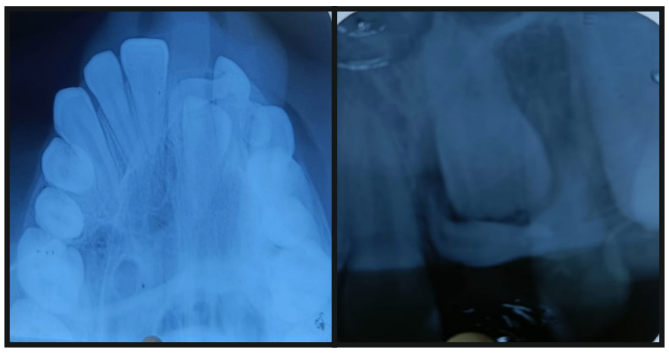

Fig 2 occlusal radiograph and Intraoral radiograph

CBCT images showed the evidence of- impacted 21, well-defined calcified masses resembling tooth (enamel, dentin, pulp) present coronal to 21 and part of it is labial to a mid radicular portion of 22 and distal coronal part of 23. They are lying horizontally. It's one end showed dilaceration and is in close approximation with the nasopalatine canal. It measures approx. 15.2mm in maximum dimensions. Presence of radiolucent band around the crown of impacted 21. (Fig. 3).

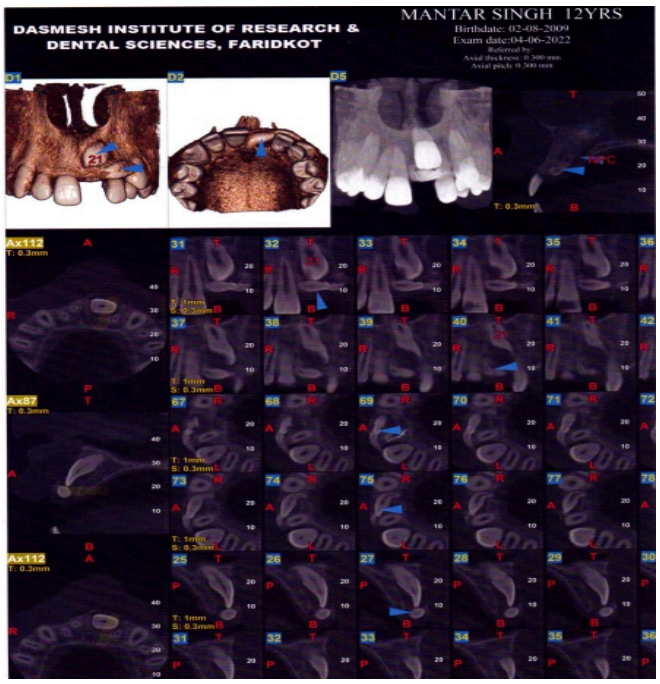

Fig 3. CBCT image

Based on clinical and radiographic features, the condition was provisionally diagnosed as odontoma. The need for surgical removal of the masses was explained to the patient. After obtaining the informed consent, the patient was prepared for surgery under local anesthesia with bilateral infraorbital block and nasopalatine block. The surgery was performed in the dental office under aseptic conditions. A mucoperiosteal flap was raised exposing the shell-like bony expansion in the maxillary right central incisor region. The bone was removed using surgical bur, and multiple teeth-like structures were identified. Careful removal of these structures was done using the periosteal elevator (Fig. 4).

Fig. 4: Exposure of odontoma & removal of denticles

The lining of the cavity was removed and curetted Fig. 5 (a) and it was confirmed by IOPA Fig.5 (b). Around 3 denticles of various sizes ranging from 8 mm to 1.5 cm were removed (Fig. 6)

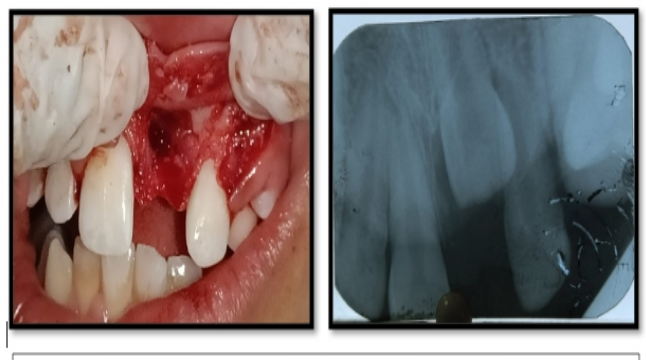

Fig. 5: (a)Completely curretted bony socket. (b) Post-surgical IOPA

The region was carefully irrigated using normal saline, and the flap was closed and sutured. The specimen was sent for histological examination. On histological examination, a decalcified section of hard tissues revealed dentinal tubules along with soft fibrous tissue. Based on histopathology and radiographic

details, the diagnosis was confirmed as compound odontoma. Follow up was done after 15 days (Fig 7).

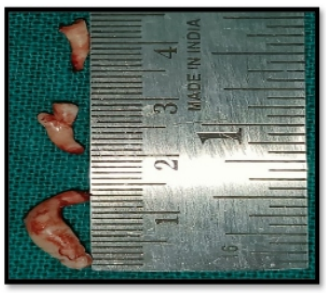

Fig. 6: Removed denticles

Fig. 7: Follow up after 15 days

DISCUSSION:

The term "odontoma" was coined by Pierre Paul Broca in 1867. He outlined the term odontoma as "tumors formed by the overgrowth of transitory or complete dental tissues".1 Odontomas are the most common types of odontogenic tumors which result from the growth of completely differentiated epithelial and mesenchymal cells that give rise to ameloblasts and odontoblasts. When fully developed, odontomas consist chiefly of enamel and dentin with variable amounts of pulp and cementum.4 According to Hitchin, odontomas are congenital or sometimes occur as a result of gene mutation or postnatal disturbance in the genes that control tooth development.5 Katz in 1989 analyzed 396 cases of a compound and complex odontomas and concluded that diagnosis usually happened between 11 years to 15 years of age.6

Another study by Budnick showed that odontomas are identified most frequently throughout the 2nd decade of life.7 Often these lesions are found associated with unerupted teeth. The most frequent teeth involved are the canines, followed by maxillary central incisors and 3rd molars. In the current case, the age of the patient was 12 years, and the associated tooth was left maxillary central incisor which is similar to most of the cases reviewed in the literature. Mostly these deformities are intraosseous but sometimes may erupt into the oral cavity. The complex odontomas frequently originate in the posterior mandible, while compound odontomas have an affinity for anterior maxilla.8

In the present case also, the lesion was located in anterior maxilla which is in agreement with other cases. Odontomas show a characteristic radiographic feature. The complex type appears as an asymmetrical mass of mineralized structure encircled by a radiolucent halo with a smooth border. Compound odontoma appears as calcified teeth-like structures in the center of a distinct radiolucent border. These lesions may be revealed by routine radiography. However, lack of calcification may hinder their identification. Compound odontomas occur as three main types:

• Denticular type: They comprise of multiple distinct denticles, all having a crown and a root or Hertwig's epithelial root sheath with enamel and dentin similar to that found in a normal tooth.

• Particulate type: In this type, the masses or particles do not show any structural resemblance to a tooth. The enamel and dentin are arranged abnormally.

• Denticulo particulate type: It is a combination of the types mentioned above in which the denticles and masses or particles occur side by side.9

In the present case, 3 denticles of various sizes ranging from 8 mm to 10.5 cm were encountered. Odontomas are also classified as extraosseous when they occur in the soft tissues overlying the alveolar process and intraosseous when occurring inside the bone. The intraosseous lesion may sometimes erupt into the oral cavity. Since the patient had a history of delayed eruption, immediate bonding and traction of the central incisor were not done, and the patient was asked to report back after 3 months. Depending upon the radiographic comparison after 3 months the required orthodontic treatment will be planned.

CONCLUSION

According to scientific literature, odontomas which are completely removed does not relapse, but close observation is essential in young children to prevent eruption disturbances in the dental arch. Additionally, a cautious follow-up review by clinical examination and radiographs to evaluate the eruption of the un-erupted or impacted teeth is obligatory. Early diagnosis of odontomes aids in conservative treatment and better prognosis. Complications in dental arch development, occlusion and esthetics can be avoided through timely intervention. Surgical excision is the treatment of choice however care should be taken not to damage the adjacent tooth or tooth germs especially in

children.

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Case Report

LINEAR GINGIVAL ERYTHEMA - A RARE CASE REPORT

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ABSTRACT

Linear gingival erythema (LGE), formally referred to as HIV gingivitis, is the most common form of HIV-associated periodontal disease in the HIV-infected population. Evidence suggests that this disease also occurs in HIV-negative immunocompromised individuals and is not specific to HIV infection. A 35 years old male patient presented with gingival inflammation in upper and lower anterior & posterior teeth mimicking LGE, but blood investigations showed HIV-negative status. The microbial sample from the affected area confirmed candida infection and antifungal therapy with scaling helped to resolve the lesion. This case report emphasizes that the clinician should investigate through medical history to diagnose such a condition. If there are signs and symptoms suggesting a systemic disease such as HIV, appropriate diagnostic testing such as blood testing or cytology must be considered. Patients with LGE should undergo laboratory diagnosis to ensure that any underlying disorder is diagnosed and treated at the earliest possible time.

Keywords: Linear Gingival Erythema, candidal infection, HIV-infection

INTRODUCTION

Linear Gingival Erythema (LGE) is also one of the seven oral manifestations commonly associated with HIV infection. LGE referred to as HIV/AIDS gingivitis is the most common form of HIV/AIDS-associated periodontal disease1. It is considered resistant to conventional plaque removal therapies, being considered nowadays as a lesion of fungal etiology. There is now evidence that this disease also occurs in HIV-negative immunocompromised individuals and is not specific to HIV infection. However, the prevalence of this lesion was significantly higher for HIV-infected individuals. Some data indicate a relationship between LGE and colonization of Candida species that can be concluded that LGE is another variant type form candidiasis in HIV/AIDS patients2. LGE is characterized clinically by a red-fired, linear band 2 to 3 mm wide on the marginal gingival accompanied by petechiae-like or diffuse red lesions on the attached gingival on the oral mucosa and may be accompanied by bleeding3. The prevalence of this lesion varies widely in different studies, ranging from 0 to 48% probably because in many of them, LGE was misdiagnosed as gingivitis. According to recent studies, the prevalence of LGE ranges from 2 to 25%. LGE, most commonly associated with the upper and lower anterior dentition, has been observed in pediatric patients4. Based on clinical experience, it has been determined that approximately 10% of children have this condition. These lesions usually do not cause clinical problems or interfere with nutrition.

CASE REPORT

A 35year old male patient visited to the department of Oral Medicine and Radiology with the chief complaint of bleeding from gums since 1 month. The full case history was taken which did not reveal any medical problems. The patient dental history reveals burning sensation and peeling of marginal gingiva for 1 month. Intraoral examination revealed moderate plaque and calculus extending till the gingival third of teeth in both upper and lower dentition. Bleeding on gentle probing was seen, and was more profuse bleeding seen in the posterior region of both the jaws compared to the anterior region. Further gingival examination showed an erythematous linear band that extended approximately 2–3 mm from the free gingiva and extending the attached gingiva extending from canine to molar region in both upper and lower dentition. [Fig1a,b] & [Fig 2] On extraoral examination, it was noticed that the patient had class 1malocclusion with competent lips. The lesion causes clinical problems or mild interference with nutrition. The treatment plan was made which included a plaque and supragingival calculus removal on the first visit. The patient was given oral hygiene instructions and also advised for proper brushing techniques. The patient was also advised to use a chlorhexidine mouthwash for 2 weeks to decrease the bacterial load. The next visit after 2 weeks involved scaling and removal of any subgingival calculus. The patient's condition did not show any relief in that span of time.

Fig1(a) Erythematous linear band wrt lower left posterior teeth

1(b) Erythematous linear band

Fig 2 Front occlusal view.

To diagnose tausative factor, a full blood analysis was done including the HIV status of the patient. The report of the patient was normal with all the complete blood count within normal range and the HIV status was negative. The patient's hemoglobin percentage was also normal stating that the patient was neither anemic nor immunocompromised. To discover the etiology, a microbial sample from the gingival area was taken. This sample was used for culture in Sabouraud Dextrose Agar (SDA) which showed Candida colonies after 3 days of incubation. To confirm the Candida albicans as the causative factor, the germ tube test was done which came positive. Now, the treatment plan included antifungal therapy. The patient was prescribed topical antifungal drug nystatin cream 100,000 units 4times per day for 2 weeks. The patient showed remarkable improvement with no red band seen in the lower gingiva within 1 week.

DISCUSSION

LGE, formally referred to as HIV-gingivitis, is the most common form of HIV-associated periodontal disease in the HIV-infected population5. There is now evidence that this disease also occurs in HIV negative immunocompromised individuals and is not specific to HIV infection6. However, the prevalence of this lesion was significantly higher for HIV-infected children7. In the above case, the fact that this patient presented typical LGE lesions, which were resistant to conventional plaque-removal therapies, has led to a microbiological investigation. This investigation provides strong evidence that LGE in non-HIV-infected patients may be considered of fungal etiology since Candida species were isolated from LGE lesions. C. albicans was the most frequent species isolated, seen in five of six patients, which confirms that such yeast is the main etiologic factor of mucosal candidiasis8. These findings are similar to the study of Velegraki et al. (1999) in which HIV-pediatric patients presented LGE with positive cultures for Candida9. They are also in agreement with the consulted literature which classifies LGE as a lesion of fungal etiology10.

LGE is characterized by intense gingival inflammation which does not respond to scaling and root planning or oral hygiene control. LGE may sometimes be unresponsive to corrective

therapy, such lesions may undergo spontaneous remission. LGE-like lesions can sometimes be adequately managed by following the therapeutic principles associated with marginal gingivitis. However, as mentioned previously, it has been suggested that gingivitis lesions that respond to conventional therapy do not represent LGE. The affected sites should be scaled and polished. Subgingival irrigation with chlorhexidine or 10% povidone-iodine may be beneficial. The patient should be instructed regarding the meticulous oral hygiene procedures. The condition should be reevaluated 2–3 weeks after initial therapy. If the patient complains about home care procedures and the lesions still persist, the possibility of a candida infection should be considered. The first treatment should be topical antifungal therapy, that is, oral nystatin suspension 2–5 mL, 4–6 times/ day or clotrimazole troches 10-mg tablet, 3–5 times/day but it is doubtful that topical antifungal rinses will reach the base of the gingival crevices. Consequently, the treatment of choice may be the empiric administration of a systemic antifungal agent for 7 days such as fluconazole 3–5 mg/kg once daily or itraconazole 100 mg/day orally for children > 3 years of age or ketoconazole 5–10 mg/kg/day. It is important to note that LGE is often refractory to the treatment. If so, the patient should be carefully monitored for developing signs of more severe periodontal. conditions (e.g. necrotizing ulcerative gingivitis, necrotizing ulcerative periodontitis, necrotizing ulcerative stomatitis). The patient should be placed on a 2- 3-month recall maintenance interval and retreated as necessary11.

A differential diagnosis included:

A. HIV-associated linear gingival erythema (LGE)

B. Chronic marginal gingivitis

C. Candida-induced LGE

D. Herpetic gingivostomatitis

CONCLUSION

LGE is not always associated with HIV infection. The clinician should obtain a thorough medical history to investigate such a condition. If there are signs and symptoms suggesting a systemic disease such as HIV, appropriate diagnostic testing such as blood testing or cytology must be considered. Patients with LGE should undergo laboratory tests to ensure that any underlying disorders are diagnosed and treated at the earliest possible time.

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Case Report

CONSERVATIVE MANAGEMENT OF A GIANT PERIAPICAL CYST IN THE MAXILLA: A CASE REPORT

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ABSTRACT:

Periapical cyst is the most common inflammatory odontogenic cyst caused by an infected tooth, leading to necrosis of the pulp, which often leads to periapical inflammation. Other causes include tooth fracture, improper restoration. The highest incidence is in the 3rd and 4th decades. Males are more affected commonly than females. If the lesions are small then, these are clinically undetectable but most often are discovered as an incidental finding on radiographic survey. This paper presents a case report of periapical cyst in the maxilla of 60 years old female patient, which was managed conservatively.

Keywords: Odontogenic cyst, Periapical cyst, Enucleation, Marsupialization

INTRODUCTION:

A cyst is a pathological cavity filled with fluid or semifluid material or gases contain which may or may not be lined by epithelium but not created by the accumulation of pus 1,3. Cysts are classified as developmental or odontogenic. Periapical cyst is odontogenic in origin 4. These cysts are the most common cysts of the jaws that can be caused from a pre-existing periapical granuloma, a focus of chronically inflamed granulation tissue located at the apex of non-vital tooth. These cysts are usually asymptomatic and are discovered incidentally during routine dental radiographic examination5.

CASE REPORT:

A 60-year-old female patient (Fig.1) reported to the Department of Oral and Maxillofacial Surgery presenting symptoms of pain, swelling and pus discharge in upper right front teeth region for 1 year. Patient reported that she visited local dentist before for extraction, but didn't get relieved. There was no gross facial asymmetry. Intra-oral examination showed: Missing of 14 to 17, 24 to 27. Root stumps of 12,13,25. Swelling extending from maxillary right central incisor to 2ndpre molar and from maxillary left central incisor to lateral incisor. Swelling was hard, non-tender, immobile with labial and palatal cortical plates expanded. Purulent discharge was present at the apex of 14, 15. Aspiration was carried out which showed straw colored fluid with purulent discharge. Vitality test of the entire maxillary teeth was carried out and which showed no response. Radiographic examination (Fig:2) demonstrated well-defined radiolucency involving apices from 13 to 23.

Fig.1 : Frontal profile of patient.

Fig 2: OPG showing well defined radiolucency with upper anterior

After giving vertical releasing incision from 15 to 24, a full-thickness mucoperiosteal flap was raised (Fig.3) from right second premolar to canine on left side. There was bony window present at 13 and 14 region which was then further extended slightly and cyst enucleation was carried out along with the extraction of root pieces and the cavity was packed (Fig.4) with ribbon gauze soaked in liquid paraffin and iodoform powder and the pack was taken out by creating a nick at apices of 13 and 14 region and the pack was changed every week interval. After the cyst enucleation the cystic lining (Fig.5) was sent for histopathological examination and which further biopsy report

revealed cystic capsule overlaying lumen. The lumen was lined by stratified squamous epithelium which was showing (Fig.6) arcading pattern due to epithelial hyperplasia. The overlaying capsule stroma showed presence of dense collagen fibers with chronic inflammatory cells, foamy cells and endothelial lined blood vessels. Correlating the overall features, a final diagnosis of Periapical cyst was made.

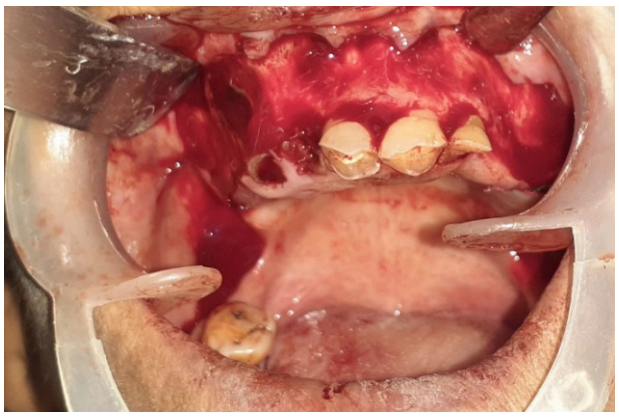

Fig.3: Flap reflection along with presence of bony window.

Fig 4: Cavity packed with ribbon gauze soaked in liquid paraffin and iodoform powder

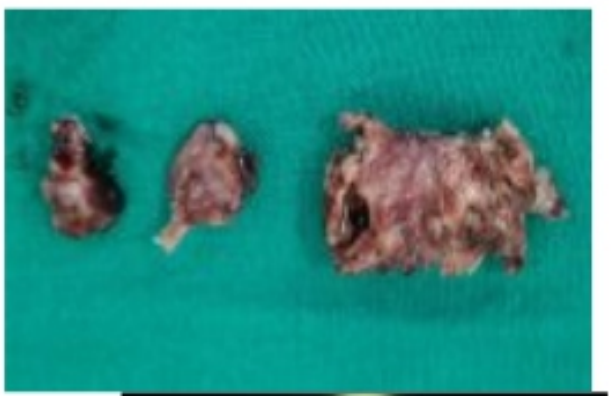

Fig.5 Specimen

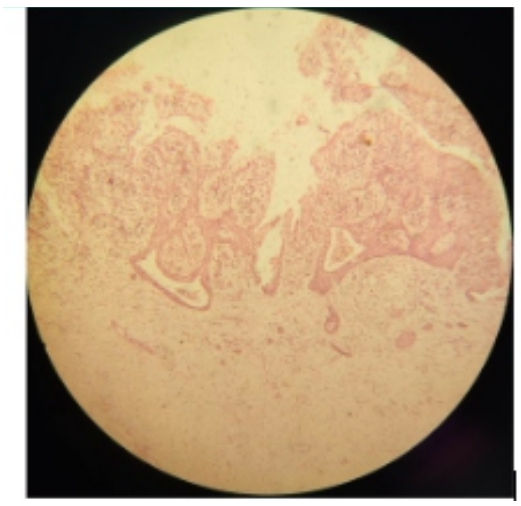

Fig.6: Shows cystic capsule overlaying lumen. The lumen was lined by stratified squamous epithelium which was showing arcading pattern due to epithelial hyperplasia. The overlaying capsule stroma showed presence of dense collagen fibers with chronic inflammatory cells, foamy cells and endothelial lined blood vessels.

DISCUSSION:

Periapical cyst is a chronic inflammatory response to the epithelial rest of malaise which occurs in the periodontium of affected teeth 6. This cyst may be a slow growing, bony swelling and asymptomatic, and can be determined unpredictably on periapical radiographs7. Periapical cysts (60 %) are mostly found in the maxilla especially around incisors and canines 10. The highest incidence is in the 3rd and 4th decades2. Males are more affected than females 2 and are seldom seen associated with the 1odentition8,9. The most prone region of the cyst development in maxilla, is the anterior region and, in the mandible, it is in the premolar region 9,11.

Clinical Features:

1. Asymptomatic unless there is an acute inflammation 12.
2. Mainly occur in the edentulous area 12.
3. Slowly growing which can lead to mobility, root resorption, displacement of teeth and may lead to pain and swelling if infected 13,14.
4. The infected region does not respond to thermal and

electric pulp testing 12.

Treatment option depends on the extension of the region(small or large).For small region choice of treatment is conventional endodontic technique like nonsurgical RCT (root canal treatment) 6,15,16.For large region surgical treatment like enucleation with extraction of the offending tooth, marsupialization or decompression which can be done in association with endodontic treatment i.e. with or without calcium hydroxide medication, cystectomy 6,15,16,17,18.Decompression is more conservative surgical approach as being the least invasive surgical treatment 19

In the developing countries, most of the people are not concern about the health of the oral cavity, which lead to the development of such cysts like periapical cyst, residual cyst.

In the present case report, a large periapical cyst like lesion was found in the maxillary anterior region which is the aesthetic zone so conservative surgical approach was planned. As the patient, in this case, was female, more care of the aesthetic region was done. The lesion was treated successfully by surgical enucleation along with curettage followed by iodoform and liquid paraffin pack. Regular long-term follow-up was done with iodoform dressing which kept the cavity away from contamination & enhances the healing of the lesion with excellent bone formation, reestablishment of the periodontal ligament.

CONCLUSION:

The present case reported was found to contain large size periapical cyst. It was managed successfully by conservative surgical enucleation which involves the removal of the infected lesions along with the surrounding healthy tissue, followed by iodoform pack with good prognosis.

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Case Report

PERIPHERAL OSSIFYING FIBROMA:- AFFECTING MAXILLARY POSTERIOR REGION: A CASE REPORT

Dr. Manish Sukhija, Dr. Suruchi Juneja Sukhija

ABSTRACT

Peripheral ossifying fibroma (POF) represents a rare separate entity of reactive benign lesion of connective tissue origin, not being the soft tissue counterpart of central ossifying fibroma. The present article is a case report related to peripheral ossifying fibroma in a 35year male who reported with a painless growth in the maxillary posterior region of jaw which is an unusual location for this lesion. The case report highlights the diagnosis and its surgical management.

Keywords: Gingival overgrowth, Ossifying fibroma, Reactive hyperplasia of gingiva

INTRODUCTION

Benign fibrous overgrowths arising from the mucous membrane are called as fibromas and are frequent growths in the oral cavity. Peripheral ossifying fibroma (POF) is a non-neoplastic enlargement of gingiva that is classified as a reactive hyperplastic inflammatory lesion. It is typically seen on the interdental papilla and comprises about 9% of all gingival growths.1 It shows a predilection for females and is most commonly found in maxillary incisor and canine region. It may be sessile or pedunculated, the color varying from pale pink to cherry with smooth surface.2,3 Trauma or local irritants such as plaque, calculus, microorganisms, masticatory forces, ill fitting dentures, and overhanging restorations are all known to precipitate the development of POF.4 The present article highlights a case report of peripheral ossifying fibroma, its diagnosis and clinical management.

CASE REPORT

A 35 year old male patient reported with complaint of a painless gingival growth in relation to left upper back teeth which caused discomfort while eating. (Fig.1) The swelling started as a small nodule that progressed gradually to the present size within a span of one month. The patient did not give any history of trauma, injury or food impaction and there was no significant medical history. Intraoral examination revealed firm, erythematous, non-hemorrhagic, non-tender and pedunculated solitary oval gingival growth measuring about 15mm x 15mm. (Fig.2) It involved interdental and marginal gingiva in relation to maxillary left premolars and extended till the mesial aspect of first molar.

Fig. 1- Preoperative picture showing the gingival overgrowth

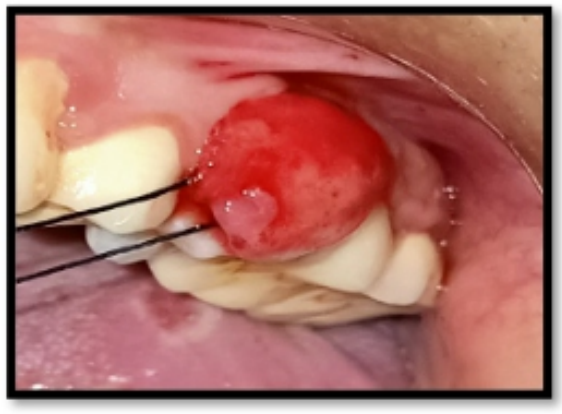

Fig. 2- Pedunculated lesion with suture to assess its attachment

Clinically, differential diagnoses for the growth were pyogenic granuloma, peripheral odontogenic fibroma, fibroma and peripheral giant cell granuloma. Hematological investigation was done including complete blood picture and blood glucose and all the reports was normal. The growth was excised conservatively to prevent the development of an unsightly gingival defect followed by gingivoplasty (Fig.3) Patient was given post-operative instructions and was prescribed with analgesic and mouth rinse (Fig 4). The excised tissue was sent for histopathologic

examination (Fig.5). Histopathological examination showed ulcerated squamous epithelium with dense inflammatory infiltrate in submucosa along with fibroblastic proliferation. Isolated foci of calcifications were also seen which confirmed the diagnosis of peripheral ossifying fibroma. The patient was called after one week for follow up and uneventful healing was observed (Fig.6).

Fig. 3 – Gingivoplasty done with electrocautery

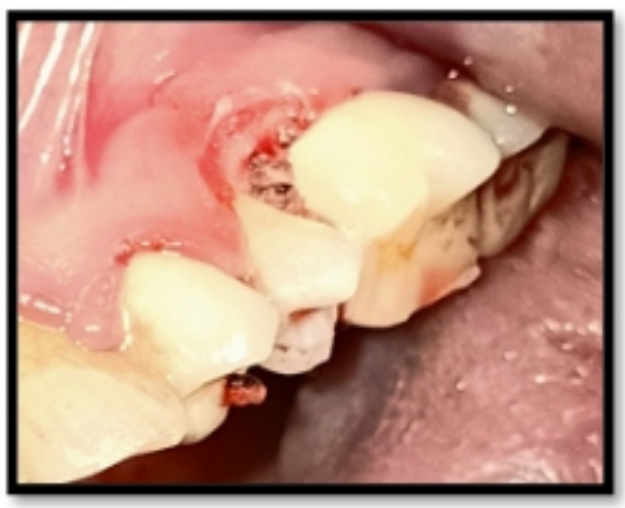

Fig. 4 – Immediate post-operative picture

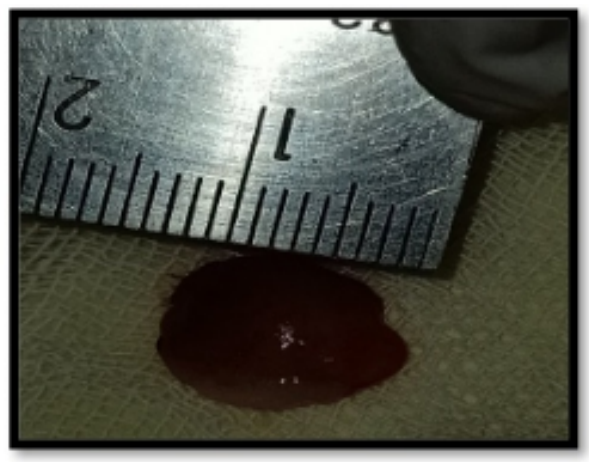

Fig. 5 – Excised gingival overgrowth

Fig. 6 - Picture at one week follow up showing satisfactory healing

DISCUSSION

Gingival overgrowths are one of the common lesions encountered in day to day practice. POF is a gingival lesion. Although Menzel described it first in 1872, Montgomery coined the term ossifying fibroma.5 There are two types of ossifying fibroma, central, and peripheral. The nidus of origin for the central type lies in the endosteum or the periodontal ligament adjacent to the apex of the root which over a period causes the expansion of the medullary space producing the associate extra oral swelling whereas the peripheral type arises in relation to the soft tissues in the tooth-bearing areas of the jaws.3

The pathogenesis of POF is not clear. Kumar et al.6 suggested that POF arises from the periodontal ligament cells as it arises frequently in interdental papilla, its proximity to the gingiva and the periodontal ligament along with the presence of oxytalan fibers within the mineralized matrix of some lesions. It has been postulated that POF develops from the secondary fibrosis of long-standing pyogenic granuloma to which it resembles clinically as well as histopathologically. It may arise following chronic irritation of the periosteal and periodontal membrane causing metaplasia of the connective tissue along with formation of bone or dystrophic calcified masses. Hormonal influences may play an important role, as it has predilection for females particularly in the second decade of life. In the present case, the lesion was reported in a male patient.

The occurrence of POF has been mostly reported in maxillary anterior region. In contrast, the lesion was found to be in posterior region. There is scarcity of similar cases reported wherein the lesion was in posterior segments of the jaw.7 Histologically these lesions, appears characteristically fibrous proliferation associated increased cellularity and chronic inflammatory infiltrate which is consistent with the findings of present case.

The main treatment modality is the complete excision of the growth either with scalpel, laser or electrosurgery. Furthermore, any local irritants like plaque, calculus or ill-fitting denture should be managed and oral prophylaxis is inevitably recommended. Partial or incomplete removal of the base of the pathologic lesion can leads to recurrence of the lesion and in the literature it has been stated that recurrence rate of POF is high and varies from 7% to 58%.8,9

CONCLUSION

Though peripheral ossifying fibromas occur as non-neoplastic growth it should be properly diagnosed with appropriate investigations. The presence of these lesions possesses constraints on mastication and esthetics. Hence, it is necessary for all dental practitioners to have the knowledge of clinico-pathological presentation of this type of lesion. Any type of these reactive lesions should be identified by considering the possible differential diagnosis in order to plan an appropriate treatment. The histopathological investigations guide to make an accurate final diagnosis.

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Case Report

TREATMENT OF ECTOPICALLY ERUPTED CANINE BY SEGMENTED T LOOP: A CASE REPORT

Dr. Azhar Hashmi, Dr Bisma Aziz, Dr Vivek Mahajan

ABSTRACT

A fourteen year old male presented with ectopically erupted canines and retained deciduous canines in the maxillary arch and maxillary arch crowding. Retained deciduous maxillary canines were extracted on both sides of the arch and segmental T – loop was constructed using 0.017×0.025" TMA for individual canine retraction. Post treatment results showed correction of ectopic canines and by this procedure of individual retraction of canines using loop mechanics prior to unraveling of anterior maxillary teeth crowding helped us in preventing tipping of anterior teeth. The following article presents the efficacy of using segmental loop mechanics in reducing the treatment time

INTRODUCTION

A major fundamental determinant in orthodontic treatment planning is the patient's own perceived need for that treatment. For most patients, the willingness to accept orthodontic treatment is motivated by a desire to improve appearance. Creating an esthetic smile requires an understanding of the principle that manage the balance between teeth and soft tissues

Ectopically erupted canines are one of the most frequently encountered conditions in orthodontic practice. Ectopic canines are believed to occur due to wide range of systemic and local causes.

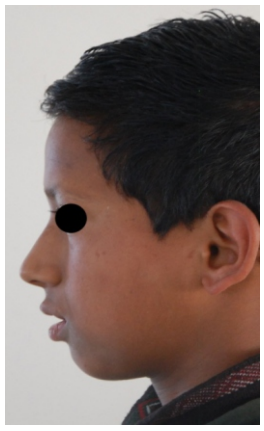
Environmental factors may contribute to this anomaly due to the long, tortuous eruption path of canine. The prevalence of impacted or ectopically erupted teeth is 1.0%–2.2%. Diagnosis and treatment of ectopically erupting permanent maxillary canines requires timely management by the orthodontist.1,2

Segmental mechanics plays a major role in the treatment module of ectopically erupted canines by retracting the canines only at the first place.3 It can be done by various means and among them T loop is one of the most effective way. By the help of T loop anchorage requirements can also be dealt in an easy way by producing differential tooth moments and by giving pre activation bends at particular angular values. In this article, we discussed a case report in which ectopically erupted maxillary canines have been brought into its normal occlusal level by the segmental arch technique using universal T-Loop

DIAGNOSIS

A 14 year old reported to the department of orthodontics and dentofacial orthopedics with a chief complaint of irregularly placed upper front teeth. Intraoral examination examination showed that patient had retained deciduous canines on both side of the maxillary arch and buccally erupted canines on both sides with palatally erupted lateral incisor on right side of the maxillary arch. In the mandibular arch patient was having a missing first molar on the left side. Overjet and overbite of the patient was normal and cephalometrically patient was having a Class I skeletal base with normal SNA and SNB values

EXTRA-ORAL PICTURES



INTRA-ORAL PICTURES

CEPHALOGRAM

OPG

TREATMENT OBJECTIVES:

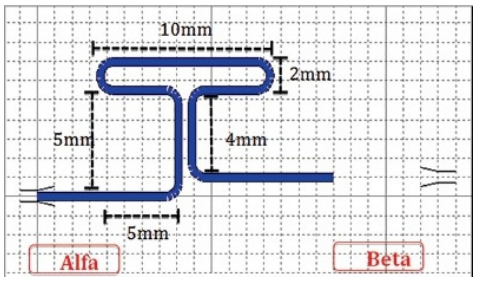
1. Extraction of retained deciduous canines and closure of the spaces
2. Correction of buccally placed canines and palatally blocked lateral incisor and closure of spaces

3. Leveling and alignment of both the arches and closure of the space in the lower arch

4. To achieve normal soft tissue profile

TREATMENT PLAN:

Extraction of retained deciduous maxillary canines on both sides of the arch, after healing of the socket a T loop was constructed using TMA wire 0.017 × 0.025. Conventional T loop design by Burstone was used. T loop consists of anterior and posterior segment. Anterior segment length (mesial leg) was 5 mm and pre activation bend of 15 degrees where as the length of posterior segment (distal leg) was 4 mm and pre activation bend of 25 degrees was given and height of the loop was 2mm.4,5 The design was constructed in this particular way so as to meet the requirement demands of high anchorage and on each visit activation of 2mm was done.



TREATMENT PROGRESS :

After extraction of deciduous retained teeth treatment began by bonding both maxillary canines and premolars on both the sides and mandibular arch except maxillary Incisors with MBT 0.022 X 0.028" slot. To enhance anchorage a transplatal arch was used and soldered to the palatal side of the maxillary molar bands. A standard segmented 17× 25 TMA T loop was employed at the bracket of ectopic canine and accessory molar tube bilaterally.

At each visit 2 mm activation was done and for a period of 6 to 7 months canines were retracted to the normal place and after that maxillary incisors were bonded and a wire of dimension 0.012 NITI in both the arches and further leveling and alignment was accomplished with 0.014 NITI and 0.018 NITI round nickel titanium wires followed by 0.017 X 0.025-in rectangular nickel titanium wires and then followed by 0.019 X 0.025 stainless steel working wire.

TREATMENT RESULTS

POST TREATMENT RESULTS

INTRA ORAL PICTURES

Post-treatment record of the patient shows us proper levelling alignment of both the arches along with the proper positioning of the ectopically placed canines.

DISCUSSION

Ectopic buccally erupted maxillary canines are one of the most frequently encountered conditions in orthodontic practice. Palatally displaced canines (PDC) occur twice as frequently as buccally. However, buccally displaced canines (BDC) are commonly seen in practice. When dentitions with PDC, erupted and unerupted, are compared with dentitions with BDC, erupted and unerupted, the main difference between these two conditions is an altered tooth size–arch length relationship.

Ectopic canines are believed to occur with a wide variety of systemic and local etiologies.. Another possible explanation is that a disturbance associated with the follicle of the unerupted tooth may influence the direction of eruption and contribute to the displacement of the maxillary canine.6

For canine retraction the first important issue to be addressed is whether the retraction will be done with all the six anterior teeth or canine separate. The magnitudes used for en-masse retraction are practically the same as the magnitudes used for retraction only of the canine, since low magnitudes of force retract all the six teeth. So, there is no difference in the loss of molar anchorage between the two approaches. 4

Effective space closure is challenging, and can be optimized when there is control and predictability of the force system. The simplest way to determine and visualize the force system is utilizing two groups of teeth, to obtain one center of resistance and one center of rotation in each unit. This is possible using the segmented arch approach. Moreover, the greater interbrackets distance and smaller load/deflection rates of the loops are favorable to the dental movement biology. Pre-calibrated loops, as the T-loop, are an important part of this technical approach5,7

Different alloys can be used for the construction of the T-loop. This changes the stiffness, the amount of activation and may increase or decrease the risk of plastic deformation, because it changes the maximum force and moment released by the loop.8 TMA releases 42% less force than stainless steel; thus, normally stainless steel alloys are not the first choice for the T-loop9

The space closure T-loops are frequently used in orthodontic mechanics and several formats are reported in the literature. Studies indicate that the higher the loop and the greater the apical length, the higher the M/F ratio and the lower the released force. 4

CONCLUSION

The successful treatment of a patient with an ectopic tooth and severe crowding can be a challenging task for an orthodontist. Proper treatment of an ectopic canine patient with severe crowding requires careful treatment planning by the orthodontist. Segmented 0.017×0.025″ TMA T-loop was used in this case successfully in retraction of highly placed canines in upper arch.

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Review

DENTURE ASSOCIATED ORAL MUCOSAL DISTURBANCES: NEGLECTED BUT IMPORTANT ASPECT OF PROSTHETIC DENTISTRY

Dr. Anusheel Sharma, Dr. Madhurima Sharma, Dr. Shalabh Kumar, Dr. Rohit Sharma

ABSTRACT

In edentulous patients, rehabilitation of aesthetic and functional problems with removable or fixed prosthesis increases the quality of life. However, removable prostheses especially predispose the oral environment to the development of oral mucosal alterations and disturbances. Oral mucosa coverage, trauma, incompatibility of prostheses, insufficient hygiene, continuous use of prostheses, and duration of prostheses use are the risk factors for oral mucosal lesions. Understanding the causes of oral mucosa lesion formation in patients using removable prosthesis is important to produce solutions for these causes. Most importantly, Prosthodontists must be aware of these oral mucosal lesions and should take all possible care in prevention of these oral pathologies both during fabricating the removable prosthesis and during follow up visits of the patients. This review is an effort to enhance knowledge and awareness on these oral mucosal problems among the prosthodontic practitioners.

KEYWORDS: Removable dentures, Oral mucosa, disturbances, Prosthodontists,

INTRODUCTION

The improvements in health-care methods and delivery have resulted in the elderly population being the fastest growing section of population and this needs due consideration. One of the most common complaints of elderly patients is edentulism, either partial or complete. Several studies on the prevalence of edentulousness show that it is associated with age, gender and living areas in most countries.1,2,3

Several treatment options are available for edentulous patients depending upon age, ridge resorption, medical conditions and financial status of the patient.1,2 Majority of patients prefer implants or fixed prosthesis however removable prosthesis is still one of the most delivered prosthesis particularly in Dental Colleges. However, data from various survey shows that several different mucosal lesions occur in patients using removable dentures, both partial and complete dentures. The patient's age varies, ranging from the youngest at the age of 26 to the oldest at 80 years. Some are located on the alveolar ridge, floor of the mouth, mucobuccal folds, palate, and onto the tongue.3,4,5

The prevalence of these oral mucosal lesions has also been shown to increase with age. Some authors suggest that length of denture use increases with increasing age of patients, and that they are reluctant to restore or replace old dentures, which can cause oral lesions. Several lesions are found to be more common in females. It may be due to the fact that female patients wear their dentures more often and perhaps for longer periods of time for esthetic purposes.1,3,5

It is important to understand that oral lesions in denture wearers constitute a heterogeneous group of tissue changes, both with regard to pathogenesis, clinical and histopathological appearance, and possible complications. Dentures may be the direct cause of these conditions or general diseases like diabetes mellitus may influence the oral environment and alter tissue responses and resistance. Different medical conditions associated with hyposalivation and parafunctional activity may also frequently result in higher risk of oral mucosal alterations.1,2

Denture-related oral mucosal lesions (DML) have been associated with denture plaque, Candida infection, poor denture retention and mechanical trauma. The literature suggests that defective dentures create additional opportunities for lodged food and limit the natural cleaning action by the tongue, lips, and cheeks. Denture cleaning methods may affect the condition of dentures, and pigmentation and abrasions in dentures occur with the use of toothpaste or toothbrush.1,4

Dentures may predispose patients to the onset of fungal lesions like denture stomatitis and angular cheilitis, hyperplastic lesions like epulis fissuratum and traumatic fibroma, various hypersensitivity reactions, Burning Mouth Syndrome, Sialorrhea as well as traumatic lesions like an ulcer or frictional keratosis and even malignancy. This review is an effort to enhance knowledge and awareness on these oral mucosal problems among the prosthodontic practitioners.

DENTURE STOMATITIS

Denture stomatitis or chronic erythematous candidiasis is one of the most common denture associated oral lesion. It is

characterized by erythema of the oral mucosa covered by the denture. The prevalence of denture stomatitis ranges from 20 to 67% among denture wearers. Removable dentures are known to decrease the flow of oxygen and saliva to the underlying tissue, producing a local environment that facilitates growth of candida.1,2,3

Poor oral hygiene and the continuous use of dentures are the most important factors for developing denture stomatitis. Candidal growth has also been associated with dentures relined with the soft liners. Systemic diseases that may predispose to candida infection are immunosuppression, dietary deficiencies, and hematological disorders.4,5

Denture stomatitis is commonly seen on the palatal mucosa and is more prevalent in female patients. Buccal and labial mucosa which are in direct contact with the denture base might exhibit denture stomatitis. According to Newton's classification in 1962, type I denture stomatitis is where the mucosal inflammation is localised as a result of trauma. In Newton's types II and III denture stomatitis, the denture bearing mucosa is diffusely involved, and it is granular in type III. Terminologies used for advanced stage of this disease are inflammatory papillary hyperplasia, granular denture stomatitis, and Newton's type III stomatitis. The condition may also be associated with angular cheilitis, atrophic glossitis, acute pseudomembranous candidiasis, and chronic hyperplastic candidiasis.4,5,6

These lesions are treated with the help of topical antifungals like nystatin and clotrimazole or systemic antifungals like fluconazole and ketoconazole. Maintaining hygiene and periodic dental checkup reduces the risk of denture stomatitis.

ANGULAR CHEILITIS

Angular cheilitis appears as deep fissures on the angle of the mouth and sometimes may have an ulcerated appearance. Loss of vertical height is a known cause of angular cheilitis but at the same time active colonization by Candida, associated with denture wear and poor oral hygiene are equally significant causes. The prevalence of angular cheilitis in denture wearers vary between 8 and 30%.3,4

The clinical appearance of the lip lesions fell into 4 categories. A ground rhagad at the corner of the mouth involving adjacent skin is the most common type among dentate patients, whereas a deep lesion following the labial marginal sulcus is frequently observed in denture patients. It is again treated with mostly with topical antifungal agents.2,3

DENTURE INDUCED FIBROUS HYPERPLASIA

A common tissue reaction to ill-fitting dentures is the occurrence of tissue hyperplasia (inflammatory hyperplasia, epulis fissuratum, redundant tissue) of the mucosa in contact with the denture border. Denture irritation hyperplasia is usually found in 5–10% of denture wearers.

The lesions are the result of chronic injury by unstable dentures or by thin, overextended denture flanges. The proliferation of tissue may take place relatively quickly after prosthetic treatment.1,2,4 Clinically, it presents as a sessile raise lesion in the form of folds usually with erythematous overlying mucosa. Because of chronic irritation, it may get traumatized and present with an ulcerated surface.2,3

Treatment includes immediate withdrawal of the ill-fitting prosthesis followed by topical application of antifungal agents and anesthetic pastes. Fabrication of new denture should be carried out. In cases of fibrous growth, excision of the lesion becomes necessary. Excision can be performed by either conventional surgical approaches or by using laser.3,4

HYPERSENSITIVITY REACTIONS TO DENTURE MATERIALS

A number of constituents of the resin, in both its unpolymerized and polymerized state, have been implicated as putative allergens giving rise to oral hypersensitivity reactions. These include the unpolymerized acrylic monomer methyl methacrylate, the initiator benzoyl peroxide, hydroquinone, formaldehyde and plasticizing agents. The response to the materials has usually been described as a locally irritant reaction, with rarely any systemic effects like 'asthma, soreness and itching', or 'swollen ankles and dizziness'.1,3,6 There are five types of hypersensitivity reactions and hypersensitivity in denture patients is usually Type III

(Immune complex mediated) hypersensitivity reaction. Such reactions arise as a result of formation of insoluble antibody/antigen complexes which may lodge at various sites within the body. Such reactions may be local, as in the Arthus reaction, producing erythema and oedema of a few hours or may be Systemic like pyrexia, lymphadenopathy, and urticarial rash arising from the presence of circulating complexes.2,4,6

BURNING MOUTH SYNDROME

Burning Mouth Syndrome (BMS) is an enigmatic pathology associated with oral burning without presence of any cause. Denture materials may elicit a burning response in sensitive BMS patients. Change in the denture material is usually indicated in these patients. Also, inadequate denture retention and stability may result in abnormal activity in the tongue which is a habit patients develop in an effort to retain dentures in the mouth. An inadequate freeway space and denture extensions may further increase the load on the denture bearing areas which may then result in oral burning sensation. Correction of such deficiencies in dentures or fabrication of new dentures must be undertaken to improve oral symptoms.7

Therefore, it may be advisable to carry out allergen patch testing to identify such patients and avoid using the implicated dental restorative or impression materials. Nickel is a component of the alloy used in fabrication of metallic or porcelain fused to metal crowns. Nickel and titanium ions leaching from dental cast alloys and dental implants have been identified as a possible causative factor for oral burning in BMS patients. Use of metal free crowns and alternatives to dental implants as a choice for tooth replacement must be considered in such patients.7

SIALORRHEA

Sialorrhea (drooling or excessive salivation) is defined as saliva beyond the margin of the lip. Sialorrhea results in numerous problematic physical and psychosocial complications and has a significant negative impact on quality of life for both the patient and caregiver. One of the major problems experienced by elderly patients when they wear a new denture is excessive drooling. Initially it seems normal as a new foreign body is placed inside the oral cavity. However, if it persists it may be because of nerve stimulation due to over extended denture, excessive pressure to the tissues or aggravated altered neuromuscular response of the patient.3,4

The management of sialorrhea is best accomplished with a multidisciplinary team approach. Treatment options range from conservative measures such as observation, positioning, behavioral therapies, and pharmacological therapy to more aggressive methods such as botulinum toxin injections or surgery.

TRAUMATIC LESIONS

Traumatic ulcers caused by dentures are seen in about 5% of denture wearers. It most commonly develop within 1–2 days after insertion of new dentures, but can also be found in old, ill-fitting dentures, because of overextended denture flanges, or unbalanced occlusion. Traumatic ulcers are most commonly seen on lateral border of tongue or buccal mucosa.1,2,8,9 They present as single persistent ulcer having necrotic floor. Until the cause of trauma is removed, these ulcers do not heal. Symptomatic treatment includes application of topical anesthetics, anti-inflammatory agents or topical steroids. Traumatic keratosis or frictional keratosis is very common among denture wearers and present as keratotic non scrappable white lesions on areas irritated by dentures. Traumatic Fibroma appearing as a fibrous growth on buccal mucosa also may develop due to trauma from denture.8,9,10

MALIGNANCY

It is usually claimed that the possibility of malignant transformation of denture-induced lesions should be considered. Although no substantial evidence is reported, malignant lesions such as squamous cell carcinoma and gingival carcinoma have been associated with chronic irritation. Carcinomas arising in denture wearers are usually seen on the palate, the alveolar ridges, and on the mucobuccal and lingual folds.2,9,10 Therefore, dentists can play a significant role in educating patients and in the early detection of malignant lesions in denture wearers. Chairside investigations like vital staining, Vizilite, velscope and early biopsy can help clinician to identify malignant changes taking place in a single chronic non healing traumatic lesion.

CONCLUSION

The complete denture wearers (CDWs) should be educated about the importance of periodic examination due to the changing supporting tissues for detection of early mucosal lesions, in order to maintain their oral and denture hygiene at an optimum level. Moreover, to prevent or minimize the extent of the lesions, denture wearers should be recalled regularly for an examination of the oral cavity and the dentures. They should be explained regarding problems faced due to prolonged use of the prosthesis, not removing the prosthesis at nights, and improper storage environment when the prosthesis is removed. It is important that the examination is carried out by a person who has adequate medical knowledge.

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Review

RECENT ADVANCEMENT IN EXODONTIA

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ABSTRACT:

Exodontia is most common procedure performed in oral surgery, and it is often the first surgical procedure carried out by interns and maxillofacial surgery residents. The sequence of extraction by conventional methods involves stripping of the periodontium around the tooth followed by luxation with an elevator or forceps. This method invites inadvertent trauma to the surrounding hard and soft tissues. If forceps extraction fails then surgical removal is performed. The increased amount of soft tissue and bone loss may lead to unfavorable postoperative sequel, thereby comprising the harmony. The traditional means of extracting teeth involving creation of a mucoperiosteal flap, elevation, and luxation with forceps often results in fracture or deformation of the dentoalveolar complex. This trauma could lead to ridge defects, creating postoperative prosthetic problems, especially placement of implants very difficult or even impossible in some traumatic extraction cases. There have been several exciting technological advances in extraction techniques and outpatient oral surgery within the last decade. A variety of new instruments and techniques are revolutionizing the fields of oral and maxillofacial surgery. Unfortunately, many students and clinicians are not aware of it. This article is an overview of recent advancement in exodontias including the principles and instruments and the appropriate use of them.

Keywords: Elevators, Dental forceps, Recent Advancement, Exodontia, Instruments

INTRODUCTION:

An ideal tooth extraction may be defined as “the painless removal of the whole tooth, or tooth root with minimal trauma to the investing tissues, so that the wound heals uneventfully and no post operative prosthetic problem is created”1. Extraction is the most common procedure performed in oral surgery, and it is often the first surgical procedure carried out by interns and maxillofacial surgery residents2.With the growth of implant dentistry, a good skill set in basic and complex exodontia is therefore essential for oral surgeons and well-trained general Dentists who wish to be clinically involved in this field of their practice. A variety of new instruments and techniques are revolutionizing in the fields of oral and maxillofacial surgery and dentistry3 within the last decade. The traditional means of extracting teeth involving creation of a mucoperiosteal flap, elevation, and luxation with forceps often results in fracture or deformation of the dentoalveolar complex. This trauma could lead to ridge defects, creating postoperative prosthetic problems, especially placement of implants very difficult or even impossible in some traumatic extraction cases. Physics forceps, Luxator periotomes, powered periotome, Piezosurgery, vertical extraction system (Benex device) are few advancement in field of exodontia. The judicious use of these instruments and devices allow the efficient, effective, and safe removal of teeth with a primary focus on minimizing complications and maximizing comfort for the patient and operator. Lack of understanding of instrumentation and the physics principles being used can cause prolonged operative time, iatrogenic injury to the patient, and unnecessary fatigue and/or injury to the provider. This article reviews the principles, techniques, and instrumentation of new instruments being currently available for exodontia.

PHYSICS FORCEPS:

For atraumatic extraction a tooth, Physics Forceps (Fig. 1) uses first-class lever mechanics. One handle of the device is connected to a “bumper,” which acts as a fulcrum during the extraction. This “bumper” is usually placed on the facial aspect of the dental alveolus, typically at the mucogingival junction. The beak of the extractor is positioned most often on the lingual or palatal root of the tooth and into the gingival sulcus4.Unlike conventional forceps, only one point of contact is made on the tooth being extracted. Together the “beak and bumper” design acts as a simple first-class lever. A squeezing motion should not used with these forceps3. In contrast, the handles are actually rotated as one unit using a steady yet gentle rotational force with wrist movement only. Once the tooth is loosened, it may be removed with traditional instruments like conventional forceps. With this technique, no prior elevator use is required before attempting the

extraction and mucosal flap reflection is not needed. If immediate implant placement is planned, the clinician should consider reducing the buccal aspect of the tooth to be extracted a couple of millimeters with a surgical bur subgingivally, or consider using a periotome before using the Physics Forceps. The Dentist requires some practice before achieving complete mastery in the use of the physics forceps because the technique is significantly different from what is used for conventional forceps extractions. However, once comfortable, the clinician will marvel at the ease and the little force required while extracting even difficult teeth.

Fig.1. Physics Forceps instrument

Fig. 2. Physics Forceps being used for extraction

PERIOTOMES

Creation of extremely thin and sharp instruments, have been allowed due to advances in material's physical properties. Such as, the Luxator style periotome (Fig. 3). The extremely thin edge can be inserted between the root surface and the alveolar bone directly transecting the periodontal ligament while simultaneously acting as a wedge. The resistance to instrument fatigue and fracture is an achievement in material science. The periotome is most effective on single-rooted teeth where the working tip of the instrument is used to transect the gingival fibers and crestal periodontal ligament fibers.5The instrument is then inclined mesial and distal and advanced apically. This sweeping motion transects the periodontal ligament while simultaneously expanding the bone. The instrument is advanced approximately two thirds of the distance to the apex. The procedure is repeated on the lingual side of the tooth. The periotome is then removed and forceps is used to complete the extractions. Sharma et. al in their randomized, double blinded trial of periotome/forceps versus periosteal/forceps extraction of single-rooted teeth found a significant reduction in operative time, pain scores, and gingival laceration with the use of a periotome.5 In the age of implant dentistry, the periotome may certainly have a role in preserving bone and gingival architecture. The concept of directly transecting the fibers as opposed to tearing the fibers through luxation and bone expansion is intellectually valid if the aim is maximizing bone and soft tissue preservation. A motorized version of the handheld periotome is available that uses a reciprocating motion. This can theoretically reduce buccal plate fractures by reducing the amount of torque force that may be inadvertently applied when using the hand periotomes.6.

Fig. 3. Luxator Periotomes

Fig. 4. Powered periotome (Courtesy of Weiss et. al)

POWERED PERIOTOME

A powered periotome is an electric unit that contains a handpiece with a periotome that is activated by a foot control. This device allows precise control over the quantity of force that the periotome tip exerts and the distance it travels into the periodontal ligament space. The instrument has a microprocessor-run actuator that eliminates uncertainty while extracting a tooth. As shown in Fig. 4, this device comes with a controller box that can be adjusted to 10 different power settings. In addition, the use of the Powertome 100S system frequently allows flapless removal of teeth, decreasing postoperative pain and discomfort while maintaining the periosteal blood supply to the alveolus.7The automated powered periotome system also reduces concern for fracture of lingual bone or buccal plate during difficult extractions. The use of a standard periotome is a much more tedious process and can actually cause unneeded discomfort for the patient, especially if a mallet is also needed to separate the tooth from bone. When using the powered periotome, it has been found that starting interproximally seems to work most efficiently because of the thickness of the interproximal bone. It is important to keep the blade parallel along the long axis of the tooth being removed. The blade should follow the tooth anatomy circumferentially in an apical direction in 2- to 3-mm increments. When extracting a multirooted tooth, the authors have found it most efficient to section the tooth and treat each sectioned root as a single-rooted tooth4. This instrument has a very small learning curve, and has been used by both general Dentist and oral surgeons for tooth extractions.

PIEZOSURGERY

Piezosurgery was invented by Professor Thomas Vercellotti in 1988 and has been improved upon since then. Piezosurgery refers to the use of an ultrasonic transducer using piezoelectric crystal to convert oscillating electrical fields applied to the crystal into mechanical vibration. Fig. 5 shows an example of a piezoelectric surgical unit. It produces a modulated ultrasonic frequency of 24 to 29 kHz, and microvibration amplitude between 60 and 200 mm/s8. These vibrations can cause fragmentation of solid structures and cavitation of liquid structures to which they are applied. The frequency of the ultrasonic waves used by the surgical units is specific for hard tissue, which allows minimal impact on surrounding soft tissue.9 The ability to avoid mechanical injury of adjacent soft tissue with this technology is a

Fig.5 piezoelectric surgical unit at our Dept.

Fig. 6. Piezosurgery used to extract impacted third molar

significant advantage over rotary instruments, particularly in close proximity to neurovascular structures or sinus membranes. Advantages also include precise bone cutting to the depth of 2 to 20 mm depending on the tip in use and less force required when performing osteotomies compared with rotary instruments. Traditional burrs and microsaws do not distinguish hard and soft tissue.10 Piezosurgery also gives the operator a clearer field of vision as shown in Fig. 6 by producing a very restricted bloody region, which is caused by microcoagulation of the vessels caused by the shockwaves from implosion of bubbles (cavitation effect)11. Despite the longer time of the procedure, piezoelectric osteotomy reduces postoperative facial swelling and trismus8. In

addition, the surgical control of the device is effortless compared with rotational burrs or oscillating saws because there is no need for an additional force to oppose rotation or oscillation of the instrument.12

VERTICAL EXTRACTION SYSTEM

To overcome the limitations of conventional tooth extraction techniques and flap surgery, in preserving alveolar bone and assuming that minimally invasive methods result in better ridge preservation, a number of novel vertical tooth extraction techniques have evolved.13, 14 There have been several studies on a vertical tooth extraction system (Benex, Lucerne, Switzerland).15,16 Fig. 7 shows the Benex device. The earliest was by Muska and colleagues15 who demonstrated the principle of this system, which includes placement of a pin into the canal of the tooth followed by placement of the extractor apparatus (occasionally requiring silicone impression material on adjacent dentition for stabilization). A traction wire is attached from the pin to the extraction apparatus so that vertical traction is applied to the tooth. The traction is increased until extraction is completed successfully. The system is most successful in single-rooted teeth and in non–root canal treated teeth.15, 16. The advantage of the system when used successfully allows for extraction of severely decayed teeth without requiring elevation of flap or removal of buccal/interproximal bone. This is advantageous in highly esthetic areas where implant restorations are planned. Although likely not a first-line option, the technology certainly has a role in maximal preservation of gingival and alveolar architecture.

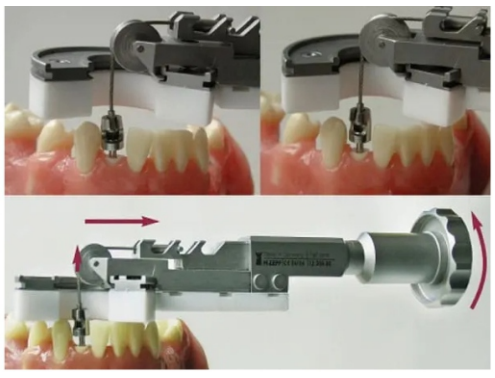

Fig.7. Benex device (Courtesy of Benex, Lucerne, Switzerland.)

SUMMARY

Exodontia is one of the most commonly performed procedures by general Dentist as well as Maxillofacial Surgeon. Although each surgeon has their routine instruments and techniques. We must also always stay updated on new techniques and technologies on our field. The apt surgeon has a thorough understanding of how, why, and when a certain instrument would be the most effective. Technology has allowed extraction techniques to evolve, and both surgeons and patients are benefiting. It is hoped this article allows reflection on and introduction to the most current techniques of exodontias.

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Review

CONCENTRATED GROWTH FACTOR (CGF): A REVIEW

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ABSTRACT:

CGF- "A miracle in regenerative dentistry". Concentrated growth factor is a new regeneration platelet aggregate which is widely used in periodontics and oral surgeries. It is acquired without the use of chemicals which marks it more eco- friendly.[1] It contains various growth factors which increases its actions and help in wound healing.[1] CGF is currently used along with autologous bone particles to bring about bone regeneration and connective tissue attachment which has shown excellent results.[1] Future research proved, that CGF can be used as a sole regenerative material.[1] CGF was seen to promote Osseointegration and enhance bone regeneration. It is an excellent biomaterial which brings it back to normal periodontium with external finishing.[1] Thus, the present article focuses on the preparation, application and advantages of using CGF in the field of regeneration.

INTRODUCTION:

Periodontitis is a disease of periodontium which begins with the development of pocket formation induced by bacterial plaque characterized by irreversible loss of connective tissue attachment and supportive bone loss.[1] The loss of teeth have been earlier replaced by dentures and bridges which help restore the ability of patients to eat, speak and esthetically improve appearance,[2] however these also have a limitations such as mastication, psychological acceptance, retention and stability of the prosthesis. Healing is a complex process,3 which involves cellular organization, chemical signals, and the extracellular matrix for tissue repair. The development of bioactive surgical additives, which are being used to regulate the inflammation and increase the speed of healing process, 4 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,5 when it was observed that they contain growth factors that are responsible for increasing collagen production, cell mitosis, blood vessels growth, recruitment of other cells that migrate to the site of injury, and cell differentiation induction, among others.

In recent years, use of autologous platelet concentrates (APC's), which are rich in growth factors, combined with these surgical techniques has emerged a possible tool for the treatment of periodontal defects.1 This is where bioactive molecules called growth factors (GF's) comes into picture. Platelets are a natural source of growth factors including platelet-derived GF, transforming GF (TGF)- β1 and β2 (TGF-β2) , fibroblast GF, vascular endothelial GF and the insulin-like GF which stimulate cell proliferation, matrix remodeling, and angiogenesis.3 Concentrated growth factor was developed by Sacco in the year 20066 and it contains more GF than platelet rich plasma, platelet rich fibrin and after application does not dissolve rapidly. According to Qin et al, CGF could release GF for 13 days.7 CGF's are produced by centrifuging blood sample alternatively and control speed using a special centrifuge. Different speed permits the isolation of much larger and denser fibrin matrix rich in growth factors.

In clinical trial CGF's exhibit superior potential for tissue regeneration in case of sinus and alveolar ridge augmentation. The strong fibrin gel in the matrix slowly remodel to a natural blood clot. Thus, increase in the concentration of CGF prolongs the duration of GF activity, support wound healing, and helps in cell proliferation and osteogenic differentiation.1 CGF's acts by degranulation of alpha granules in platelets which play major role in wound healing. Hence, CGF does not only improve wound which is necessary for new attachment but also act as a scaffold supporting cytokine attachment and cell migration. In vitro studies have established the beneficial effects of CGF in promoting bone regeneration around implants.3 The study designs of interest were randomized controlled clinical studies, prospective and retrospective studies.

PREPARATION

CGF is prepared with the protocol developed by Sacco (2006). From the patient, blood is collected in a specialized vacutaine8 in

which clot activation can occur. A standard, disposable, 10-ml non-anticoagulant tube and a matching centrifuge device is taken. Tubes containing blood is placed in a special centrifugation machine (Fig1). This machine is preprogrammed with following characteristics:

Figure 1: Centrifugation Machine

a) Acceleration for 30 seconds.

b) 2 minutes centrifugation at 2,700 rpm (692gm)

c) 4 minutes at 2,400 rpm (547gm)

d) 4 minutes at 2,400 rpm (592gm)

e) 3 minutes 3000 rpm (855gm)

f) 36 seconds deceleration and stopped.

At the end of the process, four blood fractions are identified (Fig 2, 3):

1. Superior phase, representing the liquid phase of plasma named platelet poor plasma (PPP),
2. Interim phase/ fibrin buffy coat phase,
3. Liquid phase and
4. Lower red phase.

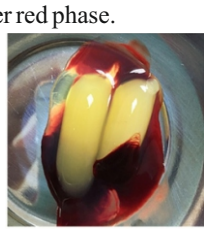

Figure 2: CGF was obtained after centrifugation

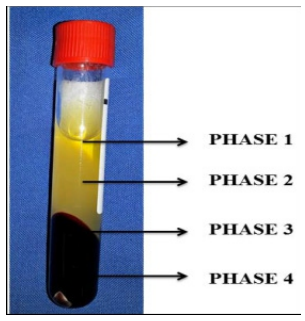

Figure 3: Phases of CGF

ADVANTAGES

CGF is a fibrin tissue adhesive with haemostatic and tissue sealing properties. It promotes wound healing and accelerates osteogenesis. CGF improves stability of the wound that is required for the attachment of a new connective tissue to the root surface.9 It promotes epithelial, endothelial and epidermal regeneration and decreases scarring. It has antimicrobial properties due to high concentration of leukocytes. It acts as an anti-antigenic agent on chronic non healing wounds. It also provides a scaffold supporting cytokine attachment and cellular migration.9 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.

DISADVANTAGES

The success of the CGF 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

CLINICALAPPLICATIONS

CGF is an excellent bioactive protein which promotes bone healing due to effect on epithelialization and angiogenesis.1 It is mixed with autologous bone particles to fill the bone defect and

cause bone regeneration. It serves as a resorbable interpositional membrane. Avoid early invigilation of the gingival epithelium inhibited by the CGF layer results as a barrier to epithelial migration. CGF also acts as a membrane support in recession coverage as it constantly releases GF to enhance tissue regeneration.1 It acts as a barrier membrane to facilitate tissue healing and results in obtaining the attached gingiva width in root coverage procedures like sliding flat technique. CGF increases stability, accelerates Osseointegration by increasing the differentiation of osteoblasts and healing of the bone around the implant. It also increases FGF-β or VEGF release, which are required for angiogenesis and enhances neutrophil migration by performing integrin release.

CONCLUSION:

CGF is a novel ingress of tissue engineering and has the ability to harbor growth factors that facilitates stimulation and acceleration of both hard and soft tissue regeneration.1 Being completely a natural, physiologic and economical source of autologous product, it possesses beneficial effects of eliminating concerns about immunogenic reactions and disease transmission. CGF might aid in obtaining vertical bone gain around implants when used alone or in combination with allogenous and xenogenous grafts.4 The quality of new bone formed around implant is gradually improved.

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Review

ORTHO WIRES: WHERE ARE WE?

Dr. Hemanth, Dr. Seema Gupta, Dr. Eenal Bhambri, Dr. Avisha Middha, Dr. Sorokhaibam Monika

ABSTRACT

Aim- The aim of this review is to discuss about the orthodontic wires in detail in detail about their physical and mechanical properties.

Objective- To enumerate the different types of orthodontic wires and their physical and mechanical properties and their clinical implications.

Background- Orthodontic wires are components of fixed orthodontic appliances that are used to carry out the necessary tooth movements as part of their treatment modality. A variety of materials like metals, alloys, polymers and composites are used to produce orthodontic wires. The properties of orthodontic wires are evaluated by various laboratory tests like tensile, torsional, and bending tests. However, oral conditions may influence their behaviour and it is importance for the clinician to understand the properties of orthodontic wires as well as their clinical implications to receive optimal results. This article reviews different materials used for manufacturing orthodontic wires and their properties along with clinical implications.

Reason- This review is mainly done for better assessment and benefits of various orthodontic wires.

INTRODUCTION

Material sciences have made a rapid progress in the recent years. Up until the 1930s, gold was the only orthodontic wire available. Austenitic stainless steel, with its greater strength, higher modulus of elasticity, good resistance to corrosion, and moderate cost was introduced to the orthodontists in 1929 and within a short span gained popularity over the gold alloy. Since then, orthodontics has come a long way. Several alloys like Cobalt – Chromium, Nickel –Titanium, Beta – Titanium, Stainless-steel wires and multistranded wire with desirable properties have been adopted in orthodontics. In this vast ocean of different orthodontic alloys available, it becomes very difficult for an orthodontist to select a proper wire with the required properties. For the correct use of orthodontic appliance, one must have a thorough knowledge of the materials from which these appliances are made. The mechanical and physical properties of these materials change greatly under varying conditions of manipulation. Therefore, the clinician must be thoroughly conversant with the various mechanical properties of the wires and their clinical applications. The objective of this article is to review the related literature available in order to describe the mechanical properties and their clinical applications of Stainless steel, Cobalt-Chromium, Nickel-Titanium, Beta-Titanium and Multistranded wires.

STAINLESS-STEEL WIRES:

Stainless-steel is the most popular wire alloy used in orthodontics because of an outstanding combination of mechanical properties, corrosion resistance, and being economical. The wires used in orthodontics are generally American Iron and Steel Institute types- 302 and 304 austenitic stainless-steel. These alloys are known as “18-8” Stainless steels, so designated because of the percentages of chromium and nickel in the alloy1,2,3. The chromium in the stainless-steel forms a thin, adherent passivating oxide layer that provides corrosion resistance by blocking the diffusion of oxygen to the underlying bulk of the alloy. The chromium, carbon, and nickel atoms are incorporated into the solid solution formed by the iron atoms. The nickel atoms are not strongly bonded to form some intermetallic compound, so nickel alloy releases from the alloy surface, which interfere with the biocompatibility of the alloy. Research has shown that the modulus of elasticity for stainless-steel orthodontic wires ranges from about 160 to 180 GPa. This value depends on the manufacturer and temper, and is indicative of difference in alloy compositions, wire drawing procedures and heat treatment conditions4,5,6. The yield strength of the wire ranges from about 1100 to 15000 MPa. The yield strength can be increased to about 1700 MPa after heat treatment. The yield strength to modulus of elasticity ratio indicates a lower spring back of stainless-steel as compared to the newer titanium-based alloys. This suggests that stainless-steel produces higher forces that dissipate over shorter periods therefore it requires frequent activations7. Heat treatment of the wire causes decrease in residual stress and increase in resilience. Heat treatment of stainless-steel wires at above 650oC must be avoided because rapid re-crystallization of the wrought

structure takes place, with deleterious effects on the wire properties. Heating stainless steel to a temperature between 400 to 900oC causes reaction of the Chromium and carbon to form chromium carbide precipitate at the grain boundaries. Loss of chromium from the iron solid solution matrix results in depletion of chromium content which in turn causes the stainless-steel alloy to become susceptible to inter-granular corrosion.

COBALT- CHROMIUM WIRES:

These wires are very similar to stainless-steel wires in appearance, mechanical properties and joining characteristics, but have a much different composition and considerably greater heat response. They are also known as Elgiloy which was developed during 1950's by the Elgiloy Corporation. The Elgiloy wires are available in four tempers depending on their resilience and are colour coded by the manufacturer; Soft (blue), Ductile (yellow), Semi-resilient (green), Resilient (red). The advantage of these wires over stainless-steel wire includes the greater resistance to fatigue and distortion. In most respect, the mechanical properties are similar to that of stainless-steel so the stainless-steel wires can be used instead of cobalt chromium wires. They have a high modulus of elasticity suggesting that they deliver twice the force of Beta Titanium and four times the force of Nickel Titanium archwires. The elastic modulus of Elgiloy blue ranges from about 160-190 GPa when under tension, while after heat treatment it increases to range from about 180-210 GPa. Similarly, the yield strength ranges from 830-1,000 MPa under tension, and 1.100-1,400 MPa after heat treatment. The clinical use of Elgiloy blue is fabrication of fixed lingual quad-helix appliance, which produces slow maxillary expansion in the treatment of maxillary constriction.

NICKEL-TITANIUM WIRES:

Nickel-Titanium alloy marketed as Nitinol by the Unitek Corporation is useful in clinical orthodontics because of its exceptional springiness. The generic name Nitinol which is applicable to this group of nickel titanium alloy originates from Ni-nickel, Ti-titanium, NOL-Naval Ordnance Laboratory. The pioneer for the development of these wires for orthodontics was Andreasen. Two new super-elastic nickel titanium wires were also introduced namely; Chinese NiTi and Japanese NiTi8,9. Shape memory is one of the remarkable properties of the NiTi alloys. There are two major NiTi phases in the nickel-titanium wires. The austenitic phase has the ordered body centered cubic structure that occurs at high temperatures and low stresses. The martensitic phase has a distorted monoclinic, triclinic or hexagonal structure that forms at low temperatures and high stresses. The shape memory characteristics of the nickel titanium alloys are associated with a reversible transformation between the austenitic and martensitic phases. The martensitic phase forms from the austenitic phase over a certain transformation temperature range or when the stress is increased above some appropriate levels. The difference in the temperature ranges for the forward transformation from the martensitic phase to the austenitic phase, and for the reverse transformation, is termed Hysteresis. In order for a nickel titanium archwire to possess shape memory, the transformation of the phases must be completed at the temperature of the oral environment10. Nickel-titanium archwires with Ion-implanted surfaces have been introduced to reduce the archwire bracket friction. As provided for orthodontic use, Nitinol is exceptionally springy and quite strong but have poor formability. The advantages of these wires can be enumerated as fewer archwires are required to achieve the desired changes, less chair side time, and less patient discomfort. Their poor formability makes them best suited for the pre-adjusted appliance. Placing bends in the wire adversely affects the spring back property of the wire. Clinical disadvantage of these alloys is that permanent bends cannot readily be placed in the wires and that the wires cannot be soldered11.

BETA-TITANIUM WIRES:

A beta-titanium orthodontic alloy, also called as TMA, which represents" Titanium-molybdenum alloy" is marketed by the Ormco Corporation. The wire has a potential for delivering lower biomechanical forces compared to stainless steel and cobalt-chromium-nickel alloy too12. Beta titanium alloy wires have excellent formability due to their body centered cubic structure.

The TMA alloy has the elastic force delivery ranging from about 62-69 GPa, which is less than that of stainless-steel wires. Another clinical advantage of the alloy is that it possesses true weldability. Welded joints that are fabricated from stainless-steel and cobalt-chromium-nickel alloys must be built up with the use of solders to maintain adequate strength. The excellent corrosion resistance of the wire is due to the presence of a thin, adherent, passivating surface layer of Titanium oxide. Following are some properties which should be considered by the orthodontists before the clinical use of the wires: Heat treatment by the clinician is not recommended. Solution heat treatment between 700-730 C, followed by water quenching, and then aging at 480oC results in the precipitation of alpha titanium phase. The beta titanium wires are generally the most expensive of the orthodontic wire alloys, but their advantages like excellent formability, intermediate force delivery, and weldability when fabrication of more complex appliances makes them to be used widely in orthodontics. It has been shown that TMA wires have high surface roughness. This surface roughness contributes to the high values of archwire bracket sliding friction, along with localized sites of cold welding or adherence of the wire to the bracket slots. However recently developed N+ Ion-implanted TMA wires that have substantially reduced archwire bracket friction are available from Ormco or Sybron.

MULTISTRANDED WIRES:

Multistranded wires are made of a varying number of stainless-steel wire strands coaxially placed or coiled around each other in different configurations. The important characteristics of these wires are development of low forces, low stiffness and a resilience13,14 and these wires are less expensive than titanium alloys15. They develop higher friction at bracket-wire interface compared to NiTi wires and single-stranded stainless-steel wires16.

CONCLUSION:

Metals, alloys, polymers and composites are the materials used for producing orthodontic wires. Each type of material has its advantages over the other. However, the practitioner should have a thorough knowledge of the mechanical and physical properties of wires to determine their clinical behaviour and to achieve a satisfactory and predictable outcome. Fiber reinforced composites are regarded as the cutting edge of orthodontic materials due to their excellent esthetics, strength and the ability to customize their properties to the needs of the practitioners.

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