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CONTENTS

Editorial:

- NAAC Accreditation** 94
Prof. (Dr.) Vinod Sachdev

Original Research Article:

- Relationship of body mass index to maximum bite force in a sample group from Nepalese population** 95-97
Pramita Suwal, Bishal Babu, Rojina Shakya
- Association between maternal oral health literacy and their preschoolers' oral health outcomes in Muradnagar -A cross-sectional study** 98-101
Upasana Tyagi, Ipseeta Menon, Deepa Tomar, Avnish Singh, Jyoti Goyal
- Comparative evaluation of antiseptic pomade to prevent bacterial colonization after periodontal flap surgery- a clinical & microbiological study** 102-107
Swyeta Jain Gupta, Siddharth Tevatia, Vivek Khatri, Vidya Dodwad
- Clinical trial to compare conventional incision technique and diode laser on the treatment of oral submucous fibrosis** 108-111
Arpit Shah, Romil Shah, Neha Vyas, Nitu Shah
- Antibiotic prescription patterns in a Dental college located in Northern India** 112-118
Achint Garg, Uday Pratap Singh, Aakriti Bhatnagar, Siddharth Gupta, Garima Martolia
- Prevalence of periodontal disease in rural population of Raigad district of Maharashtra: A cross-sectional study** 119-121
Sujeet Khiste, Bharat Gupta, Nikita Ramachandran, Nikita Ranade, Aalia Patrawala, Saniyah Shaikh, Bhavika Shetty, Kanika Agarwal
- The relationship between burnout and perfectionism in medical and dental students in Saudi Arabia** 122-127
Khalid Aboalshamat, Maha Alzahrani, Nejoud Rabie, Rahaf Alharbi, Roaa Joudah, Shatha Khulaysi, Walaa Alansari
- Evaluation of microleakage after restoration with different posterior tooth coloured restorative materials- An in vitro study** 128-130
Nitin Malik, Ruchika Gupta Dewan, Sonal Soi Sharma, Rohit Kochhar
- Comparison of modified Kreyberg's, modified Papanicolaou, Ayoub-Shklar, and Haematoxylin and Eosin stains to demonstrate keratin in paraffin embedded tissue sections** 131-137
Aprajita Srivastava, Anil Singh, Kunal Sah, Vineet Raj, Bhavana Gupta
- Orthopantomogram study of mental foramen in Muradnagar-Ghaziabad Population** 138-141
Mohit Mangla, Lily Rajput, Amit Kumar, Pradeep Sharma, Vidhi C. Rathi, Sanjeev Kumar
- Comparison of metal release from fixed orthodontic appliances in oral mucosa cells in patients with and without fixed orthodontic appliances- An in vivo study** 142-147
Sudha Halkai, Anand Mangalgi, Kundan Shah, Ganesh Paramshivam, Deepika Mallasure

Journal of Dental Specialities

- Comparative evaluation of pain in vestibular depth extension procedure using scalpel, electrocautery and diode laser** 148-151
Sandeep K. Bhullar, Viniti Goel, Amandeep Bhullar, Lakshay Goyal, Vijita Mehta, Tarun Nanda, Mallika Sethi
- Case Report:**
- Management of endodontic-periodontic lesion with regenerative procedure: a split- mouth observational comparative case report** 152-155
Pinal Patel, Archita Kikani, Komal Thakar, Vacha Patel
- Management of intra alveolar root fracture in primary incisor: A conservative approach and review of literature** 156-159
Richa, Neeraj Kumar
- Phenytoin – induced gingival overgrowth: a case report** 160-163
Reetika Gaddale, Shrikar R. Desai, Ilangovan Karthikeyan, Sangeeta S. Kulkarni
- Natal teeth retained for 3 years: A rare case report** 164-165
Nidhi Agarwal, Manpreet Kour, Ashish Anand
- Rejuvenating and revitalizing non vital traumatized young permanent teeth: A case series** 166-168
Vinita Goyal, Yasha Tyagi, Pulkit Jhingan
- Peripheral Ossifying Fibroma: A rare case report** 169-170
Razeena Salam, Jagadish Pai, Anish Varkey, Amit Walvekar
- Threat to implants: Peri- implantitis: A case report** 172-174
Komal Thakkar, Pinal Patel, Archita Kikani, Mihir Shah

NAAC Accreditation



Prof. (Dr.) Vinod Sachdev

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Editor-in-chief*

Dear Readers!

Warm Greetings!

Just as I was overwhelmed by coming to learn about a robotic 3-D implant surgery for the very first time, it was equally ecstatic to hear a simple water test, in proof of concept stage lately, which could help prevent skeletal fluorosis, especially in India. Innovation sounds familiar with invention; however, the former adds synergy to ideas already put on the table. Whilst, scholars of scientific sphere agree to relentless learning as lifelong process, aiming to nurture elastic minds is need of the hour! A wide perspective towards research and development can prove to be a cornerstone for a teaching institute's success.

As the country is developing, the demand for inclusivity in educational institutions has reached a new high with student learning objectives centered on a diverse outreach. Professional institutes with graduate and post graduate courses, in the digitally competitive world, need to enhance perception of what lies on the shelf, to their target audience.

While different accreditation agencies promote different values in organizations worldwide, the National Assessment and Accreditation Council (NAAC), an autonomous body of University Grants Commission (UGC) of India, has emerged as a benchmark for quality outcomes. Meeting the expansive scalable criteria remains a major challenge for many institutes, since the margins are little for skipping. NAAC promotes excellence in teaching-learning, innovation and high impact educational delivery. Value framework and vision and mission of NAAC echo with international standards of educational systems. Amidst the ongoing debate whether NAAC

accreditation is essential for an institute; the importance of improving the research acumen in the colleges cannot be overlooked. The colleges have a significant responsibility to provide facilities for promoting research culture among faculty and students. Further, the theoretical and clinical findings of the research need to be shared with community through the medium of publications. Breakthrough research and publications in high quality journals are the primary criteria for getting higher NAAC scores.

Our journal is working towards PUBMED indexing status which will increase the credibility of its articles. I congratulate subscribers and people of research interest for showing a wonderful enthusiasm for journal contributions and would expect high quality original research in the upcoming issues. Keep the bright lights shining!

Happy Reading!

Regards

Dr. Vinod Sachdev

Editor-in-chief

Journal of Dental Specialties.

Relationship of body mass index to maximum bite force in a sample group from Nepalese population

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Abstract

Statement of problem: The force generated by masticatory apparatus can be called as bite force in normal functions of jaws. Various factors such as age, sex, built, periodontal support etc. can affect the bite force.

Purpose: To evaluate the impact of body mass index (BMI) over bite force in Nepalese adult individuals.

Materials and Method: Total 384 adult volunteers from Eastern Nepal were enrolled in the study to record bite force and BMI. Statistical analysis was done at 95% confidence interval with the level of significance at 0.05.

Results: The mean maximum bite force (MMBF) of Nepalese adult population was approximately 273N. The BMI had no significant impact on MMBF.

Conclusion: The study found the MMBF of Nepalese adult population and within its limitations, the study did not establish BMI as a predictor of MMBF.

Keywords: Mean maximum bite force, BMI, Masticatory efficiency, Age, Gender, Masticatory apparatus.

Introduction

Bite force is defined as the force generated between maxillary and mandibular teeth by an act of the jaw elevator muscles.⁽¹⁾ It is one of the determinants of the functional state of the masticatory system, which is determined by the central nervous system, feedback from muscle spindles, mechanoreceptors and nociceptors, which in turn is modified by the craniomandibular biomechanics that influence and coordinates the movement of the jaw elevator muscles.⁽²⁾ It is utilised to know the beneficial effect of prosthetic rehabilitation, and also in identification of the disorders in stomatognathic system.^(3,4)

Several parameters such as craniofacial morphology,⁽²⁾ age,⁽⁵⁾ sex,⁽⁶⁾ periodontal support of the teeth,⁽⁷⁾ and the type of measuring devices⁽⁸⁾ can influence the measurements of bite force determination. Also, for recording various devices like bite fork, force sensing resistors,^(8,9) strain gauge transducers,⁽¹⁰⁾ foil transducers⁽¹¹⁾ can be utilised.

In the current study, the role of body mass index (BMI) over maximum bite force is evaluated. There are many studies⁽¹²⁻¹⁷⁾ pertaining to BMI. The results of them were contrasting and thus this study aims to test the hypothesis that the BMI has an impact on MBF in a study sample from Nepalese population.

Materials and Method

The study was carried out in 384 adult dentate participants with a full set of teeth till the second molar, without considering the presence or absence of the third molar teeth from Nepalese population. The exclusion criteria were that the participants had no known

craniofacial abnormality, no known temporomandibular disorders upon general evaluation, no evidence of wasting disease occurring in the teeth, the absence of carious lesions in the molars, no past history of orthodontic treatment or prosthodontic rehabilitation. The study was ethically permitted by Institutional Review Committee of B. P. Koirala Institute of Health Sciences.

A bite force measuring device was customised for the purpose of measurement of the bite force of the participants. This device had miniature load button of LLB (Load Button Load Cell) series as biting element and stainless steel Clamp Probe paired with FUTEK's Handheld Digital Display (IHH500). The measured force was displayed in Newton(N) digitally.

The participants were seated comfortably in a dental chair in an upright position and then the bite force measurement method was demonstrated. The measuring device was kept straight and parallel to the floor. Instructions to the participants were given and asked to bite with the hardest force on the gauge without any movement of the head. The bite force measurement was made on both sides of the first molar teeth. Three readings of the bite force was taken from each participant, the reading was made in an interval of three minutes for the relaxation of muscle fatigue. To measure the bite force and reduce the inter-observer bias single investigator was allotted to perform and record the score.

Body height was measured with a measuring scale on a wall when patient stood in an erect position without shoes with a precision of 0.1 cm, and weight was recorded in kilograms with a weighing scale. The

BMI was calculated using the formula; BMI = weight (kg)/height (meters)²

Results

The data collected were entered into Microsoft Excel program and transferred to SPSS software to perform the statistical analysis. With 95% confidence interval the level of significance was kept as p≤0.05. The results of the observations made from the study population showed that mean maximum bite force

(MMBF) was 273.01N on right and 273.70N on left side. While comparing between the bite force at left and right side of the jaw there was no statistically significant difference.

Mean maximum bite force was found to be 314.94N in males and 223.69N in females. There was no statistically significant difference in observations made between genders. The results of the study are depicted in Tables 1-3.

Table 1: Mean and significance of bite force between left and right side

	Number of subjects	MMBF±SD	p-value
Right bite force	384	273.01±49.57	0.488*
Left bite force	384	273.70±49.17	

p>0.05 indicating not significant

Table 2: Mean and significance of bite force between genders

Parameters	Number of subjects	MMBF±SD	Minimum	Maximum	p-value
Gender					
Male	209	314.94±14.29	221.00	343.50	0.773*
Female	175	223.69±18.86	181.50	343.50	

p>0.05 indicating not significant

Table 3: The effect of BMI in MMBF

Parameters	Number of subjects	MMBF±SD	Minimum	Maximum	p-value
BMI					
Normal	367	272.18±48.54	181.50	343.50	0.112*
Overweight	17	277.18±46.60	191.50	321.50	

p>0.05 indicating not significant

Discussion

The present study was conducted amongst Nepalese population. The separation of teeth was 15 mm in all participants during the recording of the bite force. Several authors^(18,19) found that the magnitude of force increased when jaw opening was up to 15 -20 mm of the interincisal opening which roughly equals to the optimal length of elevator muscles.

Gender and BMI were found to be predictor of MBF in Saudi Arabian study sample as higher BMI was correlated with higher MBF in the participants who were dentate as well as who had fixed prostheses.⁽²⁰⁾ Gender difference during the measurement of bite force was observed in some studies^(9,10) unlike the observations in the present study. The difference was not significant, may be due to larger but unequal sample of male and female participants.

The bite force of the Taiwanese sample population showed that it was higher in obese girls and overweight boys. The mean serum testosterone was correlated to increase in BMI.⁽²¹⁾ Their findings contrast to the present study as no significant effect of BMI over the maximum mean bite force was observed. There are several studies^(3,14-16) which agree with this finding indicating no significant impact of BMI on bite force.

However, lower weight was significantly correlated to MBF values in one of the studies.⁽¹⁴⁾ There are several published studies^(12,13) in weight and built which have similar findings, but none of these studies were able to establish BMI as a predictor of MMBF.

Conclusion

Within the limitations of the measured variables of this study, it was found that the mean maximum bite force in studied population sample was 273N. The right or left side has no significant impact on MMBF, and also there was no statistically significant impact of BMI over MMBF in Nepalese population.

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Association between maternal oral health literacy and their preschoolers' oral health outcomes in Muradnagar -A cross-sectional study

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Abstract

Aim: To assess the association between maternal oral health literacy and their preschoolers' oral health outcomes in Muradnagar.

Materials and Method: Among the preschool children of Muradnagar, a cross-sectional study was conducted to assess the association between maternal oral health literacy and their preschoolers' oral health outcomes. The examiner for interviewing mothers and for the clinical examination of children was single trained calibrated. Rapid Estimate of Adult Literacy in Dentistry (REALD-30) was used to measure maternal oral health literacy. Mother's socio-demographic variables, oral health related knowledge and behavior was recorded using a structured questionnaire. Clinical examination of the children was done by using Visible biofilm index, Modified gingival index and WHO dentition status 2013. SPSS software version 18 was used for statistical analysis.

Results: 48% of the children were males, among the 197 Mother/Child Pairs examined. REALD-30 scores and clinical oral health status of the child ($p < 0.05$) showed a significant relationship.

Conclusion: Maternal oral health literacy significantly modifies oral health status of their preschoolers.

Keywords: Maternal Literacy, Oral health literacy, REALD-30

Introduction

Dental caries is the most common chronic disease of children. The General Accounting Office has reported that poor children have five times more untreated caries than children from higher income families.⁽¹⁾ Dental caries may cause many problems in children like chewing, smiling, speaking etc if left untreated.⁽²⁾ The significant impact of oral disease among young children and their families is well established.⁽³⁾ Parents may play a vital role in the health of their children especially mothers. Caregiver literacy is related to other health outcomes among young children⁽²⁾ and may be proved as an important factor for treating dental health problems in children. We hypothesized that maternal oral health literacy may be a crucial variable in oral health behavior and the development of dental caries among children.

An important determinant of oral health is Oral health literacy (OHL). OHL has been defined by the National Institutes of Dental and Craniofacial Research (NIDCR) as "the degree to which individuals have the capacity to obtain, process, and understand basic oral health information and services needed to make appropriate health decisions".⁽¹⁾ Individuals with low literacy skills often have poorer health knowledge and health status, unhealthy behaviors, less utilization of preventive services, higher rates of hospitalizations, higher rates of chronic diseases, increased health care costs, and ultimately poorer health outcomes than those with higher literacy levels. Individuals with low literacy skills often have poorer health knowledge and health status.⁽²⁾

This study was done to assess the association between maternal oral health literacy with their oral

health knowledge, oral health behaviors and the clinical oral health status of their child.

Materials and Method

A cross sectional survey was conducted on preschool children of Muradnagar to assess the relationship between maternal oral health literacy and their preschoolers' oral health outcomes. Preschools of Muradnagar was the study area. Before starting the study ethical clearance was obtained from the ethical committee of I.T.S-CDSR Muradnagar, Written consent from preschool authorities and parents of children were taken before their participation and clinical examination of the children in the study. Mothers and school authorities were informed in advance before conducting the survey and collection of the data was carried out during the month of September- October 2015.

A pilot study was carried out on 20 (10%) subjects in the month of August 2015 to check feasibility of proforma and validity of questionnaire, their after necessary modifications were made. Calibration of the principal investigator was done in the Department of Public Health Dentistry I.T.S- CDSR Muradnagar, Ghaziabad to limit the examiner variability. The subjects were randomly called on different days and examiner repeated the examinations on them in order to reduce the intra examiner variability. The mean Kappa co-efficient values for intra-examiner reliability was 0.88.

The sample size was determined based on the results of the pilot study using the formula –

$$Z^2 P (1-P) / d^2$$

Where, P = Prevalence rate which was estimated to be 15% after the pilot study.

Z = Z statistic for a level of confidence (For the level of confidence of 95%, which is conventional, Z value is 1.96).

d = Precision (Least permissible error which was taken at 5.0%).

Using the above formula, the estimated sample size was 197.

Inclusion criteria:

1. Parents who gave their consent for participating in the study.
2. 3 to 5 years old children present on the day of examination

Exclusion criteria:

1. Children who were mentally or physically handicapped
2. Children who had medical problems and were undergoing any medication/Treatment.

Data Collection: Rapid Estimate of Adult Literacy in Dentistry (REALD-30)⁽⁴⁾ was used to measure the maternal oral health literacy. REALD-30 was a previously validated word recognition test instrument and it contained 30 different words of dentistry arranged in the increasing order of difficulty level. In this the mothers were asked to pronounce the words aloud in front of the interviewer if they knew the word and asked to skip if they did not know about that particular word. The scoring was done by giving one point for correct pronunciation and then the total was summed up to get the net REALD-30 score of the individual. The lowest score could be zero indicative of lowest maternal literacy and highest could be 30 indicative of highest maternal literacy. A pretested, structured questionnaire in English was filled by single calibrated interviewer to examine socio-demographic status, the maternal oral health knowledge and the child's oral health behavior.⁽⁵⁾ Clinical examination of the children was done by the examiner by using Visible Biofilm index,⁽⁶⁾ Modified gingival index⁽⁷⁾ and WHO dentition status 2013. The forms were arranged in serial number and stacked together. The bundles were labelled with ID numbers and date of recording so as to make them ready for data entry. The data entry was made on the same day so that if any discrepancy was seen it could be rectified easily.

Inspection, Scrutiny and clarifications:

The survey forms were rechecked to assess any missing information.

Statistical analysis:

It was carried out in 2 steps.

1. Data compilation and presentation
2. Analysis of data statistically

SPSS 18.0 was used for the analysis of the data. Systematic compilation of data was done. Master table was prepared in computer after transformation of data from a pre-coded proforma to the computer. Meaningful distribution and presentation of data was done.

Inferential and Descriptive statistical analysis of data was carried out in the present study. Results on continuous measurements were presented on Mean ±SD (Min-Max) and results on categorical measurements were presented in Numbers (%). P value was taken as not significant (p value: p > 0.05), significant (p value: 0.01 < P < 0.05) or, highly significant (p value: p < 0.01).

Results

52% children were females and 48% were males among the 197 mother/child pairs participated in the study (Fig. 1). The percentage of children in each age range (Fig. 2) was as follows: 11% were of 2 to 3 years, 43% were of 3 to 4 years, 46% were of 4 to 5 years old.

Socioeconomic status of the family showed significant relation with mother's oral health knowledge. Oral health literacy was high in mothers of high socioeconomic status (Graph 1).

Mother's knowledge and practice showed direct relation with REALD-30 score. Mothers with high total knowledge score and practice score were having high REALD-30 value and vice-versa (Graph 2).

Clinical findings of children were inversely proportional to REALD-30 score. Inverse proportional relation was also seen among the presence of dental caries to REALD-30 score. Visible biofilm index score and Modified gingival score was high in case of low REALD-30 score (Graph 3).

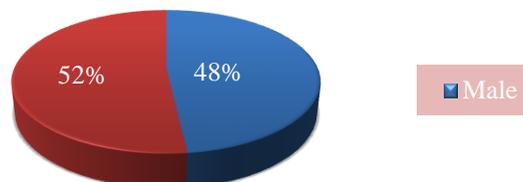


Fig. 1: Distribution of study population on the basis of sex

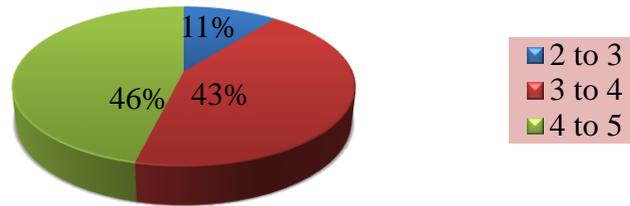
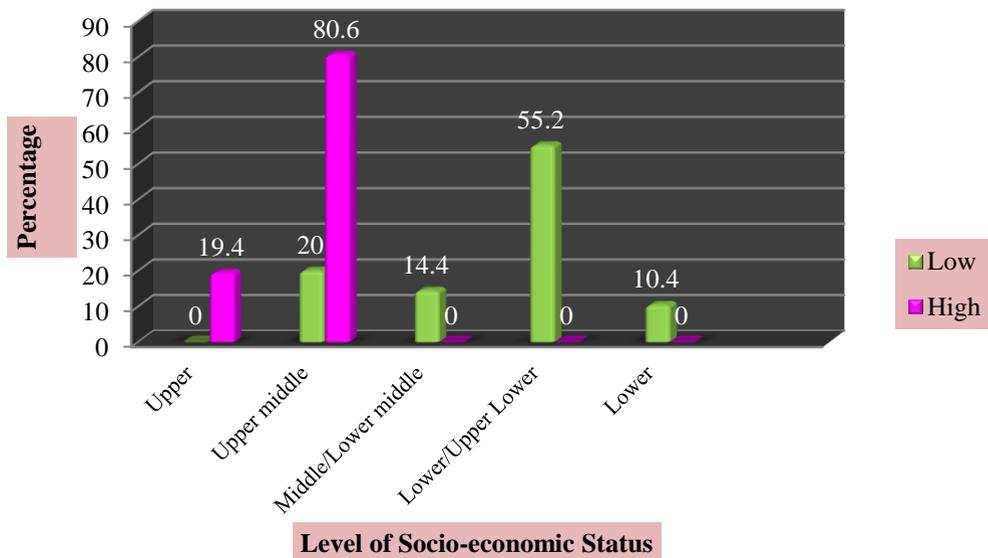
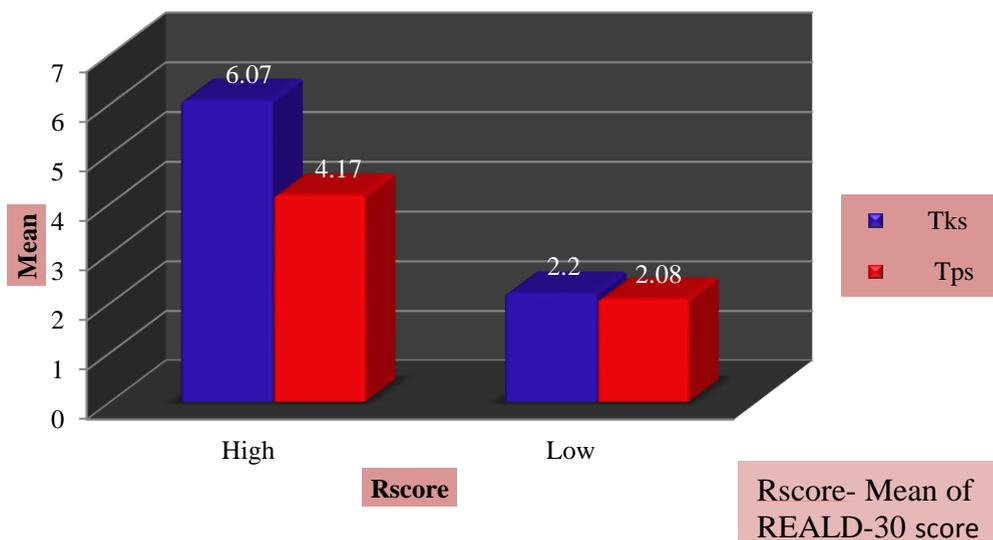


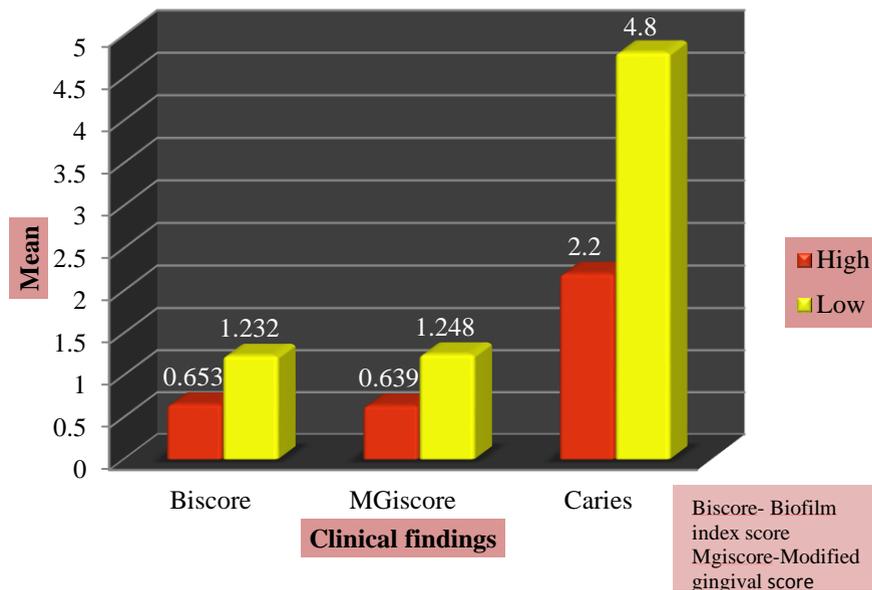
Fig. 2: Distribution of study population on the basis of age

Graph 1: Comparison of oral health literacy with socio-economic status



Graph 2: Comparison of REALD-30 with Total Knowledge Score (Tks) and Total Practice Score (Tps)



Graph 3: Comparison of REALD-30 with clinical findings

Discussion

According to our knowledge, it is one of the pioneer study to assess the role of maternal literacy on oral health outcomes in Muradnagar.

The clinical literature supports the finding of our study. In our results maternal literacy was directly proportional to child dental health status and these results are same in spite of income as confounding variable. We found that the health outcome of the child was affected by maternal literacy and these findings are similar to studies done by Ross LA et al⁽⁸⁾ and De Walt DA et al.⁽⁹⁾ A study by Moon RY⁽¹⁰⁾ on literacy and health knowledge also demonstrated similar results. Dental caries showed strong relationship with parental factor and is similar to findings of study done by Menon I et al.⁽¹¹⁾

Some limitations are also present in the study. The study design is cross-sectional and while changing the study design, results may get varied. The used instrument REALD-30 is for English-speaking persons only.

Our study has several strengths as well. Clinical examination and mother's interview was done by a calibrated and trained examiner. Dental literacy was measured by a validated instrument. To assess the outcome a proper clinical examination was done.

Our study has a public health implication as well. It provides a baseline for designing interventions of improving knowledge, behaviours and literacy regarding oral health. It also gives opportunities to improve communication between mother and healthcare provider which ultimately improves child's oral health.

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Comparative evaluation of antiseptic pomade to prevent bacterial colonization after periodontal flap surgery- a clinical & microbiological study

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Abstract

Introduction: Surgical site infections can occur due to capillary effects of sutures resulting in bacteria permeating the wounds. By incorporating antimicrobial agents in the sutures these complications might be avoided through inhibition of the bacterial pathogens. The aim of this study was to compare the bacterial colonization of two different antiseptic coated silk sutures after periodontal flap surgery.

Materials and Method: 30 patients scheduled for treatment of periodontal pockets with flap surgery were selected and divided randomly and equally into three groups- Plain suture, Chlorhexidine and Tetracycline coated. On the 7th and 15th postoperative day 2 millimeters of the suture was harvested from each patient and the bacteria that had adhered to them were cultured. The number of colony-forming units per milliliter (CFU/mL) was determined and the groups were compared using the Mann-Whitney statistical test ($P < 0.05$).

Results: The antibacterial coated sutures showed statistically significant difference in CFUs/ml compared to plain uncoated sutures.

Conclusion: In this experimental model, the antiseptic pomade was effective in reducing bacterial colonization on silk braided sutures.

Keywords: Silk suture, Chlorhexidine, Tetracycline; Colony-forming unit, Antiseptic coated suture

Introduction

Periodontal disease, a chronic oral infectious disease is amongst the most prevalent diseases worldwide and also remains the major cause of tooth morbidity. The major characteristics of the disease are the presence of gingival inflammation, periodontal pocket formation, loss of connective tissue attachment and alveolar bone around the affected teeth. The primary goal of periodontal therapy is to arrest the progression of periodontal disease and maintain the natural dentition in health and comfortable function. This goal can be accomplished by non-surgical therapy in patients with mild to moderate periodontitis, whereas in advanced cases, open flap debridement results in greater success.⁽¹⁾

Proper wound closure accompanied most importantly by absence of bacteria at the healing site are the most important factors affecting the success of any periodontal surgical procedure. Sutures used in oral cavity are continuously bathed in saliva containing 7.5×10^8 microorganisms/mL and can act as a reservoir of microbes at the surgical site leading to increased chances of infection at the surgical site.⁽²⁾ This results in continuous wicking of microorganisms along the suture at the surgical site which results in a prolonged inflammatory response and Surgical Site Infection (SSI). Studies regarding the use of antibiotic-coated sutures were conducted and have shown varying results in prevention of SSI for many years.^(3,4) Sutures impregnated or coated with antibacterial agents have been developed in an attempt to reduce bacterial

adherence and colonization. A suture made from Polyglactin 910, coated with the antiseptic agent Chlorhexidine, is an example of one such product that has been used in different situations.^(5,6) The aim of the present study was to assess whether Chlorhexidine and tetracycline antiseptic pomade could reduce the bacterial colonization of silk braided sutures after periodontal flap surgery.

Materials and Method

Patient's selection criteria: The presented clinical study was performed at the Department of Periodontology and Oral Implantology, I.T.S Centre for Dental Studies & Research, Ghaziabad, India. The research protocol was reviewed and approved by the Ethical Committee of the Institution. All patients were educated about the study and then written consent was acquired before enrolment in the study. The study was conducted for a period of three months.

A flow diagram for complete methodology is presented in Fig. 1. Twenty (30) patients were diagnosed with the problem of Chronic Periodontitis. The patients with age group between 18-45 years and periodontal pockets > 5mm were included in the study. Patients in gestation or lactation period, medically compromised, allergic to the medicament were excluded from the study.

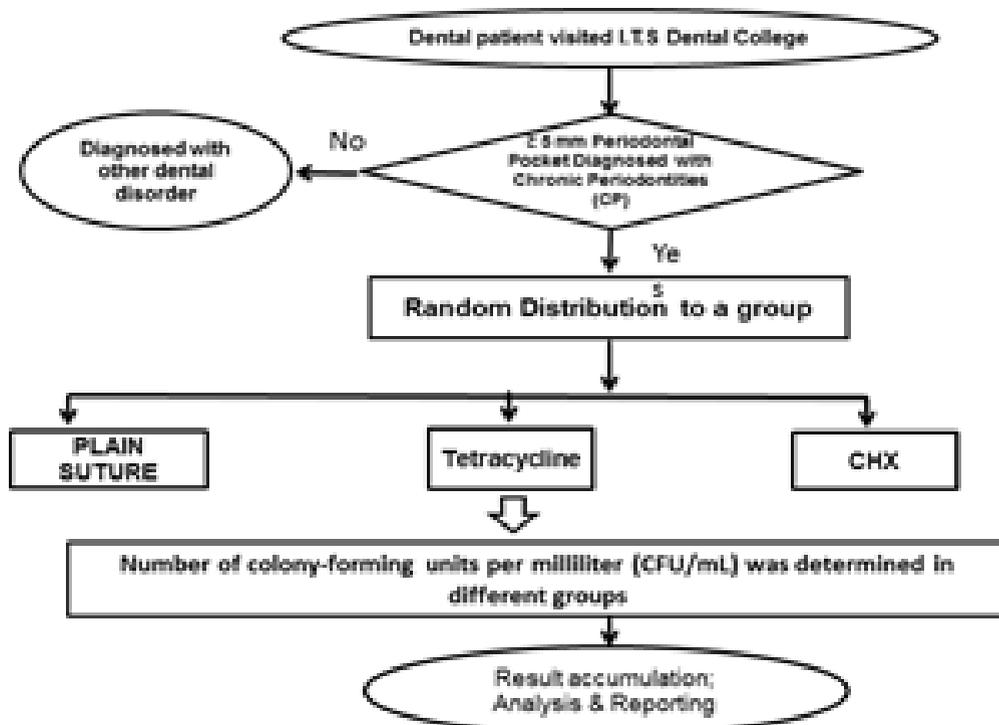


Fig. 1: Flowchart showing the study methodology

Patient's allocation & procedures: Patients were assigned equally but randomly to one of the three treatment groups (N = 30). Envelopes containing identifications for treatment groups were enclosed, mixed, and then numbered. Each participant was randomly allocated to one of the following group. Twenty minutes before each surgical procedure, the patients were instructed to use chlorhexidine (0.2%) as a mouth rinse for 1 minute.

In each of the experimental groups (n=10) the black 3-0 silk braided suture was covered with the antiseptic pomade either tetracycline or 0.2% chlorhexidine and in the control group (n = 10) the plain suture was used without any pomade. The pomade was applied to the suture thread by the examiner immediately before performing the suturing. The examiner placed the pomade on the tip of the thumb and index finger, and then slid the thread between them until it was saturated with pomade.

On the 7th and 15th post-operative day suture materials were harvested from the external part from each patient. Harvested pieces were immediately immersed in the sterile tubes to maintain a viable bacterial culture (Fig. 2). Each tube contained 4.2 mg of sodium chloride, 3.1mg of anhydrous dipotassium phosphate, 0.3 ml of bidistilled glycerine and 0.7ml of distilled water.



Fig. 2: Sterile tubes for collection of suture

The tubes were kept in a constant mechanical flux at 12 rpm for 10 minute. The deposits that were induced were discarded and the suspension was subjected to 10 fold dilutions. The first dilution of 10^{-1} was prepared by pipetting 1ml of the suspension and diluting it in 9 ml saline solution (0.85% NaCl). From the first 10^{-1} dilution (1:10) subsequent dilutions were prepared upto 10^{-3} by transferring 1ml of each dilution to obtain the next (Fig. 3). The tubes were kept under constant homogenization. One ml of each dilution was plated on a medium of blood agar plus defibrinated sheep blood (5ml blood agar per 100ml base medium), reaching a pH of 6.6 -7.0.



Fig. 3: Preparation of Serial Dilutions

The plates were incubated at 37 degrees centigrade under microaerophilic conditions (5% CO₂) for 48 hours (Fig. 4). After incubation the number of colony forming units per ml (CFU/ml) were recorded with the aid of colony counter (Fig. 5).



Fig. 4: Incubation Chamber



Fig. 5: Colony Counter

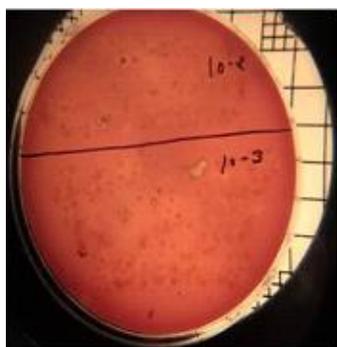


Figure A. Plain Suture

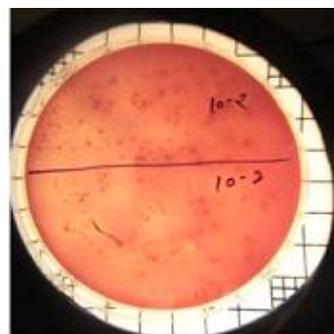


Figure B. Tetracycline

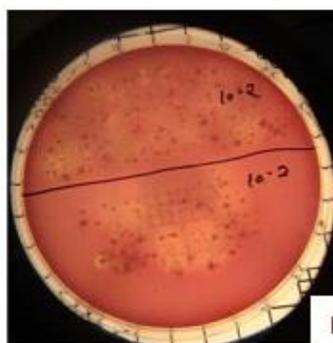


Figure C. Chlorhexidine

Fig. 6: Colony forming units A. Plain Suture B. Tetracycline C. Chlorhexidine

The total number of Colony forming units was multiplied with the dilution factor in the experimental and control groups in the samples collected on 7th and 15th post-operative day and a tabulation was achieved. (Fig. 6)

Statistical analysis: Statistical analysis was carried out using Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, version 16.0 for windows). Test for qualitative variables, mean and standard deviation were calculated. To test the significance of difference of mean rank of bacterial contamination of the silk braided between three groups was test by Mann-Whitney *U* test.

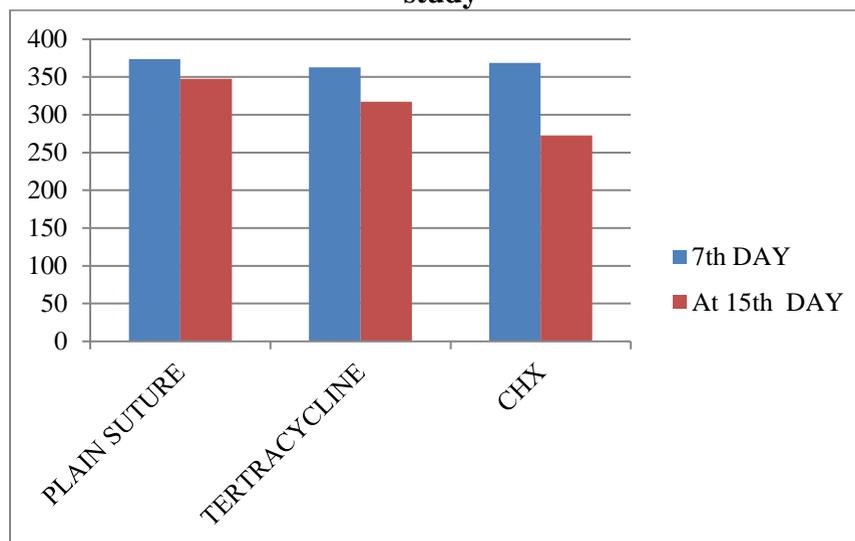
Results

The mean colony-forming units (CFU/mL) scores at 7th Day in Plain Suture, CHX and tetracycline were 373.60 ± 43.295 , 362.80 ± 42.166 and 368.70 ± 42.375 respectively. At 15th Day the mean colony-forming unit's scores were found to be 347.60 ± 44.061 , 317.30 ± 42.075 and 272.80 ± 52.917 in the control and test group respectively. There was significant difference ($p < 0.05$) in the mean colony-forming units at 15th Day in both test and control groups. (Table 1, Graph 1).

Table 1: Comparison of colony forming unit between test and control groups

CFU	Groups	Mean	Std. Deviation	t-test value	P-value	Mean Difference
At 7 th Day	Plain Suture	373.60	43.295	.820	-.228	10.800
	Tertracycline	362.80	42.166			
	CHX	368.70	42.375			
At 15 th Day	Plain Suture	347.60	44.061	.002*	-3.031	74.800
	Tertracycline	317.30	42.075			
	CHX	272.80	52.917			
Unpaired t-test *significant difference (p-value<0.05)						

Graph 1: Show the colony forming units with time in different groups incorporated in the study



Discussion

Infection associated with surgery is one of the major complications in surgery. Sutures can serve as the nidus for such an infection via adhering bacteria entering the wounds by capillary action and form infamous biofilms, leading to chronic infections. Hence the sutures can cause so called suture-associated infections, induced by proliferation of adhering pathogens.⁽⁷⁾ Anti-microbial coatings for surgical sutures can solve that problem via protecting sutures by inhibiting bacterial growth. The findings of the present study provide insight into the mechanism by which the use of a suture coated with a bactericidal agent would protect wounds, in agreement with earlier reports.^(8,9)

In addition, this study demonstrated that the antimicrobial activity of the compound was sustained over a long period of time, including the early period in the postoperative timeline, when a surgical wound is usually most subject to microbial exposure resulting from technical complications, such as mastication and brushing. As many surgeons consider the silk suture to be the gold standard, and also because among natural suture materials it has been demonstrated with better handling characteristics hence it was chosen as a material of choice for this study. Also the multifilament sutures are preferred, because monofilament is more difficult to manipulate, exhibits poor knot security and has sharp ends that irritate oral tissue. However, the use of multifilament sutures has been challenged by some studies, which suggest that this type of suture can act as a wick, leading bacteria into the wound, causing severe inflammation.⁽¹⁰⁾ Earlier studies^(11,12) used a similar methodology and evaluated the effect of this pomade on tissue adjacent to surgical site. The authors evaluated the clinical and microbiological parameters and have found no adverse effects within the tissue. Studies have examined the effectiveness of chlorhexidine in different

suture materials and surgical sites.^(13,14) Tissue-based studies in an animal model have suggested that triclosan-coated braided sutures exhibited no adverse effect on wound healing but did exhibit antibacterial activity sufficient to prevent in vivo bacterial colonization.⁽¹⁵⁾ The scanning electron microscope (SEM)⁽¹⁶⁾ study revealed that the deposition of Tetracycline onto the surface of silk sutures does not generate more friction and less tenacity and knot strength than the untreated silk sutures. These characteristics combined with good drug release and antimicrobial characteristics suggest that Tetracycline drug is suitable to improve the functional properties of suture materials. Thus, in our study we have compared the efficacy of the antimicrobial chlorhexidine and tetracycline coated surgical silk sutures on bacterial colonization after periodontal flap surgery both clinically and microbiologically. Overall, the results of this study showed that antibacterial-coated sutures exhibited an inhibitory bactericidal activity against the commensal bacteria that colonize oral surgical wounds. The results also showed that the antiseptic coated silk braided sutures had a satisfactory clinical behavior for routine use without the risk of bacterial contamination of the surgical wound. Also, that the antiseptic efficacy of tetracycline coated suture is significantly better than chlorhexidine and plain surgical silk suture.

The limitation of the present study is a small sample size because this increased the possibility of bias if some patients were more efficient than others in maintaining oral hygiene after surgery. Randomization of patients was done to minimize this possibility of bias, but a larger number of participants could also have minimized possibilities for this variable. Nevertheless, the statistically significant difference between the groups was so great ($P < .002$) that a larger sample size probably would not have affected the results significantly. Therefore, the efficacy of this antiseptic pomade as a

coating for sutures should be investigated further by a larger sample size evaluating its clinical outcomes, microbiology also the economic benefits. Further more studies should be conducted to compare antiseptic-coated silk braided suture with a monofilament suture

Conclusion

The methods used in the present study were safe and satisfactory for well being of all the patients. Within the limits of this study, it is safe to conclude that the antiseptic pomade treatment modality using tetracycline proved to be the most effective treatment in terms of reducing bacterial colonization on silk braided sutures as compare to chlorhexidine and plain suture.

However, long term follow-ups are warranted for better authentication of the results.

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Clinical trial to compare conventional incision technique and diode laser on the treatment of oral submucous fibrosis

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Abstract

Introduction: Oral mucosal lesions are the most common lesions encountered by the dentist or physician during oral health screening. Oral submucous fibrosis is a common potentially malignant disorder associated with limited mouth opening due to fibrosis and muscle changes in the submucosa. The present study was carried out to compare the two surgical interventions for Oral submucous fibrosis using conventional scalpel technique and diode laser technique for the surgical excision of the fibrotic bands to improve the mouth opening for the patients and also to assess the post-operative pain and healing.

Aims and Objectives: The present study was designed to analyze two treatment modalities of Oral submucous fibrosis using diode laser and scalpel surgery and to compare the outcome of both the interventions regarding postoperative pain and mouth opening.

Materials and Method: A total of 20 patients (16 males and 4 females) were included in the study. The patients were divided equally and randomly into the treatment groups i.e., conventional scalpel technique and diode laser in a continuous mode after obtaining prior informed consent. Patients in Group A were treated with conventional scalpel technique while in group B were treated using Diode laser technique and followed up for a period of 3 months periodically.

Results: The mean age of the study group was 32±15.38 years. The results of the present study showed significant changes in the mouth opening (pre-operative and post-operative comparison) for both the groups using One-way ANOVA and Bonferroni correction. Study groups also reflected highly significant difference for Post-operative pain assessed in VAS scale using Paired “t-test”.

Conclusion: Fibrectomy with diode laser is an effective method with several advantages over the traditional methods and can safely be done in the patients with advanced stage of Oral submucous fibrosis. Diode lasers can be used as alternative instruments for excisional biopsies of oral soft tissue lesions. Intra- and postoperative complications are rare, with minor bleeding being the only complication observed during surgical procedures.

Keywords: Oral submucous fibrosis, LASER, Fibrectomy, Prognosis.

Introduction

Oral mucosal lesions are the most common lesions encountered by the dentist or physician during oral health screening. There are various types of lesions present in the oral cavity. Diagnosis and identification of commonly occurring oral lesions, complete history with oral examination is required. Knowledge of clinical characteristics such as size, location, surface morphology, colour, pain and duration is also helpful.⁽¹⁾

Population based surveys and screening and literature have identified the most common oral lesions as candidiasis, recurrent herpes labialis, recurrent aphthous stomatitis, mucocele, fibroma, mandibular and palatal tori, pyogenic granuloma, erythema migrans, hairy tongue and also identified most commonly occurring premalignant lesions like leukoplakia, erythroplakia, oral submucous fibrosis and oral lichen planus.⁽¹⁾

Indian medical literature dates back 600 BC at time of Sushruta, a renowned Indian physician and surgeon termed Oral submucous fibrosis (OSMF) as ‘Viduri’ which was later described by Schwartz in 1953.⁽²⁾ It is characterised by fibrosis and hyalinization of the

connective tissue with progressive atrophy of the epithelium. It is associated with symptoms such as burning sensation, excessive salivation, altered taste sensation and reduced mouth opening. The treatment protocol for OSMF is based primarily on the severity and extent of the disease. The aim is to maintain oral function and limit progression of disease. Group I & II cases are usually treated by long term antioxidant therapy with local intra-lesional injections of steroids, gamma interferon, hyaluronidase, placental extracts, triamcinolone and chymotrypsin. Intra-lesional injections are painful and may give discomfort to patient. Needle trauma may lead to further fibrosis, oedema and CNS side effects. Hyaluronidase can cause burning sensation and further trismus. Advanced cases i.e. Group III, IV-A & IV-B cases, are treated with surgical intervention. A sufficient mouth opening can be achieved by complete release of fibrotic tissue by fibrectomy and followed by coronoidectomy and temporal myotomy.^(3,4)

For reconstruction of the defect, various techniques have been described including split thickness skin grafts, buccal fat pad grafts, microvascular free radial

forearm flap, tongue flap and nasolabial flaps.⁽⁴⁾ Kim et al. have discussed the advantages of buccal fat pad flap as treatment option as it is a simple surgical procedure with good epithelialization and high vascularity without the need of additional skin graft and has been used with high success rate.⁽⁵⁾

Most commonly used lasers for treatment of OSMF are Carbon dioxide (CO₂) laser & Diode laser. The diode lasers have an advantage of sharp and definite cutting edge, hemostasis and coagulation after surgery in addition to small size and better manoeuvre during application with minimal post operative pain and excellent wound healing.^(2,6) The aim of the study was to clinically compare between conventional incision technique (scalpel surgery) and diode laser for fibrectomy procedure in Oral submucous fibrosis and to analyse the treatment of Oral submucous fibrosis using diode laser and scalpel surgery and compare the outcome of both the interventions regarding post-operative pain and mouth opening.

Materials and Method

The study was carried out at the Department of Oral & Maxillofacial Surgery at Ahmedabad Dental College, Ahmedabad, Gujarat. Ethical approval was obtained from the institutional ethics committee. Participation sheet was provided to the participant explaining them individually in English and Gujarati. Informed consent was obtained after their approval. The purpose & procedure of the study was informed to each study subject. An information sheet was provided to each individual & verbally explained to the individuals in English and/or Gujarati Language. Informed consent was taken from the participant.

Inclusion Criteria: Clinically and histopathologically diagnosed case proven cases of Oral submucous fibrosis with reduced mouth opening irrespective of age, sex, caste, religion, etiological factors or degree of involvement.

Exclusion Criteria: Patients having history of basic systemic disease; patients with immune-compromised diseases; patients with underlying metabolic or endocrine diseases; patients with porphyria should avoid most forms of light therapy; patients on certain drugs like methotrexate or chloroquine should use caution with light therapy, as there is a chance that these drugs could cause porphyria were excluded from the study.

Twenty patients with confirmed histopathological diagnosis of oral submucous fibrosis were enrolled in the present study and were equally divided into the treatment groups i.e. diode laser in a continuous mode and by use of conventional scalpel technique.

All the patients were motivated strictly to leave the habits (e.g. betel nut chewing, tobacco chewing) causing OSMF prior to the surgery. Preliminary clinical examination was carried out which consisted of a questionnaire covering past medical and dental history,

and a thorough extra-and intraoral examination were performed on all patients.

Intra-Operative Procedure: Extra-oral painting was done with 5% Povidone iodine followed normal saline and intraoral flushing with 5% povidone iodine followed by normal saline. 2% Lignocaine hydrochloride with adrenaline (1:80,000) was infiltrated in the surgical site for hemostasis. Fibrous bands were palpated to assess the extent of incision. For the Group – A, an incision was made using no. 15 Bard Parker blade at the buccal mucosa at the level of occlusal plane, away from the Stenson's duct orifice. The incision was extended posteriorly to the pterygomandibular raphae of the fauces and anteriorly as far as the angle of mouth. The incision was carried out to the depth of submucosal layer, wound created was further freed by manipulation using fingers until no restriction was felt. The mouth was then forcefully opened using Heister's mouth gag as wide as possible. The procedure with the laser was performed in a separate operating room. The diode laser was used with a spot size of 0.2 mm continuous mode (10 watts). Approximately 2 mm deep until the muscle layer was reached. The patients, the surgeon, and the operative staff wore personal protective equipments.

All the patients were given prophylactic antibiotic coverage: a combination of Amoxicillin (500mg) and Potassium clavulanate (125mg) two times a day for five days. Oral hygiene was maintained by regular intra oral flushing and gargling with betadine mouthwash 3-4 times daily.

Statistical Analysis: The data collection was performed following the guidelines of Declaration of Helsinki and the data recorded was transferred to a computer. The data was entered into Microsoft excel sheet and analysed using IBM SPSS version 19.0 for statistical analysis. The mean difference between study groups were measured using One-way Analysis of Variance (ANOVA), multiple comparisons using Bonferroni Correction and paired "t-test".

Results

This study was conducted to assess the treatment outcome for the OSMF using conventional treatment in comparison with the diode laser. A total of 20 subjects participated in the study after meeting the inclusion and exclusion criteria. The mean age of patients was 32.56±12.35 yrs for the males and 32±15.38 yrs for the females. The total mean age for the all patients was 32.4±12.56 yrs. Table 1 represents the mouth opening of the subjects undergoing conventional treatment at baseline, 1st day, 3rd day, 10th day, 1 month & 3 months for all the subjects. Table 2 represents the mouth opening of the subjects undergoing diode laser treatment at baseline, 1st day, 3rd day, 10th day, 1 month & 3 months for all the subjects. Table 3 represents the VAS score analysis using paired "t-test" analysis among both the treatment groups. Paired mean was

3.7±1.37 (t= 19.042 & p=0.000) representing the highly significant difference between the two groups. Post-

operative pain reported with diode laser was significantly less compared to the conventional group.

Table 1: Mouth opening of the subjects undergoing conventional treatment (Group A) at baseline, 1st day, 3rd day, 10th day, 1 month and 3 months

Patients	Baseline (mm)	1st Day (mm)	3rd Day (mm)	10th Day (mm)	1 Month (mm)	3 Months (mm)
Case 1	9	27	28.85	29.74	31.2	31.3
Case 2	17.24	29.2	31.26	32.76	35.33	37.34
Case 3	9	31.3	33.46	36.04	37.61	40.88
Case 4	16.13	29.53	33.78	34.62	34.62	34.62
Case 5	12.62	28.19	24.22	21.54	21.33	21.33
Case 6	16.45	38.21	27.95	28.09	28.09	28.09
Case 7	18.03	32.53	33.49	37.12	39.32	39.43
Case 8	18.4	27.26	32.39	34.78	36.07	36.89
Case 9	15.45	26.41	28.65	31.57	32.43	33.79
Case 10	17.12	31.45	30.79	33.46	35.76	37.88

Table 2: Mouth opening of the subjects (in mm) undergoing diode laser treatment (Group B) at baseline, 1st day, 3rd day, 10th day, 1 month and 3 months

Patients	Baseline (mm)	1st Day (mm)	3rd Day (mm)	10th Day (mm)	1 Month (mm)	3 Months (mm)
Case 1	13.34	29.07	31.11	32.43	34.39	35.29
Case 2	19.12	30.19	30.89	32.12	31.73	31.49
Case 3	19	29.33	30.87	32.21	32.21	32.21
Case 4	20.14	36.1	37.07	42.95	42.49	45.16
Case 5	16.04	28.77	29.05	34.48	36.91	36.91
Case 6	17.88	41.67	41.77	33.73	34.32	34.32
Case 7	22.23	32.77	35.88	40.45	40.45	40.45
Case 8	17.22	30.12	28.54	29.82	30.34	30.34
Case 9	15.29	38.3	39.1	39.82	41.32	44.38
Case 10	19.29	34.83	29.28	31.45	34.76	35.12

Table 3: VAS- Score analysis using PAIRED "t-Test" analysis among both the treatment groups

	Paired Differences					t	df	Sig.(2-Tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Conventional vs. Diode Laser	3.70000	1.37396	.19431	3.30953	4.09047	19.042	49	.000

Discussion

Oral submucous fibrosis is a potentially malignant disorder that affects people of South-east Asian origin. The condition was prevalent in the days of Sushruta (2500-3000 BC) and was first described by Schwartz in 1953 while examining five Indian women from Kenya, which they termed as 'Atrophica idiopathica mucosae oris'.⁽²⁾ The disease has been extensively studied by Pindborg and others and is characterized by the fibrosis of the connective tissue in the region of buccal mucosa, pterygomandibular raphe, and rima oris which causes trismus.⁽⁷⁾

OSMF has been associated strongly with the habit of chewing of areca nut/quid or pan masala. It is seen

that the younger population is addicted more to it. Also, pan masala was chewed by a comparatively younger age group and was associated with more probability to develop this disease at an earlier age than those not having habit of areca nut/ betel quid chewing.^(4,8) Such patients show petechiae with ulceration, excessive salivation, defective gustatory sensation and burning sensation of the mouth. Advanced cases of OSMF represents blanching of mucosa with white fibrous bands involving buccal mucosa, lips, soft palate and tongue and in severe cases, patient cannot protrude the tongue beyond the incisal edges.⁽⁴⁾

Mouth opening at the baseline for the patients undergoing diode laser treatment was 17.955±2.57 and

14.94±3.51. The opening at the end of 3 months was 36.56±5.18 and 34.155±5.90 respectively. The mean difference among both the treatment groups and result obtained was highly statistically significant (Paired t test, $t=19.042$, $p=0.00$). Previous studies by Chaudhary et al. have reported significant improvement in mouth opening in oral submucous fibrosis patients after the use of ErCr: YSGG Laser fibrotomy method. They also observed an improvement in Visual Analogue Scale scores for oral burning sensation.⁽⁹⁾

Tripathy et al. have reported a case series of 5 patients treated with diode lasers. All the cases showed significant mouth opening following excision of fibrotic bands using Diode laser treatment.⁽¹⁰⁾ According to Talsania et al., Diode lasers are an inexpensive and useful technique of managing OSMF patients, especially in in group III and group IVA cases in whom bilateral temporalis myotomy and coronoideotomy are considered to be the only solution. In their prospective clinical study with a follow up of 3 years, all the 8 patients were relieved of trismus. Better mouth opening resulted in improving the nutritional status, maintenance of proper oral hygiene and improved psychological well-being.⁽¹¹⁾

Vascularized grafts were considered first choice of treatment in OSMF patients. However, the limitations include post operative infection and chances of graft failure in compromised patients such as those with systemic illness such as diabetes mellitus who may have difficulties with capillary regeneration.⁵ Kshirsagar et al. have discussed the possible complications of using surgical technique of bilateral inferiorly based nasolabial flaps used in management advanced oral submucous fibrosis. In their study, complications such as partial necrosis, intra-oral hair growth, unacceptable extra-oral scar, wound dehiscence, orocutaneous fistula, and pin cushioning effect were observed.⁽¹²⁾ Use of lasers in managing OSMF avoids the possibility of such complications following surgical management.

Conclusion

Fibrectomy done with diode laser is an effective method having numerous advantages in comparison with the traditional procedure. Diode laser can also be used as an alternative treatment option in oral submucous fibrosis patients as it is safe, relatively inexpensive with advantage of reduced post-operative complications with better healing. Diode lasers have shown to overcome the limitations of surgical methods of treatment in Oral submucous fibrosis patients with favourable results.

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Antibiotic prescription patterns in a Dental college located in Northern India

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Abstract

Introduction: Antibiotics are a boon for infection control; however, injudicious prescription of these drugs cause resistance and is a matter of concern. The assessment of awareness and knowledge of antibiotics prescription among clinicians is important for preventing the development of this resistance.

Aim and Objectives: To assess the knowledge, attitude and practice of dentists towards antibiotic prescription in a dental college located in Northern India.

Materials and Method: A total of 102 dentists divided into three groups – Faculty (n=17), Post-graduate students (n=27) and Interns (n=58) were invited to participate in the study. The participants belonged to various branches of dentistry.

Results: The study revealed that higher percentage of respondents prescribed antibiotics in localized dental infections that do not need antibiotic coverage under usual circumstances (acute periapical infection, reversible pulpitis, irreversible pulpitis, apical periodontitis). The results showed that 5.8% Post-graduates and 18.6% Interns would advise antibiotics for cases of herpes labialis, a viral infection. Majority of respondents, especially from the Post-graduates and Interns group reported that they prescribe antibiotics because of fear of post-operative complications.

Conclusion: The general awareness about appropriate use of antibiotics in various dental pathologies is generally limited even in the Pharmacology teachers because of their background in Medical field, rather than Dental backgrounds.

Keywords: Antibiotic, Dental infections, Viral infections, Drug Prescription.

Introduction

Antibiotics are one of the most commonly prescribed drugs by dentists.⁽¹⁾ While hours spent in the subject of pharmacology delivers academic knowledge regarding different classes of antibiotics, their pharmacokinetics and pharmacodynamics, very little is instructed about the practical aspects of their daily usage. In India, pharmacology is taught in the second year of BDS curriculum when practical knowledge about various dental and orofacial infections as well as clinical judgement of a dental student is negligible.⁽²⁾ Also, the lessons are taught by teachers from medical backgrounds who have considerably limited knowledge regarding various orofacial pathologies themselves. By the time the student is appraised with various orofacial infections in the clinic, most of his hard learnt concepts have evaporated.

Starting from dental caries through periapical abscess and finally space infection, all stages represent a pathologic continuum.⁽³⁾ The riddle as to which stages of these processes need antibiotic coverage has not been eluded to majority of dentists world-wide because reviews and meta-analysis from various countries report antibiotic misuse by dental professionals and demand improvement in prescription practices.^(4,5)

Another question that remains unanswered is whether antibiotic coverage during restorative or endodontic work or extractions actually improves the treatment outcome. Majority of the dentists in India prescribe antibiotics prior to starting a root canal treatment or an extraction.⁽⁶⁾

In order for improvement in antibiotic prescribing practices, which is imperative, all institutions must initiate audits within their institutions for controlling the patterns of antibiotic prescription. Internal audits, such as this, could help create a lot of awareness within the institution. Because all dental institutions render treatment and prescribe antibiotics they should consider their own role in preventing antibiotic resistance.⁽⁷⁾

The purpose of this survey was to reveal the current antibiotic prescription patterns at I. T. S. Dental College, Hospital and Research Centre, Greater Noida, Uttar Pradesh.

Materials and Method

It is a questionnaire based study conducted at I.T.S Dental College, Greater Noida in June 2016 over a period of two weeks. Total 102 Faculty, Post Graduate students and Interns from various Clinical departments were part of the study. A questionnaire was circulated through various departments of the college pertaining to various questions regarding antibiotic prescription practices. All participants were given a self structured questionnaire. The questions in the form were to be answered in Yes or No. It was to be filled and returned on the same day. The questionnaire consisted of various questions regarding need of antibiotics in various orofacial infections. The study questionnaire and pattern was approved by the Ethical Committee of the institution.

Results

The questionnaire given comprised of questions with different situations where the participant would prescribe antibiotics or not. The conditions given were localized infections or dental sequelae, spreading dental infections such as dentoalveolar abscess or cellulitis, chronic inflammatory periodontal conditions, before and after extractions or impaction surgeries, viral infections such as herpes labialis, pain, fear of post-operative complications, as short course antibiotic coverage, or prophylactically.

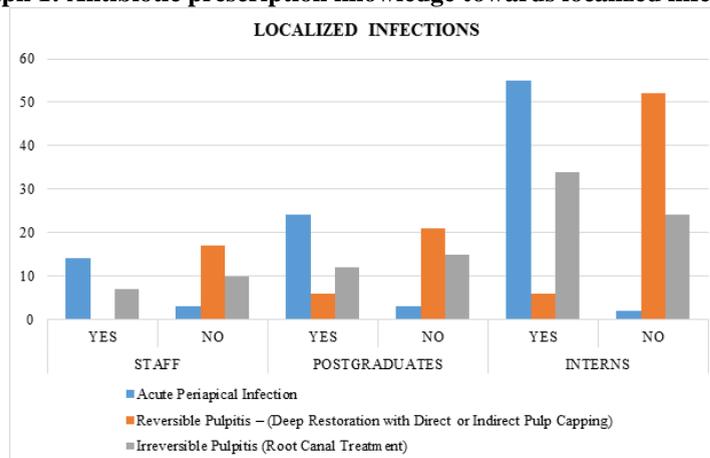
The responses to these questions were evaluated and the judgment of antibiotic prescription was evaluated for faculty, post graduate students and interns independently.

1. **Localized infections** (Graph 1) [acute periapical infection, reversible pulpitis, irreversible pulpitis,

apical periodontitis]: 14 (n=17) Staff, 24 (n=27) Post-graduates and 55 (n=58) Interns believed that antibiotics are required for acute periapical infections. No staff, 6 (n=27) Post-graduates and 6 (n=58) Interns reported that they would prescribe antibiotics for reversible pulpitis. 7 (n=17) staff, 12 (n=27) post-graduates and 34 (n=58) interns reported that they would prescribe antibiotics for irreversible pulpitis or during a root canal treatment.

The results revealed higher rates of antibiotic prescription by all three groups in stages of dental infection that does not need antibiotic coverage [Interns>Postgraduates>Staff]. This reveals the essence of antibiotic abuse, and seems to root from either influence of lack of adequate knowledge or accepting suggestions of equally uneducated peers, or fear of potential post-operative complications.

Graph 1: Antibiotic prescription knowledge towards localized infections

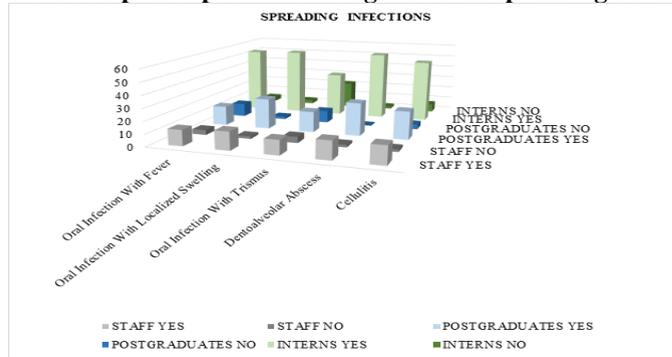


2. **Spreading dental infections** (Graph 2) [*Fever, localized swelling, trismus, dentoalveolar abscess, cellulitis*]: 4 (n=17) Staff, 11 (n=27) Post-graduates and 4 (n=58) Interns reported that they would not prescribe antibiotics for an Oral Infection with fever. 2 (n=17) Staff, 2 (n=27) Post-graduates and 3 (n=58) Interns reported that they would not prescribe antibiotics for an oral infection with localized swelling. 5 (n=17) staff, 10 (n=27) post-graduates and 22 (n=58) interns reported that they would not prescribe antibiotics for an oral infection with trismus. 2 (n=17) staff, no post-graduates and 2 (n=58) interns reported that they would not prescribe antibiotics for a dentoalveolar

abscess. 2 (n=17) Staff, 4 (n=27) Post-graduates and 7 (n=58) Interns reported that they would not prescribe antibiotics for a case of cellulitis.

Spreading of infection from the tooth pulp into surrounding regions requires antibiotic coverage along with incision and drainage through the root canal itself or through surgical intervention wherever possible. Many members from all the three groups maintained that antibiotics need not be given in these stages of infection [Interns=Postgraduates>Staff]. This represents that knowledge about principles of antibiotic prescription are significantly flawed as many respondents would rather not prescribe antibiotics in these cases, in face of 'antibiotic abuse'.

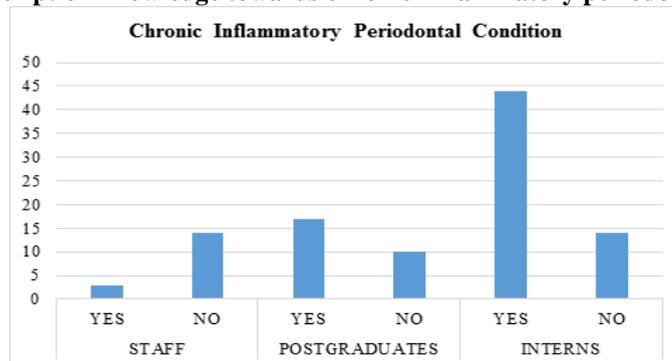
Graph 2: Antibiotic prescription knowledge towards spreading dental infections



Chronic inflammatory periodontal conditions: 0 (n=17) Staff, 6 (n=27) Post-graduates and 19 (n=58) Interns reported that they would prescribe systemic antibiotics to patients suffering from chronic inflammatory periodontal conditions.

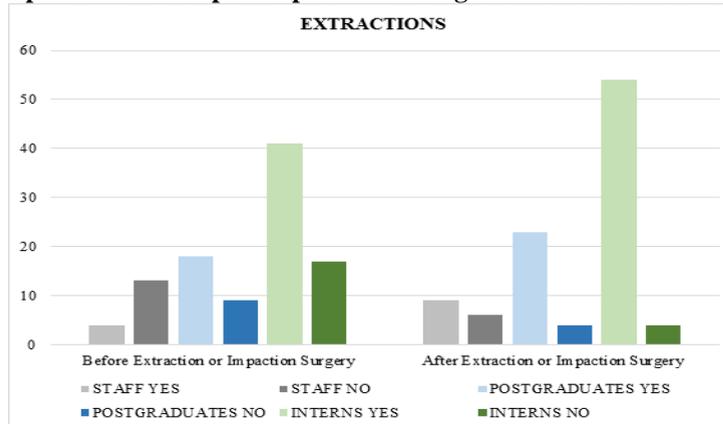
- Antibiotics do not have any role in chronic periodontal conditions and their prescription in such conditions is actually unwarranted.⁽⁸⁾ [Interns>Postgraduates>Staff] The graphs reflect the poor knowledge and awareness of Interns as well as Post-graduates regarding the basics of antibiotics and disease processes involved in chronic periodontitis. (Graph 3)

Graph 3: Antibiotic prescription knowledge towards chronic inflammatory periodontal conditions



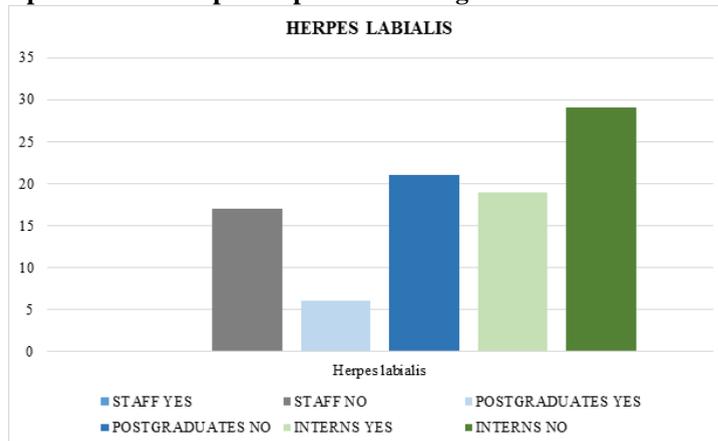
- Before and after extractions and impaction surgeries** (Graph 4): A large number of respondents (4 (n=17) Staff, 18 (n=27) Post-graduates and 41 (n=58) Interns) from all the three groups reported that they would prescribe antibiotics before and (9 (n=17) Staff, 23 (n=27) Post-graduates and 54 (n=58) Interns) after an extraction or impaction surgery [Interns>Postgraduates>Staff]. Prescribing antibiotics before and after a general out-patient dental surgery is a redundant practice, at least theoretically. But in India it is a common practice amongst many dental practitioners.

Graph 4: Antibiotic prescription knowledge towards extraction cases



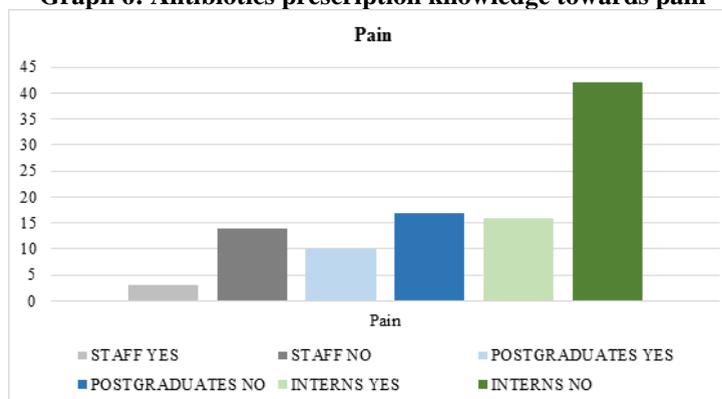
5. **Viral Infections** (Graph 5): 0 (n=17) Staff, 6 (n=27) Post-graduates and 19 (n=58) Interns reported that they would prescribe antibiotics for management of Herpes labialis. This illustrates the height of antibiotic abuse of antibiotics in Herpes labialis – a manifestation of a viral infection [Interns>Postgraduates {Staff=0}].

Graph 5: Antibiotic prescription knowledge towards viral infections



6. **Pain** (Graph 6): 3 (n=17) Staff, 10 (n=27) Post-graduates and 16 (n=58) Interns reported that they would prescribe antibiotics for management of pain complaints. According to a Cochrane review, Antibiotics do not have any analgesic effect whatsoever, and such prescription is uncalled for and represents antibiotic abuse.⁹ Reduction in the spread of infection reduces inflammation which later reduces pain. Such an effect can also be attained by proper dosage of an analgesic alone.

Graph 6: Antibiotics prescription knowledge towards pain

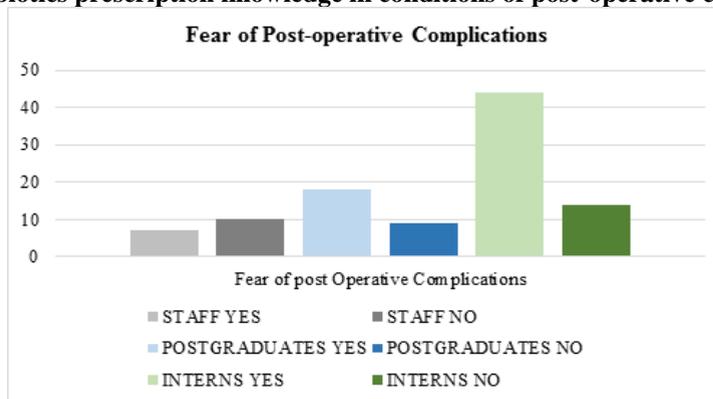


7. **Fear of post-operative complications** (Graph 7): 7 (n=17) Staff, 18 (n=27) Post-graduates and 44 (n=58) Interns reported that they would prescribe antibiotics because of fear of post-operative complications.

Fear of post-operative complications seems to be an important reason for antibiotic prescription [Interns>Postgraduates>Staff] among all the groups. Establishment of prognosis and predicting the possible

post-operative complications through appropriate investigations differentiates an average dentist from an astute oral physician. The way antibiotics are being prescribed due to 'fear of possible post-operative complications' seems to stem from a lack of clinical experience, knowledge or lack of confidence in the treatment that the dentist is rendering. Adequate knowledge as well as experience will abolish such fears and thus help reduce antibiotic abuse in our society.

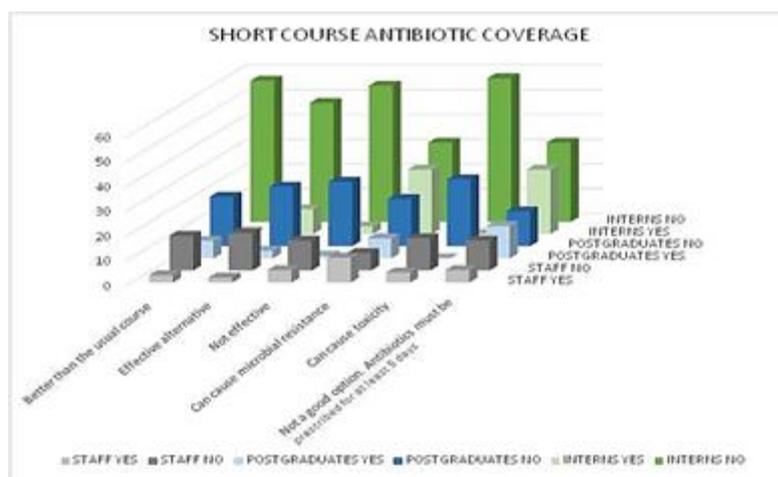
Graph 7: Antibiotics prescription knowledge in conditions of post-operative complication fear



8. **Short course antibiotic coverage** (Graph 8): 14 (n=17) Staff, 20 (n=27) Post-graduates and 57 (n=58) Interns reported that they do not consider short course antibiotic therapy to be superior to standard therapy. 15 (n=17) Staff, 24 (n=27) Post-graduates and 48 (n=58) Interns reported that they do not consider short course therapy to be effective. 10 (n=17) Staff, 8 (n=27) Post-graduates and 26 (n=58) Interns reported that they believe that short course antibiotic therapy could cause antibiotic resistance and only 4 respondents from the Staff group believed that it could cause toxicity.

Knowledge of many respondents seems to be limited regarding the short course antibiotic therapy i.e. two dose 3g amoxicillin in a day [Interns>Postgraduates>Staff]. Many of them feel that the short course could cause microbial resistance [Interns>Postgraduates>Staff]. Also, a large number of respondents believe that antibiotics should be prescribed for at least 5 days. The short course of antibiotic administration had been accepted to be rather better than the usual course as it reduces the chances of microbial resistance and improves compliance.⁽¹⁰⁾ The earlier concept of administering antibiotics for a fixed number of days has now been abolished.

Graph 8: Antibiotics prescription knowledge towards short-course antibiotic coverage



9. **Antibiotic prophylactic coverage** (Graph 9): 15 (n=17) Staff, 22 (n=27) Post-graduates and 51 (n=58) Interns reported that they would prescribe prophylactic antibiotic coverage for Native or prosthetic Heart Valve disease. 9 (n=17) Staff, 16 (n=27) Post-graduates and 41 (n=58) Interns reported that they would use prophylactic coverage for patients with Cardiac pacemakers. 7 (n=17) Staff, 13 (n=27) Post-graduates and 22 (n=58) Interns reported that they would prescribe

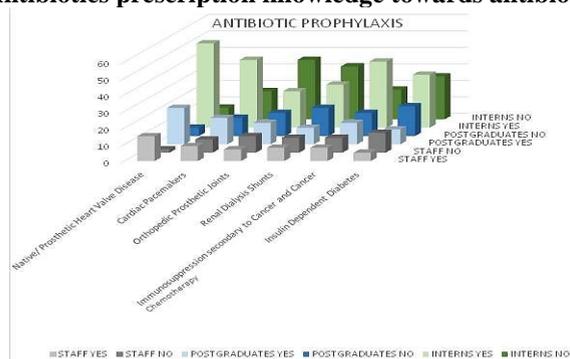
prophylactic coverage for patients with Orthopedic Prosthetic joints. 8 (n=17) Staff, 10 (n=27) Post-graduates and 26 (n=58) Interns reported that they would prescribe prophylactic antibiotic coverage for patients on renal dialysis. 8 (n=17) Staff, 13 (n=27) Post-graduates and 40 (n=58) Interns reported that they would use prophylactic coverage for patients who are Immunosuppressed secondary to cancer and/ or cancer chemotherapy. 5 (n=17) Staff, 9 (n=27) Post-graduates and 32 (n=58)

Interns reported that they would use prophylactic antibiotic coverage for patients with diabetes.

Antibiotic prophylactic coverage is another dimension of antibiotic prescription that represents inadequate utilization of the gift of antibiotics. Many respondents [Interns>Postgraduates>Staff] believe that there is no need of antibiotic prophylaxis in (Native/

Prosthetic Heart Valve Disease, Cardiac Pacemakers, Orthopedic Prosthetic Joints, Renal Dialysis Shunts, Immunosuppression secondary to Cancer and Cancer Chemotherapy, Insulin Dependent Diabetes). This could stem from either inadequate skill of taking past medical history or lack of knowledge about these conditions.

Graph 9: Antibiotics prescription knowledge towards antibiotic prophylaxis



Discussion

This whole survey in its different segments thus represents that knowledge about antibiotics is generally poor among the various dentists in the institution. The general awareness about appropriate use of antibiotics in various dental pathologies is generally limited even in the Pharmacology teachers because of their background in Medical, rather than Dental backgrounds. Definitely, the knowledge of Staff and Postgraduates are specialists who render treatment according to their specialties must be adept, it is actually the Interns who will be treating the bulk of the populations. It is thus imperative that these students be clear about the proper prescription patterns of antibiotics.

It must be stressed that antibiotic prescription patterns should attend to three basic issues.

1. *Their intended use:* Antibacterial effects
2. *Their feared effects:* Microbial resistance
3. *Their possible effects:* Side effects

Most dental students are taught about the first issue, both academically as well as practically in the second year in Pharmacology as well in the respective clinical trainings in third and final years. Thus according to the clinical presentation at hand, most students are capable of prescribing antibiotics for disease control but their concerns for causing microbial resistance are almost non-existent. The process of microbial resistance because of unclassified prescription of antibiotics is an incipient phenomenon with no immediate consequences of personal interest.⁽¹¹⁾ It would take academic as well as social education to motivate a general dental student to make him or her appreciate these concerns.

Also, side effects of antibiotics are quite common even in healthy patients. Many patients with medical

comorbidities need dose adjustments.⁽¹²⁾ Ability to make these adjustments require not only knowledge about the antibiotic to be prescribed, but also the particular medical comorbidity in question. This in turn requires good skills in recording a case history and good knowledge in General Medicine. At times it might seem cumbersome to a general dental student, but they should realize or be made so, that it is their responsibility to be aware of these basic questions in detail:

- a. To whom are they prescribing a drug?
- b. What drug are they prescribing?
- c. Why are they prescribing it?
- d. What are the possible complications at the individual as well as the community level?

Conclusion

On a broader perspective it can be suggested that acquiring better knowledge about principles of antibiotics, will benefit doctors, patients and the whole community would be benefitted, because the emerging menace of microbial resistance is an ecological one, as stated in various international forums.

We as an institution are bound ethically to improve our knowledge, especially when it has been outlined in a tangible format through this survey. We could schedule extensive separate educational programs for students as they enter the clinics, as well as the postgraduates while they are attending their basic sciences lectures. Planning Continuing Dental Education programs regarding antibiotic use and abuse might be very well accepted by the dental fraternity and is actually the call of the hour.

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Prevalence of periodontal disease in rural population of Raigad district of Maharashtra: A cross-sectional study

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Abstract

Introduction: Periodontal disease is a multi-factorial condition that has been predominantly seen in areas where dental health care facilities are limited. Rural areas in Maharashtra are currently deprived of adequate dental care facilities.

Aim: The purpose of the present study was to evaluate the prevalence of periodontal disease in the rural population of Raigad district of Maharashtra state in India.

Materials and Method: 400 subjects from Raigad district were randomly examined for prevalence of periodontal disease. Subjects were divided into following groups: 15-24 years, 25-44 years, 45-64 and 65-74 years. CPI score for the selected individuals were recorded and the data was analyzed.

Results: It was observed that as the age increased, the CPI score also increased. While CPI score 2 (calculus) was most predominant in age groups 15-24 years, CPI score 3 (pathological pocket of 4-5 mm) was more common in the age groups 25-44 years & 45-64 years. CPI score 4 (pathological pocket of >6 mm) was the highest in age groups 65-74 years.

Conclusion: There is a high prevalence of periodontitis in the selected population. The severity of periodontitis was seen to increase with increase in age.

Keywords: Periodontitis, Loss of attachment, CPI, Periodontal pocket.

Introduction

Periodontal disease is defined as a disorder of supporting structures of teeth that includes the gingiva, periodontal ligament, and alveolar bone. Periodontal disease is preceded by inflammation of the gingiva, termed as gingivitis.⁽¹⁾ Plaque is considered as the main etiological factor in the development of periodontal disease in association with increased host susceptibility.⁽²⁾ World Health Organization has described the periodontal disease, along with dental caries, as a major cause of oral distress having a high prevalence rate.⁽³⁾ According to a study conducted by the WHO, the presence of periodontal disease is still very high in developing countries due to lack of adequate oral health care measures.⁽⁴⁾ Periodontal disease has been documented as a leading cause of tooth loss in India. The major symptoms include bleeding gums, receding gums, migration and loosening of teeth.⁽⁵⁾

Owing to the fact that rural Indian population lacks awareness and facilities for oral health care, there is a higher rate of prevalence of periodontal disease in rural Indian areas.⁽⁶⁾ There is no adequate information about the periodontal status of the rural population of India. Raigad district of Maharashtra state in India is one such area where no data had been gathered in relation to the periodontal health and disease. The aim of the present study was to assess the periodontal and oral health status of the rural adult population of Raigad district of Maharashtra.

Materials and Method

The present study consisted of 400 participants who were randomly selected from four villages of Raigad district. The age range for participants involved in the study was restricted from 15 to 74 years. Examination of the periodontal status of participants was conducted at the primary health centre in the village. CPI (Community Periodontal Index) was chosen to assess the periodontal status of the subjects in the study. A sterile WHO CPITN-E probe was used for oral examination. The teeth were divided into six sextants: 18-14, 13-23, 24-28, 38-34, 33-43 and 44-48. 10 index teeth were chosen for examination: 17, 16, 11, 26, 27, 37, 36, 31, 46, 47. All the subjects were examined for gingival bleeding, calculus, and periodontal pockets. The study was reviewed by the Institutional Review board and clearance was obtained. A descriptive cross-sectional study was conducted to assess the periodontal status among the adult population in Raigad district of Maharashtra. A WHO assessment form was used to record the data which was analyzed later.

Results

A total of 400 subjects were examined out of which 384 were selected based on the selection criteria of CPI index, out of which 224 (58.3%) were males and 160 (41.7%) were females. Periodontal examinations were conducted for these subjects and were distributed into the following groups according to WHO Standard Age

Grouping: 15-24 years, 25-44 years, 45-64 years, 65-74 years.

In the age group of 15-24 years, it was observed that 43 (44.7%) subjects had healthy periodontium (score 0). 41 (42.7%) subjects showed signs of bleeding gums (score 1) while 9 (9.3%) subjects were examined to have calculus deposits. 3(3.1%) of the subjects in the group scored 3 showing signs of periodontal disease. In the other age group of 25-44 years, dental calculus (score 2) was detectable in 62 (50.7%) subjects. Other subjects, 39 (27.4%) in the group demonstrated shallow periodontal pockets with score 3. Also, 12 (8%) subjects were reported to have deep periodontal pockets above 5mm. However, in the age group of 45-54, the majority of the subjects had severe periodontal problems. 39 (39.8%) subjects had periodontal pockets from 4-5mm (score 3) while 21 (21.4%) subjects had periodontal pockets greater than 5 mm. Only 11 (11.2%) subjects showed signs of reversible periodontal disease (score 2) and only 9 (9%) subjects were healthy. In the last age group of 65-74 years, 19 (39.5%) subjects showed shallow periodontal pockets (score 3) while 11 (22.9%) subjects showed deep periodontal pockets (score 4) (Table 1). The results showed that the prevalence and severity of the periodontal disease increase with increase in the age. In addition, males showed a greater prevalence of periodontal disease as compared to the females.

Table 1: CPI scores for different age groups of the rural population

Age groups	CPI Score					
		0	1	2	3	4
	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)
15-24	96	43	41	9	3	0
25-44	142	17	12	62	39	12
45-64	98	9	11	18	39	21
65-74	48	1	5	12	19	11

Discussion

The aim of the present study was the assessment of the prevalence of periodontal disease in the Raigad district of Maharashtra. The study showed that age was a major factor that resulted in increased prevalence of periodontal disease in the rural areas. One of the major reasons for this finding was ascertained to the lack of awareness among the rural population. Other reasons attributed to high disease prevalence were lack of basic dental care to the rural areas and adverse habits of the population. Periodontal disease is a bacterial disease that begins in young adult life and progresses thereafter if not treated. After 45 years, the severity of periodontal disease increases, demonstrated through increased periodontal pocket depth and loss of attachment which is in accordance with the previous studies conducted.^(7,8)

In a study conducted by Kumar TS (2009), it was observed that the subjects had a predominant CPI score of 2 and the calculus deposition was observed to increase with age. Also, shallow pockets were seen in individuals with 35-44 years of age and deep pockets were seen in older individuals.⁽⁹⁾

Our study was in agreement with the findings of a study conducted by Kumar S et al. (2008) which involved oral health assessment through WHO oral health survey. It was reported that disease severity increased with increase in the age and maximum score (CPITN) was present in 35-44 years age group.⁽¹⁰⁾

Another study conducted by Joshi NV (2004) reported that calculus deposits were high in subjects with age 15-19 and 20-29 years. A high percentage of shallow pockets was seen in age group 30-44 and 45-60 years, while deep pockets were more in the age group 61 and above. These results are similar to those seen in the present study.⁽¹¹⁾

A study performed by Singh T et al. (2009) to assess the periodontal status of the rural population of Belgaum district reported that individuals above 45 years of age in two groups (45-60 years and 65 years above) had more periodontal problems than those in groups less than 45 years of age. Shallow and deep periodontal pockets were the most common signs observed. The study clearly demonstrated that severity of periodontal disease increased with increase in age.⁽¹²⁾ These results were in accordance with our present study.

Thus, there is evidence that severity of the periodontal disease increases with increase in age which could be attributed to the reduced ability of the periodontal tissues to sustain the inflammatory load and descent of immune function. The study, however, did not individually assess the chronic or aggressive nature of the periodontal disease that has a different rate of disease progression.

India is a diverse nation with difference in culture, educational levels, and socioeconomic status. Many parts of the country, especially the rural areas are lacking primary oral health care services. In addition the majority of these rural areas are not assessed for the existing periodontal status of oral health. Thus, the actual scenario of severity of periodontal status has been masked and needs to be explored for a better oral health of the country. Multi-centric studies are required to be conducted to assess the quality of oral health and oral hygiene practices in different parts of India. The rural population is commonly deprived of oral health care facilities and should be the focus of research in future.

Conclusion

Within the limitations of the study, we conclude that severity of periodontal disease increases with increase in age and majority of the adult population are affected by periodontal disease. The present study highlights the importance of making the rural

population aware about the various causes of periodontal disease, the earliest symptoms experienced and the importance of getting the disease treated at the earliest.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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The relationship between burnout and perfectionism in medical and dental students in Saudi Arabia

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Abstract

Objectives: The aim of this research was to investigate the relationship between perfectionism and burnout, and the prevalence of burnout, in medical and dental students in Jeddah, Saudi Arabia.

Materials and Method: A cross-sectional study was conducted among 645 clinical-year medical and dental students and interns in Jeddah, Saudi Arabia. Data were collected using a self-reported questionnaire. The Copenhagen Burnout Inventory was used to measure burnout, and the Perfectionistic Self-Presentation Scale was used to measure perfectionism. SPSS version 18.0 was used for statistical analysis. Data were analyzed by linear regression, t-test, and ANOVA.

Results: There was no significant correlation between burnout and any of the three types of perfectionism that were studied. The prevalence of normal or low burnout was 32.1%, and the prevalence of high burnout was 67.9%. The mean (standard deviation) of perfectionistic self-promotion was 42.99 (10.01), of non-display of imperfection was 42.314 (10.70), and of non-disclosure of imperfection was 29.50 (5.95). Burnout was higher in Saudis, students from low-income families, and clinical year students than in other subgroups. None of the three types of perfectionism were significantly correlated with gender, faculty (medicine or dentistry), marital status, family income, or type of college (government or private).

Conclusions: Because medical and dental students suffer from high levels of burnout, health programs to support the students and provide palliative measures for their psychological burdens are recommended.

Keywords: Burnout, Perfectionism, Medical students, Dental students, Saudi Arabia

Introduction

Medical and dental students encounter many challenges that affect their psychological health.^(1, 2) Such challenges include overwhelming academic loads, decreased relaxation time, pressure to maintain high grades, and dealing with specific medical procedures and patients.^(1,3-5) Burnout, which is defined as a syndrome of psychological lethargy, skepticism, and decreased professional capability, happens regularly with individuals who work in jobs involving serving others.⁽⁶⁾ Burnout among medical and dental students is an area of active investigation,⁽⁷⁻¹⁶⁾ because burnout can lead to medical mistakes, contribute to suicide, and have an effect on drug abuse and personal relationships.^(13,16-19) One systematic review concluded that almost half of all medical students are affected by burnout.⁽⁷⁾ However, studies across different countries showed a great variability. The prevalence of burnout among medical students was found to be 22.4% to 52.8% in the United States,^(18,20,21) 35.9% in Pakistan,⁽³⁾ 26.4% in Korea,⁽²²⁾ 75% in Lebanon,⁽²³⁾ 46% in the Netherlands,⁽²⁴⁾ and 10.3% in Brazil.⁽²⁵⁾ Only one of the studies involved students from a private college rather than a governmental college.⁽²³⁾ Two studies have investigated the prevalence of burnout among medical students in Saudi Arabia, in governmental colleges in Riyadh (67.1%)⁽²⁶⁾ and Tabouk (48.6%).⁽²⁷⁾

Fewer studies have investigated burnout among dental students in a number of countries, with burnout prevalence of 22.3% in Turkey,⁽⁸⁾ 7% in Colombia, and 10 to 20% in Germany.⁽²⁸⁾ In two Jordanian studies, dental students had high levels of burnout.^(11,15) However, burnout was not investigated among dental students in Saudi Arabia according to our knowledge.

Despite the apparent higher prevalence of burnout among medical students than among dental students in most studies, a second German study found that dental students had a higher rate of burnout than medical students.⁽¹⁴⁾ This result may be due to different tools being used to measure burnout. No study has investigated burnout among medical or dental students in private colleges in Saudi Arabia.

On the other side, Perfectionism is defined as the liability to set a very high standard for oneself.⁽²⁹⁻³¹⁾ Although perfectionism can improve medical students performance and achievement,⁽³²⁾ it may increase the psychological burden on students. Unhealthy perfectionism was found among dental students, and was linked to the student's stress.^(33,34) Also, two Korean studies linked perfectionism to burnout among medical students.^(29,30) This highlighted its importance to be investigated. Nevertheless, few studies, and none in Saudi Arabia, have investigated perfectionism among medical and dental students.

This study aims to (1) measure the levels of perfectionism and burnout in medical and dental colleges in Jeddah, Saudi Arabia; (2) determine the relationship between perfectionism and burnout in the students; and (3) evaluate the difference in perfectionism and burnout between medical and dental students, and between male and female students.

Materials and Method

In this cross-sectional study, participants were recruited from private and government medical and dental colleges in Jeddah, Saudi Arabia. A convenient sample included medical and dental students in their clinical (4th to 6th) years and interns from Al Batterjee Medical College, Alfarabi Colleges, Ibn Sina National College, and King Abdulaziz University. The required sample size was 358, based on a precession level of 5%, an estimated prevalence level of 50%, and a confidence level of 95%.

Data were collected in the last month of the academic year (2017), during students' final examination days, using either hard-copy or electronic format self-administrated questionnaires. The questionnaires were administrated in English, with some terms translated to Arabic for clarification. The questionnaires were then revised to account for missing data, and were filled out again. For those using the electronic questionnaire, a link was sent to their group leader, who forwarded it to the students through social media. The expected time required to answer the questionnaire was 5–10 minutes. All participants signed a consent form before filling out the hard-copy questionnaire, or consented electronically before filling out the electronic questionnaire. The data were treated anonymously, and all identifiable information was eliminated. As an incentive, a drawing was held for three vouchers, in the amount of 100 SR each, from a famous bookstore in Saudi Arabia; winners were selected randomly from among the participants. The study was approved by the Umm Al-Qura College of Dentistry Institutional Review Board, as a part of a large project to assess the psychological well-being of medical and dental students in Saudi Arabia.

The questionnaires were divided into three sections. Section 1 comprised eight demographic questions including gender, age, faculty (medicine or dentistry), college type (government or private), marital status, academic year, family income, and nationality. Section 2 measured burnout via the Copenhagen Burnout Inventory (CBI), using the work burnout section only.⁽³⁵⁾ Section 3 measured perfectionism using the Perfectionistic Self-Presentation Scale (PSPS).⁽³⁶⁾

The CBI has a Cronbach's alpha of 0.87. It consists of seven questions answered as Always, Often,

Sometimes, Seldom, or Never/Almost Never. Test results were scored as Always = 100, Often = 75, Sometimes = 50, Seldom = 25, and Never/Almost Never = 0. The total CBI score was the average of the scores of the individual questions. Students work burnout was considered normal or low when the CBI score was less than 50, and high when the CBI was 50 or greater.

The PSPS has a Cronbach's alpha of 0.78 to 0.86. It consists of 27 items answered on a scale from 1 (strongly disagree) to 7 (strongly agree). Ten questions are under the perfectionistic self-promotion subscale (the individual tends to look perfect), ten are under the non-display of imperfection subscale (the individual avoids looking imperfect), and seven are under the nondisclosure of imperfection subscale (the individual avoids admission of imperfection). The score of each subscale equals the sum of the scores of the related questions. The higher the subscale scores, the more likely the individual is to be a perfectionist.

Research team members performed data entry on a private, password-protected computer, accessible only by the team. SPSS version 18.0 (SPSS Inc., Chicago, USA) was used for statistical analysis. Descriptive statistics included a frequency table, means, and standard deviations. The data were analyzed by t-test, ANOVA, Tukey's post hoc test and linear regression. A p -value ≤ 0.05 was considered statistically significant.

Results

The participants in this study were 645 medical and dental students. The mean (M) of their ages was 24.51 years, with a standard deviation (SD) of 1.80. Table 1 shows the demographic data of the participants.

The mean level of work burnout for all students was 56.73 (SD = 18.12). Results indicated that 67.9% of students had a high level of work burnout, and 32.1% had normal or low levels of work burnout. The mean level of perfectionistic self-promotion was 42.99 (SD = 10.01), of non-display of imperfection was 42.314 (SD = 10.70), and of non-disclosure of imperfection was 29.50 (SD = 5.95).

Using a linear regression analysis, no significant relationship was found between burnout and perfectionistic self-promotion ($p= 0.146$), non-display of imperfection ($p= 0.939$), or non-disclosure of imperfection ($p= 0.997$). Also, burnout was not significantly age related.

The results of analysis with a t-test, ANOVA, and Tukey's post hoc test, describing the relationships between demographic variables and burnout or perfectionism, are shown in Table 2.

Table 1: Demographic data of 645 participants in Jeddah, Saudi Arabia

		Number	%
Gender	Male	238	36.9%
	Female	407	63.1%
Faculty	Dentistry	363	56.3%
	Medicine	282	43.7%
Nationality	Saudi	480	74.4%
	Non-Saudi	165	25.6%
Marital status	Married	114	17.7%
	Not Married	531	82.3%
Monthly Family Income	Less than 5,000 SAR	72	11.2%
	5,000–15,000 SAR	265	41.1%
	Greater than 15,000 SAR	308	47.8%
College	Batterjee Medical College (private)	171	26.5%
	Alfarabi Colleges (private)	216	33.5%
	Ibn Sina National College (private)	80	12.4%
	King Abdulaziz University (governmental)	178	27.6%
Academic year	Student	301	46.7%
	Intern	344	53.3%

SAR: Saudi Arabia Riyal

Table 2: The relationships between demographic variables and perfectionism or burnout for 645 participants in Jeddah

	Burnout	Perfectionistic self-promotion	Non-display of imperfection	Nondisclosure of imperfection
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Gender				
Male	57.17 (19.86)	42.82 (8.83)	42.06 (10.50)	29.49 (5.35)
Female	56.47 (17.03)	43.08 (10.65)	42.45 (10.82)	29.51 (6.29)
Faculty				
Dentistry	56.86 (15.87)	43.22 (9.91)	42.95 (10.35)	29.64 (5.79)
Medicine	56.56 (20.68)	42.68 (10.15)	41.49 (11.09)	29.32 (6.17)
Academic year				
Student	60.04 (18.17)*	42.73 (10.55)	41.96 (10.75)	29.54 (6.10)
Intern	54.66 (15.51)	43.21 (9.52)	42.62 (10.66)	29.47 (5.83)
Monthly family income				
Less than 5,000 SAR	62.84 (19.38) ^(a)	42.73 (8.77)	43.34 (9.11)	29.26 (5.27)
5,000–15,000 SAR	56.94 (16.90)	42.33 (9.79)	41.77 (10.73)	29.63 (5.64)
Greater than 15,000 SAR	55.12 (18.56)	43.61 (10.44)	42.53 (11.019)	29.45 (6.36)
Marital status				
Married	57.98 (18.46)	43.09 (8.02)	40.66 (10.34)	29.66 (5.427)
Not Married	56.46 (18.05)	42.96 (10.39)	42.66 (10.75)	29.47 (6.07)
College				
Batterjee Medical College (private)	59.73 (18.30)	41.45 (11.55)	40.48 (12.19)	29.21 (6.68)
Alfarabi Colleges (private)	55.80 (15.71)	43.43 (9.65)	43.17 (9.69)	29.72 (5.51)
Ibn Sina National College (private)	54.15 (14.40)	43.95 (10.07)	42.82 (11.02)	29.48 (6.45)

King Abdulaziz University (governmental)	56.13 (21.60)	43.50 (8.65)	42.80 (10.04)	29.54 (5.50)
Nationality				
Saudi	57.96 (18.85)*	43.36 (9.91)	42.83 (10.46) *	29.72 (5.94)
Non-Saudi	53.16 (15.30)	41.91 (10.23)	40.80 (11.26)	28.84 (5.97)

SAR: Saudi Arabia Riyal

* p -value < 0.05

(a) Significant difference between (Less than 5,000 SAR) and both (5,000–15,000 SAR) and (Greater than 15,000 SAR).

Discussion

No significant relationship was found between burnout and any type of perfectionism. This suggests that work driven by a personal desire can sustain an individual's energy without burnout. These results differ from those in Korean studies^(29,30) that found socially-prescribed and maladaptive perfectionism were linked to burnout among medical and dental students. However, those studies did not investigate the three types of perfectionism that were investigated here, and used a different scale. Further cross-cultural studies using a unified scale are recommended.

This study showed a high prevalence of burnout (67.9%) among medical and dental students in Saudi Arabia. This rate was higher than the prevalence of burnout in the United States, Pakistan, Korea, the Netherlands, and Brazil,^(3,18,20-22,24,25) but lower than that in Lebanon.⁽²³⁾ However, it was very similar to that found among medical students in a local study in Riyadh,⁽²⁶⁾ but higher than that of medical students in Tabouk.⁽²⁷⁾ These differences may be due to different methods of measuring burnout, or to measuring students at different times of the year.⁽³⁶⁻³⁸⁾ Thus, medical and dental students in Saudi Arabia seem to have high levels of burnout in general, even though the levels may vary by geographical location and the method of measurement.

It was difficult to compare the prevalence of perfectionism in the medical and dental students in Saudi Arabia to that of other populations, due to the absence of the tool cutoff point, and lack of similar studies using the same measurement tools. The mean values of perfectionistic self-promotion and non-display of imperfection in the present study were similar to those in a study by Hewitt,⁽³⁶⁾ who invented the SPSP. The non-disclosure of imperfection mean was slightly higher in our study than in Hewitt's. This may indicate that medical and dental students are not likely to be more perfectionists than others, but this result needs further validation because our data was gathered during the last month of the academic year, when students may tend to be less perfectionist to cope with cases and assignment submissions.

Burnout was found to be more prevalent among students than interns, among Saudis than non-Saudis, and among those with a low family income than those

with middle or high family incomes. A previous study indicated that Saudi medical and dental students suffer from psychological distress due to higher academic challenges,⁽³⁹⁾ and that this stress may decrease during an internship. Students with low family income may have more family obligations to fulfill, which would increase stress. However, it is difficult to determine why Saudis have more burnout than non-Saudis. A qualitative study is needed to further examine this issue.

The level of burnout did not correlate significantly with gender, faculty, marital status, or type of college (private or governmental). Other studies have had conflicting results on whether gender is significantly related to burnout.^(25,27) Our results contradicted a German study⁽¹⁴⁾ that found dental students to have a higher burnout level than medical students. This may reflect the different nature of education in each country and educational institution.

The three types of perfectionism studied here showed no correlation to gender, faculty, academic level, family income, marital status, or college type. A previous study also showed no difference between males and females in levels of perfectionism.⁽⁴⁰⁾ The non-display of imperfection was higher among Saudis than non-Saudis. This suggests that Saudis may have more concern about, and put forth more effort towards, looking perfect in their lives than do non-Saudis. However, the reason for this is not clear.

This study has several strengths. It was carried out with a relatively large sample from both government and private medical and dental colleges, and only validated measurement tools were used. In addition, this is the first study to investigate perfectionism among medical and dental students in Saudi Arabia.

This study was limited in that it was based on a self-reported questionnaire, a convenient sample, and the use of both electronic and paper questionnaires. The time of the data collection (end of the academic year) caused some students not to participate, which may have resulted in higher scores for burnout and lower scores for perfectionism.

Conclusion

No evidence was found to support a correlation between perfectionism and burnout among medical and dental students in Saudi Arabia. These students have

high levels of burnout in general, and in comparison to their peers in other countries. Students who are Saudis, who are from families with a low income, or who are currently in their academic years are more vulnerable to burnout than those who are not in these subgroups. Perfectionism among the students was found to be within the normal range, except for the non-disclosing of perfectionism. Educational institutions are encouraged to support and improve student's psychological health by providing self-development coaching programs.^(41,42)

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Evaluation of microleakage after restoration with different posterior tooth coloured restorative materials- An in vitro study

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Abstract

Aim: The objective of this study was to compare the micro leakage in Class I cavity preparations restored with different tooth colored materials.

Materials and Method: Standardized Class I cavity were made in 30 human premolar teeth. Specimens were randomly divided into four groups comprising of 10 samples each (n=10). Group I: Teeth were without any restorative material (Control). Group II: Restored with a nano ionomer, Group III: Restored with a silorane composite, Group IV: Restored with SDR. All specimens were immersed in 2% methylene blue dye. The specimens were sectioned and evaluated for microleakage under stereomicroscope.

Results: Group IV (SDR) showed lesser microleakage than P90 followed by Ketac N100.

Conclusion: It was concluded that SDR (Smart Dentin Replacement) had the lowest level of micro leakage amongst all the groups.

Keywords: Microleakage, Stereomicroscope, Dentin

Introduction

Microleakage is a phenomenon where oral micro-organisms, chemical substances and fluids are diffused through the interface between tooth structure and restorative material. Fluids may progress through dentin into pulp, causing recurrent caries, post-operative sensitivity, pulp inflammation and finally failure of restorations.⁽¹⁾ The search for restorative materials with the ability to promote sealing is leading to constant introduction of new products in the market. Two types of restorative materials have emerged, glass-ionomers and composites, where each have fulfilled most of the requirements of a successful restorative material.⁽²⁾

High-polymerization shrinkage generates stresses and continues to be the major disadvantage of composites leading to bond failure and microleakage.⁽³⁾ A new generation of light cured bulk flowable composite resin, smart dentin replacement (SDR) is introduced having reduced polymerization stresses.⁽⁴⁾ The scientific breakthrough of silorane chemistry with ring opening monomers has led up to the innovation of silorane based composite P90.⁽⁵⁾ A whole new category of esthetic glass ionomer is Ketac N100 which is a light curing Nano-Ionomer having higher wear resistance when tested against competitive resin modified GIC making them an ideal esthetic posterior GIC.⁽⁶⁾ The purpose of the study was to evaluate microleakage after restoration with Ketac N100, P90 and SDR in Class I tooth preparation.

Materials and Method

Forty premolar teeth were taken. Teeth were divided into four groups, three experimental groups and one control group with ten teeth in each group.

Standardized Class I cavity were then made in all four groups which was 1.5 mm deep and width was one-fourth of the intercuspal distance.

In group I (control group), class I cavity prepared was without any restorative material. In group II, teeth were restored with nano ionomer, In Group III, teeth were restored with P90 (Silorane) and in Group IV teeth were restored with Smart Dentin Replacement (SDR). All the teeth in experimental groups were restored according to the manufacturer's instructions. Teeth in all groups were stored in distilled water for 24 hrs.

Nail varnish was then coated on all the teeth in each experimental group not extending on to the restorative material and 1 mm away from the cavosurface margins. However, in the control group, no nail polish was applied. All the teeth were immersed in 2% methylene blue dye for 24 h and then sectioned longitudinally through the centre of the restoration using a sectioning disc. The sectioned restorations were examined under a stereomicroscope and scoring was done according to the given criteria.

Scoring Criteria

Dye penetration was recorded as follows:

- Score 0 (no leakage): No dye penetration at all
- Score 1 (mild leakage): Dye penetration upto 1/3rd of the cavity
- Score 2 (moderate leakage): Dye penetration upto 2/3rd of the cavity
- Score 3 (severe leakage): Dye penetration reaching pulpal floor

Results

Group I showed the highest leakage followed by Group II, Group III and lastly that of Group IV.

Intergroup comparison shows least microleakage with Group IV (SDR) when compared to all the groups tested ($p < 0.02$). (Table 1, 2, Graph 1)

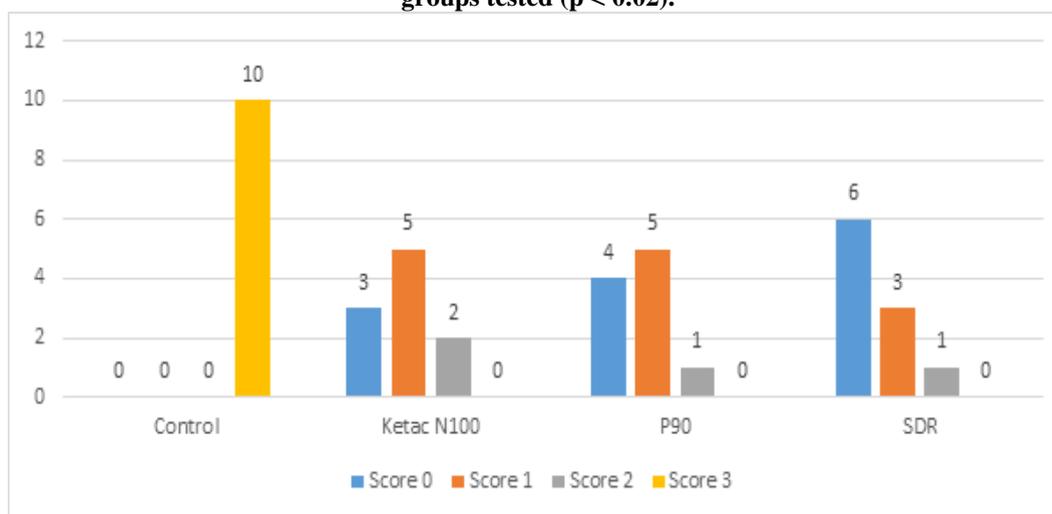
Table 1: Micro leakage scores of all the groups

Material	Leakage Scores			
	No Leakage (Score 0)	Mild Leakage (Score 1)	Moderate Leakage (Score 2)	Severe Leakage (Score 3)
Group I (control group)	0	0	0	10
Group II	3	5	2	0
Group III	4	5	1	0
Group IV	6	3	1	0

Table 2: Mean and standard deviation

	Ketac N100	P90	SDR
Mean	2.10	1.20	.70
n	10	10	10
Std. Deviation	.568	.632	.823
Median	2.00	1.00	.50

Graph 1: Intergroup comparison shows least micro leakage with Group IV (SDR) as compared to all the groups tested ($p < 0.02$).



Discussion

Microleakage is the clinically undetectable passage of bacteria, fluids, molecules, or ions between a restorative material and the cavity wall. Micro-leakage at the tooth-restoration interface is considered a major factor affecting the longevity of dental restoration.⁽⁷⁾ It may hasten breakdown of restoration margins, cause staining, hypersensitivity, recurrent caries and pulpal pathology. Composites and GIC are tooth coloured restorative materials that fulfill the requirements of a successful restorative material. However, polymerization shrinkage in composites has posed a challenge in achieving lasting marginal integrity whereas poor esthetics and low wear resistance of GIC have led to search for a better GIC product.⁽⁸⁾

Some of the recently introduced composite are SDR & P90. A urethane based dimethacrylate modulator included in SDR helps the monomers to form a more relaxed network causing reduced polymerization stresses. P90 composite incorporates “ring opening” monomers which connects by opening, flattening and extending towards each other during polymerization, resulting in less shrinkage as compared to methacrylate based composites.⁽⁹⁾ A whole new category of esthetic GIC is Ketac N100, a resin modified glass ionomer developed with nanotechnology called as “nano-ionomer”. It offers unique characteristics of wear & polish.⁽⁶⁾ Till now no study has been done to compare microleakage with these newer composites and GIC. Hence, this study was formulated to evaluate and compare microleakage after

restoration with Ketac N100, P90 and SDR. Least microleakage was seen with Group IV (SDR) as compared to groups I, II & III.

This may be attributed to the fact that SDR has the lowest level of shrinkage stress, longest pre-gel time and low shrinkage rate (Llie et al.) The chemistry of SDR is designed to slow the polymerization rate, that reduces the polymerization shrinkage stress (*Burgess et al*). In light of the present study, it is tempting to speculate that SDR can be the esthetic restorative material of choice with reduced microleakage and a simplified bulk fill technique.

Conclusion

In this study, different tooth coloured materials were used to study and evaluate microleakage in Class I restorations. Within the limitations of this study, it was concluded that SDR had the lowest level of microleakage amongst all the groups.

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Comparison of modified Kreyberg's, modified Papanicolaou, Ayoub-Shklar, and Haematoxylin and Eosin stains to demonstrate keratin in paraffin embedded tissue sections

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Abstract

Introduction: Keratin is an intermediate protein with a diameter of 7-11 nm which forms the cytoskeleton of all the epithelial cells. It forms the superficial most layer (stratum corneum) in keratinized epithelium in the oral cavity. Keratin may also be present in various pathologic conditions like squamous cell carcinoma, verrucous carcinoma and odontogenic keratocyst. The aim of the present study was to compare and evaluate the efficacy of staining of Ayoub-Shklar, Modified Papanicolaou, Routine Haematoxylin and Eosin and Modified Kreyberg's to stain known keratin tissue, and to obtain the best stain for keratin.

Materials and Method: A total of 75 paraffin embedded tissue blocks were taken of known keratin containing tissue which included Well Differentiated Squamous Cell Carcinoma (WDSCC), Hyperkeratosis with or without dysplasia (HWD), Orthokeratinized Odontogenic Keratocyst (OKC) and Verrucous Carcinoma (VC). Four sections measuring 4 microns in thickness of each block were cut and were stained with all the mentioned stains.

Results: Keratin was stained by all the four stains (Ayoub-Shklar, Modified Papanicolaou, Routine Haematoxylin and Eosin and Modified Kreyberg's) distinctly in WDSCC, HWD, OKC and VC. Ayoub-Shklar and Hematoxylin and Eosin stains showed better results, and was also statistically significant among all the stains for WDSCC, HWD, OKC and VC when intensity and patterns were compared.

Conclusion: It can be concluded that all the four stains (Ayoub-Shklar, Modified Papanicolaou, Routine Haematoxylin and Eosin and Modified Kreyberg's) can demonstrate keratin and based on the overall staining intensity and pattern. Ayoub-Shklar and H and E stains can be used efficiently to stain keratin but have certain limitations.

Keywords: Keratin, Ayoub Shklar stain, Modified Papanicolaou stain, Haematoxylin and Eosin stain, Modified Kreyberg's Stain.

Introduction

Oral epithelium can be classified into two types according to their morphology and pattern of differentiation i.e. keratinized and non-keratinized epithelium.⁽¹⁾ Keratins are the IF-forming proteins which are expressed in all types of epithelial cells. They play an important role in epithelial cell protection from mechanical and non-mechanical stressors. Keratins have been proven to be a useful diagnostic and prognostic marker in epithelial malignancies.⁽²⁾ Keratin can be confirmed by using Schiff's reagent along with various stains such as Kreyberg's method, modified Papanicolaou, and Ayoub-Shklar methods.⁽³⁾

The modified Kreyberg's method involves substitution of alcian green by Alcian blue 8GX and alcoholic saffron is substituted by 2GX and acidified metanil yellow. The results showed keratin stained with red or orange color.⁽⁴⁾

Papanicolaou stain is a routinely used staining technique, commonly available in oral pathology lab. The main use of Orange G6 in Papanicolaou method is to stain keratin. Superficial cells with high content of keratin stain yellow-orange hue and parabasal cells stain green to blue in color.⁽⁵⁾ Elzay et al have reported the modification of PAP stain by adding Phloxine-B, a

red acid dye which is a derivative of fluorescein with distinct bluish shade. It is used to stain keratin, prekeratin and mucin which appears distinct red in color.^(5,6)

Ayoub-Shklar stain is a quick and reliable histological marker to demonstrate the presence/absence and degree of keratinization in the paraffin embedded sections. In this stain, keratin appears distinct red in color. All these special stains to demonstrate keratin have certain advantages and disadvantages. The presence of keratin protein can be detected by immunohistochemistry, but this technique is time consuming and is not economical.⁽³⁾ Hence, the present study was undertaken to demonstrate the efficacy and reliability of Ayoub-Shklar, modified Papanicolaou, routine Haematoxylin and Eosin and modified Kreyberg's method of staining, so that an optimal staining technique which is specific, cost and time effective can be formulated.

Materials and Method

Three groups of keratin containing tissues were obtained for the study and were stained with Ayoub-Shklar, Modified Papanicolaou, Routine Haematoxylin and Eosin and Modified Kreyberg's stain.

The study groups included:

Group A- Well differentiated squamous cell carcinoma (WDSCC) (25 Cases)

Group B- Hyperkeratosis with or without dysplasia (HWD) (25 Cases)

Group C- Miscellaneous (OKC and VC) (25 Cases)

Four sections each of 4 micron thickness from the paraffin embedded tissue were taken and stained with Ayoub Shklar, Modified Papanicolaou, Routine Haematoxylin and Eosin and Modified Kreyberg's stain.

Procedure for Haematoxylin and Eosin: Materials used

Solution: Harris haematoxylin, Acid alcohol, Eosin

Staining Procedure:

- The deparaffinized sections in xylene were dehydrated in various grades of alcohol for 4 minutes each.
- After water wash for 10 minutes, the slides were stained with Harris Haematoxylin stain for 4 minutes.
- Later water washed for 10 minutes and after differentiation in acid alcohol, the slides were dipped under tap water for bluing for 5 minutes and were stained with eosin for 7 sec.

Procedure for Ayoub Shklar stain: Materials used

Solution:

- 5% acid fuschin solution, Acid Fuschin-5gm, Distilled water-100 ml
- Aniline blue orange G solution, Aniline blue (water soluble)-0.5, Orange G-2gm Phosphotungstic acid-1gm, Distilled water-100ml

Staining procedure:

- Deparaffinize sections through 2 changes of xylene, absolute alcohol, and 95% alcohol, to distilled water. Stain sections in acid fuchsin solution for 3 mins.
- Transfer directly to aniline blue-orange G solution for 45 min. Transfer directly to 95% alcohol for several changes. Dehydrate with 2 changes of absolute alcohol. Clear with 2 to 3 changes of xylene and mounted.

Procedure for modified Papanicolaou stain: Materials Used

Solution: Harris hematoxylin, Orange G6, Eosin-azure, Phloxine-B.

Staining Procedure:

- Deparaffinize sections through 2 changes of xylene, absolute alcohol, and 95% alcohol, to distilled water.
- Stain with Harris hematoxylin for 6 min. Two changes of tap water and single dip in acid alcohol, phloxine-B for 5 minute in Distilled water and dehydrate.
- Orange G-6 for 5 min. Rinse in 95% alcohol and then eosin azure for 1 min. Rinse in 90% alcohol, dehydrate. Clear and mount.

Procedure for modified Kreyberg's stain: Materials used

Solution:0.3% Acetic Acid Solution, 1% Alcian Blue Solution, Ammonia-Alcohol Solution, Harris Haematoxylin, Acid Alcohol Solution, 1% Erythrosin B Solution, Alcoholic Metalnil Yellow Solution

Staining Procedure:

- Deparaffinize and dehydrate in distilled water. Place in 3% acetic acid for 3 minutes
- Place in 40 ml of 1% alcian blue solution in a glass Coplin jar and microwave at power level 1 (60W) for 3 minutes. Dip the slides up and down and allow them to remain in the hot solution for 5 minutes. Rinse in three changes of distilled water.
- Place in ammonia-alcohol solution for 10 minutes. Wash well with tap water and rinse in distilled water. Place in Harry's Haematoxylin solution for 45 seconds. Wash with distilled water. Acid alcohol solution for 10 seconds. Rinse in four changes of distilled water.
- Place in erythrosin B solution for 5 minutes. Rinse quickly in one change of distilled water. A few quick dips in two changes of 95% alcohol followed by two changes of absolute alcohol.
- Place in alcoholic metalnil yellow for 30 seconds. Dehydrate with four changes of absolute alcohol. Clear in three or four changes of xylene and mount with synthetic resin.

The results were analyzed for efficacy and pattern of the four staining techniques and examined according to:

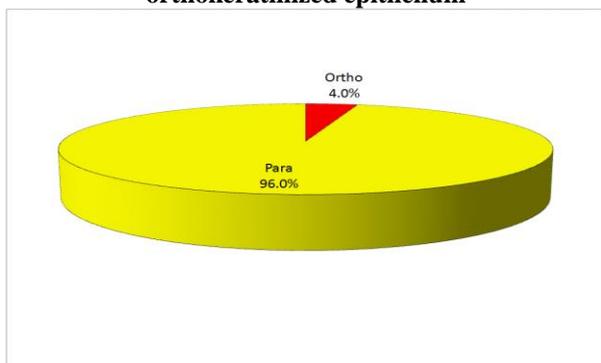
- Type of Surface keratin (parakeratinized or orthokeratinized)
- Pattern of staining (whether good, average or poor).⁽³⁾

Slides were coded and evaluated based on the intensity and pattern as per the modified scoring criteria of Rahma Al-Maaini and Philip Bryant (2008)⁽⁷⁾ (Table 1). The results were statistically analysed using SPSS software (Statistical Package for Social Sciences) Version 15.0 statistical Analysis Software.

Table 1: Criteria and scores for grading different stains in tissue sections

Criteria	Score	
Intensity	0	Poor
	1	Average
	2	Good
	3	Excellent
Pattern	0	Poor
	1	Average
	2	Good
	3	Excellent

Graph 1: Percentage of parakeratinized and orthokeratinized epithelium



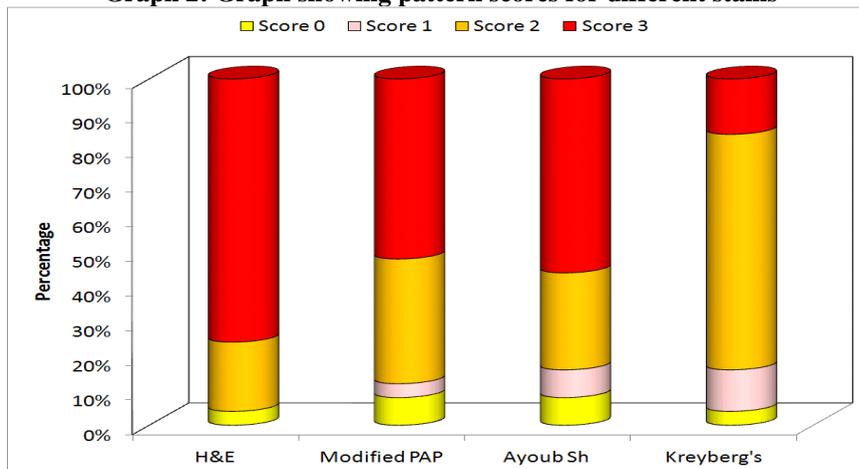
Results

Graph 1 shows the percentage of parakeratinized & orthokeratinized epithelium. Groupwise, comparison for stain pattern showed that the difference between H&E and Modified PAP, H&E and Ayoub Shklar and H&E and Modified Kreyberg’s were statistically significant. It was found that H&E had Pattern scores of significantly higher order as compared to that of Modified PAP, Ayoub-Shklar and Modified Kreyberg’s stain (p<0.05). None of the other differences were significant statistically (p>0.05). On the basis of these results, the order of staining pattern scores for different stains in the present study were as follows: H&E> Modified PAP > Ayoub-Shklar > Modified Kreyberg’s. (Table 2, Graph 2)

Table 2: Frequency table for pattern scores for different stains

Pattern Score	H & E (n=25)		Modified PAP (n=25)		Ayoub Shklar (n=25)		Kreyberg’s (n=25)	
	No.	%	No.	%	No.	%	No.	%
0	1	4	2	8	2	8	1	4
1	0	0	1	4	2	8	3	12
2	5	20	9	36	7	28	17	68
3	19	76	13	52	14	56	4	16
Mean Score±SD	2.68±0.69		2.32±0.90		2.32±0.95		1.96±0.68	
Median Score	3		3		3		2	
Inter-quartile range (IQR)	2.5-3		2-3		2-3		2-3	

Graph 2: Graph showing pattern scores for different stains

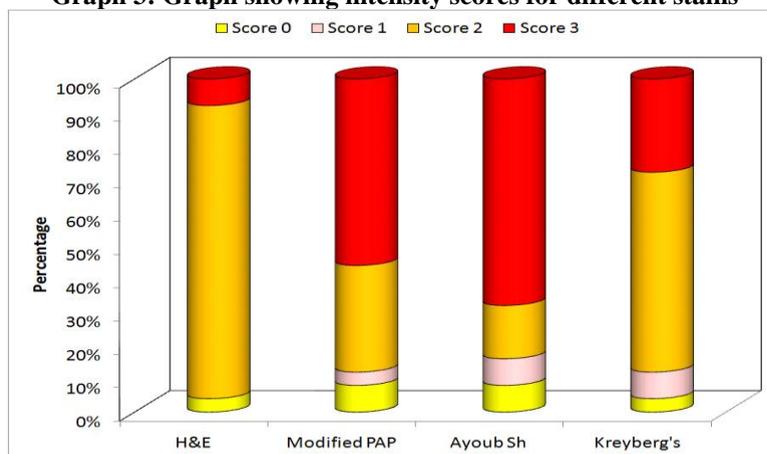


Group wise comparison for stain intensity, except for the difference between H&E and Modified PAP and between H&E and Ayoub-Shklar, none of the differences were found to be significant statistically. It was found that H&E had intensity scores of significantly lower order as compared to that of Modified PAP and Ayoub-Shklar (p<0.05). The order of intensity scores for different stains in the present study were as follows: Ayoub-Shklar > Modified PAP > Modified Kreyberg’s > H&E. (Table 3 and Graph 3)

Table 3: Frequency table for intensity scores for different stains

Intensity Score	H & E (n=25)		Modified PAP (n=25)		Ayoub Shklar (n=25)		Kreyberg's (n=25)	
	No.	%	No.	%	No.	%	No.	%
0	1	4	2	8	2	8	1	4
1	0	0	1	4	2	8	2	8
2	22	88	8	32	4	16	15	60
3	2	8	14	56	17	68	7	28
Mean Score±SD	2.00±0.50		2.36±0.91		2.44±0.96		2.12±0.73	
Median Score	2		3		3		2	
Inter-quartile range (IQR)	2-2		2-3		2-3		2-3	

Graph 3: Graph showing intensity scores for different stains



Group wise comparison for overall visualization, except for the difference between H&E and Modified PAP and H&E and Modified Kreyberg's, none of the differences were found to be significant statistically. It was found that H&E had scores of significantly higher order as compared to that of Modified PAP and Modified Kreyberg's stain ($p < 0.05$). The scores for different stains in the present study were as follows: H&E > Ayoub Shklar > Modified PAP > Modified Kreyberg's. (Table 4, Graph 4)

Table 4: Frequency table for combined scores for different stains

Overall score	H & E (n=25)		Modified PAP (n=25)		Ayoub Shklar (n=25)		Kreyberg's (n=25)	
	No.	%	No.	%	No.	%	No.	%
0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0
2	0	0	0	0	2	8.0	4	16.0
3	0	0	5	20.0	3	12.0	2	8.0
4	3	12.0	6	24.0	4	16.0	6	24.0
5	19	76.0	10	40.0	5	20.0	9	36.0
6	3	12.0	4	16.0	6	24.0	4	16.0
Mean Score±SD	5.00±0.50		4.52±1.01		4.60±1.53		4.28±1.31	
Median Score	5		5		5		5	
Inter-quartile range (IQR)	5-5		4-5		3-6		3.5-5	

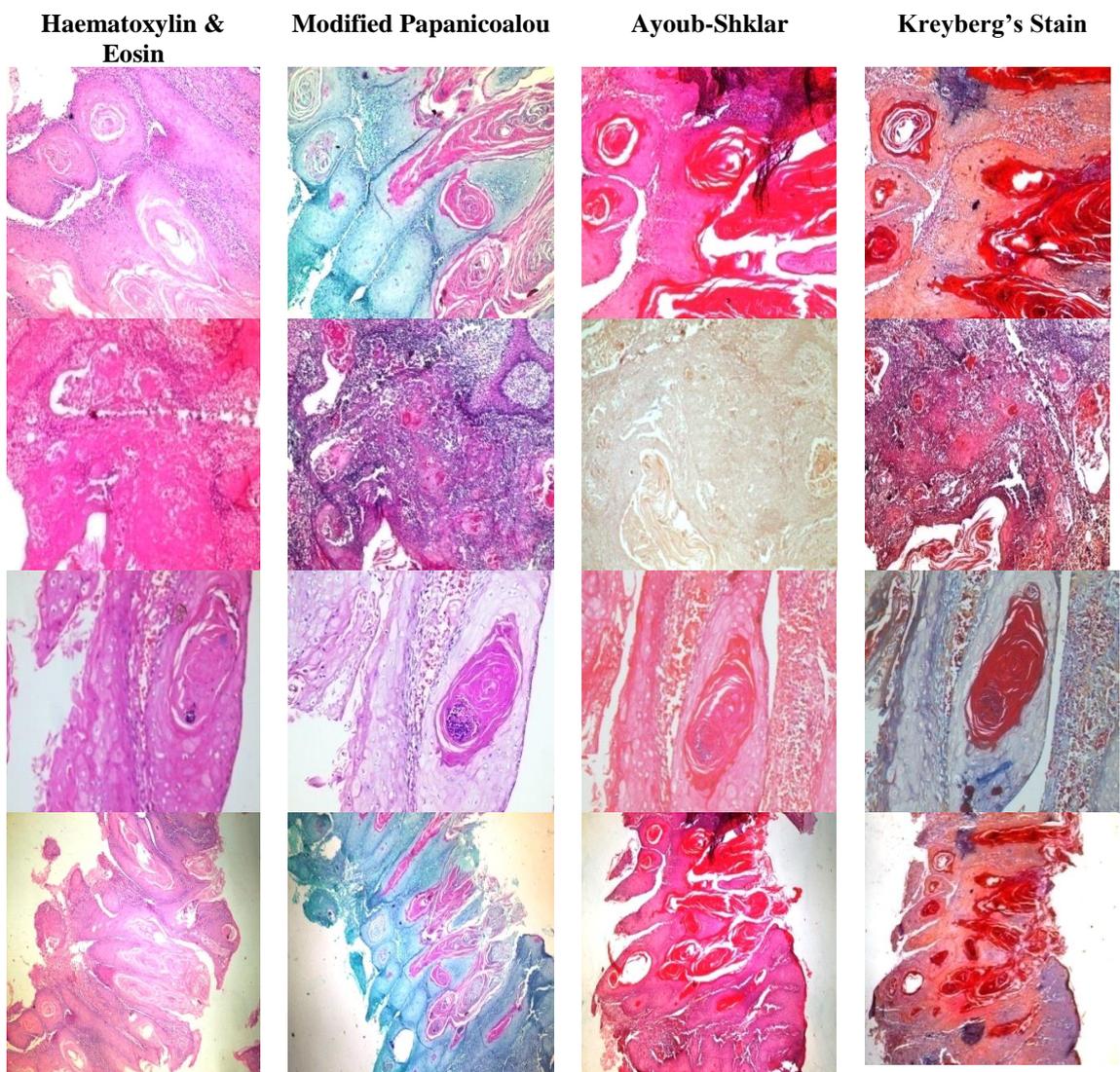
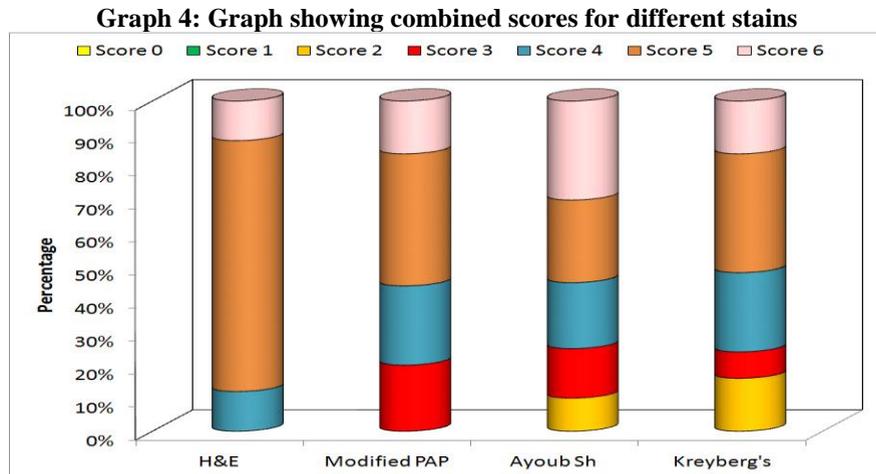


Fig. 1: Keratin pearl staining in 4 tissue sections stained by H&E, Modified Pap, Ayoub Shklar and Kreyberg's Stain. (Pic. 1, 2, 3 X400 and pic 4 X100)

Discussion

Oral mucous membrane can be classified into keratinized epithelium and non keratinized epithelium. The cells of keratinized epithelium undergoes continuous differentiation of cells and form a superficial layer of cornified cells filled with keratin.⁽⁸⁾ Keratin (protein) are intermediate filament with a diameter of 7-11nm and it forms the cytoskeleton of all the epithelial cells.⁽²⁾

Stress can alter keratin expression and makes it structurally reorganized. The reorganization of keratin is regulated by post-translational modification and association of keratin with scaffolding proteins. These changes depends upon the duration and severity of stress. For example, disassembly of network and degradation of K8/K18 occurs in hypoxic conditions. Protein modification occurring during phosphorylation modulates intrinsic properties of keratin like solubility, conformation and filament structure and other post-translational modifications.^(1,8,9) Keratins protect epithelial cell integrity during stressful conditions and it has recently been known as regulator of cellular functions as well as apico-basal polarization, determining cell size.^(10,11)

Given the characteristic cell type, differentiation and functional status-dependent keratin expression patterns in epithelial cells, the availability of specific keratin antibodies, and the fact that epithelial tumors largely maintain the features of specific keratin expression associated with the respective cell type of origin, keratins have long and extensively been used as immunohistochemical markers in diagnostic tumor pathology. Squamous cell carcinomas, independently of their site of origin, are characterized by the expression of the stratified epithelial keratins K5, K14 and K17 and the hyper proliferative keratinocyte-type keratins K6 and K16. In poorly differentiated squamous cell carcinomas, co-expression of the simple epithelial keratins K8, K18 and K19 is often observed. Most adenocarcinomas, consistently express keratinocyte type keratins, notably K5, and vimentin.^(3,12,13) Use of keratins as diagnostic markers in tumor pathology is by far their most common application in the field of cancer. In cases remaining unclear on the basis of clinical presentation and conventional histopathology, including carcinomas that are poorly differentiated or spreading over several organs and metastases of unknown primary tumor site, keratin demonstration is especially valuable for correct tumor.⁽³⁾

All the epithelial tumors contain features of specific keratin association with the respective cell of origin, hence keratins are widely used as immunohistochemical markers in Epithelial tumors have characteristic keratin which is in accordance with the cell of origin. Due to this quality keratin is widely used as immunohistochemical marker identifying tumors. For example, oral squamous cell carcinoma are characterized by K5, K14 and K17 and

hypoproliferative K6 and K16 while in poorly differentiated squamous cell carcinoma K8, K18 and K19 expression. Markers like K5, K14, K17 can characterize squamous cell carcinoma. K6 and K16 which are hypoproliferative can also characterize squamous cell carcinoma. Whereas poorly differentiated squamous cell carcinoma can be detected by K8, K18 and K19 markers is seen. For cases which remain unclear clinically and histopathologically, keratin demonstration proves to be very valuable.⁽³⁾

Special stains are the stains that are used to visualize specific tissues and cellular structures. These are the dyes that bind to the cellular components either physically or by chemical bonds. Ayoub Shklar,⁽¹⁴⁾ Modified Papanicolaou⁽⁵⁾ and Modified Kreyberg's⁽⁴⁾ are special histochemical stains used to stain keratin specifically. These stains may highlight small foci of overt epithelial differentiation that sometimes is missed in routine H&E. These stains, highlights even the minute areas of keratin which can be missed by routine H and E staining.⁽¹⁵⁾

Previous studies done by Rao et al.⁽¹⁵⁾ have shown that Ayoub Shklar method was better than PAP, Dane Herman, Gram's and modified Alcian blue PAS method in terms of staining intensity and equal efficacy in demonstrating type of keratin with all the stains. Ramulu et al.⁽³⁾ have shown that all stains were efficient in staining keratin but Hand E stain was better in demonstration of keratin pearls in oral squamous cell carcinoma cases.

Conclusion

Based on the overall staining intensity & pattern to demonstrate keratin, Ayoub Shklar and H & E stains showed better results. Further studies on larger sample size should be conducted using keratin specific histochemical stains, and should also be further correlated with the keratin type to understand the uneven staining intensity and pattern. To conclude, keratin was well demonstrated by all the four special stains which can be used as a useful adjunct to routine staining methods in demonstrating keratin.

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Orthopantomogram study of mental foramen in Muradnagar-Ghaziabad Population

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Abstract

Introduction: Mental foramen is a minute circular/oval shaped opening present bilaterally in the anterior surface of the body of the mandible. The mental foramen marks the termination of mandibular canal in the mandible, through which the inferior alveolar neurovascular bundle passes. Evaluation of the position of the mental foramen in various surgical procedures like fracture of body of mandible, nerve lateralization procedure, dental implant, orthognathic surgery etc. helps in preventing damage to neurovascular bundle thus preventing paresthesia of lower lip, gums and lower anterior teeth. The aim of this study was to determine the position of the mental foramen in the Muradnagar-Ghaziabad population using digital panoramic radiographs in order to keep a record of the variations of the morphologic features of the mental foramen in anethnic population of Muradnagar.

Materials and Method: A total of 1000 digital orthopantomogram of 635 male and 365 female patients within the age group of 15 to 55years were collected and the position of mental foramen along the vertical and horizontal axis was analyzed.

Results: The most common position of mental foramen was found to be in line with second premolar tooth (51%), in the horizontal axis and along the vertical axis, it was inferior to the apex of second premolar (68.1%).

Conclusion: This Study supports the earlier literature regarding the position of mental foramen among north Indian population and suggests that variations are present between populations of different geographical areas.

Keywords: Mental foramen, Orthopantomogram, Muradnagar-Ghaziabad Population.

Introduction

Mental foramen is a small round/oval structure present in the body of the mandible and is commonly seen apical to the second mandibular premolar or between the apices of the premolars. It opens in a posterior direction and the mental nerve and vessels supplying sensation to the lower lip and the labial mucosa traverses via the mental foramen.^(1,2) Studying the position and morphological variations of mental foramen is very important because it is a critical and distinctive landmark for localizing the neurovascular bundle passing through it, in order to perform meticulous osteotomies and dental implant placement without causing any neurosensory dysfunction. The most common position of the mental foramen is in line

with the longitudinal axis of the second premolar tooth followed by the location between the first and second premolar tooth.⁽³⁾ In literature, the position of mental foramen is stated to vary with different races and populations, so the present study was undertaken, to determine the position of mental foramen among the population of Muradnagar city of Ghaziabad.

Materials and Method

Total of 1000 digital panoramic radiographs of 635 male and 365 female patients within the age group of 15-55 years who were advised for radiographs for various purposes were studied and the position of mental foramen was determined on the radiographs.

The radiographs were chosen according to the following criteria given in Table 1:

Table 1: Inclusion and Exclusion Criteria

Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none"> Orthopantomogram in which all mandibular teeth were present upto first molars. OPGs showing all erupted teeth. The films which did not have any radiolucent or radiopaque lesion in the lower jaw and presented no radiographic artifacts. 	<ul style="list-style-type: none"> OPGs in which the lower teeth (between 36 and 46) were missing, presence of an endodontic lesion, root canal treatment or any restorations were left out because of possible associated periapical changes. Radiographs with missing lower canine were excluded. Orthopantomogram of degraded quality with superimposition of structures.

The position (Vertical and Horizontal axis) of the mental foramen was recorded as follows: (Table 2)⁽⁴⁾

Horizontal Axis (H)

H-1: Position depicting the foramen anterior to the first premolar.

H-2: Position depicting the foramen along the line with the first premolar.

H-3: Position depicting the foramen between the premolars.

H-4: Position depicting the foramen along the line with the second premolar.

H-5: Position depicting the foramen between the second premolar and molar.

Vertical Axis (V)

V-1: Position depicting the foramen inferior to the apex of the first premolar.

V-2: Position depicting the foramen inferior to the apex of the second premolar.

V-3: Position depicting the foramen at the level of the apex of the first premolar.

V-4: Position depicting the foramen at the level of the apex of the second premolar.

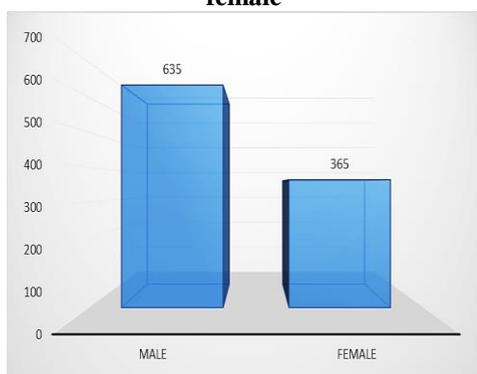
V-5: Position depicting the foramen lying superior to the apex of the first premolar.

V-6: Position depicting the foramen lying superior to the apex of the second premolar

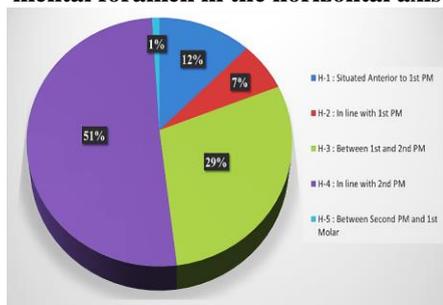
Results

A total of 1000 OPGs were assessed, therefore radiologically 2000 mental foramen were assessed, 1000 on each side i.e., left and right. Mean age for males was 38.73 years and that for females were 34.43. The results are depicted in Graphs 1-3.

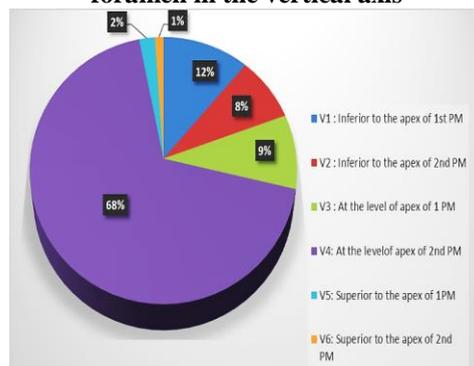
Graph 1: Depicts the total number of male and female



Graph 2: Depicts percentage of the position of the mental foramen in the horizontal axis



Graph 3: Depicts percentage of position of mental foramen in the vertical axis



Discussion

Mandible being the largest and strongest bone of facial region has evolved in morphology in homosapiens from primates through ages. The changes in size and shape of jaws have been studied immensely. The mandible shows extensive variation in its size, weight and location of bony structures during an individual's lifetime. Morphological variations are also seen in mandible among different gender, ethnicities, and races. Out of all the components of the mandible, the identification of mental foramen holds a distinct primacy as an important landmark in numerous maxillofacial surgical procedures.⁽⁵⁾ Mental foramen represents the terminal part of the mandibular canal and the mental nerve and vascular structures pass through it, supplying sensory innervation to the mucosa of lower lip, a vestibular region on the buccal aspect of lower jaw, and the gingival portion of lower jaw, of anterior region.^(6,7) Placement of mandibular endosseous implants, pose a problem in the area of neurovascular bundles leading to certain complications, such as altered sensation, numbness and pain, often due to damage to structures, such as inferior alveolar nerve (IAN) and mental foramen. The damage of related vascular structures can lead to hemorrhage, which can be difficult to control. Damage to these structures is mostly arising from iatrogenic mistakes and sometimes due to failure in identification structures. Identification of mental foramen is also of utmost importance while administering regional anesthesia, performing genioplasties, placing cuts for orthognathic procedures, while performing corticotomies in nerve lateralization and apicotectomy. Therefore, it is critical to determine the location and as well as the morphological configuration of the IAN canal and foramen, in order to minimize the damages.

In the present study, the most common position of mental foramen was found to be in line with second premolar tooth (51%) on the horizontal axis and in the vertical axis, it was found to be inferior to the apex of the second premolar (68.1%). (Table 3)

Table 2: Comparison of position of mental foramen in Horizontal axis with other studies

Authors	Most common Location of Mental foramen in Horizontal Axis
Fishel et al ⁽⁸⁾ (1976)	Was found to be present between two premolars.
Afkhami et al ⁽⁹⁾ (2013)	24% of the cases had foramen located between the premolars.
Gada and Nagda et al ⁽¹⁰⁾ (2014)	63% of the patients had foramen located between the two premolars followed by a position behind the second premolar (20.67%).
Moogala et al ⁽¹¹⁾ (2014)	40–50% of cases had foramen between premolars
Babshet et al ⁽¹²⁾ (2015)	43% in between the two premolars and 39% along the vertical line with the second premolar.
Present Study	Showed that most of the OPGs had foramen in line with Second Premolar

Table 3: Comparison of position of mental foramen in vertical axis with other studies

Authors	Location of Mental foramen in Vertical Axis	% of most common Location of Mental foramen
Wang et al ⁽¹³⁾ (1986)	Present below the apex of 2 nd premolar	58.98%
Santini & Land et al ⁽¹⁴⁾ (1990)	Present below the apex of 2 nd premolar	52.90%
Olasoji et al ⁽¹⁵⁾ (2004)	Present between 1 st and 2 nd premolar	Most common
Apinhasmit et al ⁽¹⁶⁾ (2006)	Present below the apex of 1 st premolar	Most common
Sumit Gupta et al ⁽¹⁸⁾ (2012)	Present below the apex of 2 nd premolar	75.8%
Present study	Present inferior to the apex of the 2 nd premolar.	68.1%

Conclusion

The location of mental foramen, most commonly found in Muradnagar population, was in line with second premolar tooth, along the horizontal axis and in the vertical axis, it was found to be inferior to the apex of the second premolar. The shape of the mental foramen was circular in most of the OPG's and the foramina were observed to be bilaterally symmetrical. Our findings are congruous with earlier data reviewed in literature in different populations among different varied geographic locations. It is discernible from the previous vast literary works, that the location of the mental foramen is indeed differed among different races. Accordingly, our study may add the valuable data regarding mental foramen position among different races and can provide handy inputs to the maxillofacial surgeons and dental practitioners to identify and locate it so as to accomplish uneventful surgical procedures.

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Comparison of metal release from fixed orthodontic appliances in oral mucosa cells in patients with and without fixed orthodontic appliances- An in vivo study

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Abstract

Introduction: A large variety of metallic alloys are routinely used in dentistry. Orthodontic appliances are made of stainless steel containing Nickel and Chromium. Nickel is added to maintain the steels face - centered cubic structure, and is created when heated at 9120°C or higher. Nickel also increases the strength, ductility, and resistance to general, crevice and erosion corrosion. This study aims to compare the release of Nickel and Cobalt in the oral mucosa cells of patients with and without fixed orthodontic appliance.

Materials and Method: A total of 60 subjects were selected. Test group comprised of 30 Orthodontic patients who had fixed orthodontic appliances in both arches. Control group included 30 subjects without any type of fixed orthodontic appliances or metal restorations in the mouth. The oral mucosal cell sample was collected and the metal content was determined using Atomic Absorption Spectrophotometry.

Results: The Nickel content in mucosa samples of test group was significantly higher than that in the control group. The content of Cobalt in the buccal mucosa cells of the test group was significantly higher in the test groups compared to the control group. There was no significant increase in the content of the Chromium in the buccal mucosa cells of the test group.

Conclusion: To conclude, it was seen that there is significant increase in the concentration of nickel and cobalt in the buccal mucosa in both the groups, but there was no significant change in the chromium concentration between the groups.

Keywords: Orthodontic Appliances, Nickel, Cobalt, Chromium, Concentration, Buccal Mucosa.

Introduction

A large variety of metallic alloys are routinely used in dentistry. Gold was used in orthodontics for fabrication of the accessories until the 1930s and 40s. In 1929, stainless steel was used for the first time to replace gold. Orthodontic bands, brackets and wires are universally made up of austenitic stainless steel (302 or 304) containing approximately 8-12% Nickel and 17-22% Chromium. These elements give stainless steel its strength ductility and corrosion resistance. Nickel-Titanium alloys were introduced for use as orthodontic wires in the 1970s and these alloys introduced another potential source of metallic corrosion products that could result in patient exposure. Nickel is added to maintain the steels face - centered cubic structure, and is created when heated at 9120°C or higher. Nickel also increases the strength, ductility, and resistance to general, crevice and erosion corrosion.

There is little information regarding the corrosion of orthodontic appliances in the oral cavity during treatment. Discoloration of underlying tooth surface during orthodontic treatment has been regarded as the consequence of crevice corrosion of the bracket bases.

It has been observed that the warm and moist condition in the mouth offers an ideal environment for the biodegradation of metals, consequently facilitating the release of metals ions that can cause adverse effects. Biocompatibility is strongly related to ionic release and therefore the public may express concern about possible leakage of metal ions from an orthodontic appliance.

The major corrosion products are iron, Chromium, and Nickel for stainless steel, and Ti and Ni for Nickel-Titanium alloys. Among stainless steel and Nickel-Titanium corrosion products Nickel and Chromium have received the most attention because of their reported adverse effects. Nickel is a known allergen⁽¹⁾ with carcinogenic⁽²⁾ and mutagenic effects.⁽³⁾

However, the cause and effect relationship between intra-oral use of Nickel alloys and carcinogenicity has never been demonstrated.⁽⁴⁾ Nickel is a component of certain enzyme systems in humans and it is considered an essential trace element. Daily intake of Nickel is estimated to be 100-600 µgm/day.⁽⁵⁾

Nickel is one of the most common causes of allergic contact dermatitis, and the incidence of such contact dermatitis is as high as approximately 20-30%.⁽⁶⁾ Adverse reactions related to Nickel containing orthodontic devices such as arch wires, brackets, and soldered stainless steel face-bows have been reported.⁽⁷⁾ Surprisingly Nickel sensitivity has been reported to be lower in subjects who have received orthodontic treatment. It seems that treatment with Nickel-containing metallic orthodontic appliances before sensitization to Nickel (ear piercing) may have reduced the frequency of Nickel hypersensitivity⁽⁸⁾ and patients developed immunologic tolerance over a long period of treatment.⁽⁹⁾ Allergic response to Nickel-containing alloys is mainly type IV hypersensitivity reaction, cell mediated by T-lymphocytes.⁽¹⁰⁾ It has been suggested that long-term exposure to Nickel- containing dental

materials may adversely affect both human monocytes and oral mucosal cells.⁽¹¹⁾

As mentioned earlier Nickel is ingested with the intake of foods in the range of 300 to 600 µgm per day. Approximately 10% of the general population exhibits hypersensitivity reactions to Nickel. Peltonen reported that women were 10 times more sensitive to Nickel than men. In 1977, Moffa et al. did a study to determine the intraoral response to Nickel-based alloy by patients known to be allergic to Nickel. All of the sensitized patients reacted positively to Nickel sulfate, and eight showed a positive extra oral response to Nickel alloy. However, after intraoral exposure, only one of the Nickel-sensitized patients showed evidence of allergy to Nickel alloy. Perhaps differences between the skin and the oral cavity may account for the lack of reported mucosal reactions to Nickel. The rapid and complete formation of salivary glycoprotein films may act as diffusion barriers.

The readiness with which Nickel may induce carcinogenicity depends on its solubility in the form in which it involves the tissue. Nickel carbonyl, Nickel subsulfide, and Nickel sulfide have been shown to produce carcinogenesis. As yet, no one has detected or reported a relationship between carcinogenicity in humans and the wearing of Nickel-chrome dental restorations. Nickel accumulates in the skin, central nervous system, lungs, and kidneys.

Chromium in the form of chromate salts in concentration of 885 ppm were sufficient to cause positive patch tests in patients. Chromium powder and hexavalent Chromium compound have produced local sarcomas in rodents.⁽¹²⁾

This study aims to compare the release of Nickel and Cobalt in the oral mucosa cells of patients with and without fixed orthodontic patients.

Materials and Method

Subjects were selected from the patients of Department of Orthodontics, at our institution. A total sample of 60 were selected. Test group comprised of 30 Orthodontic patients who had fixed orthodontic appliances in both arches. Control group included 30 subjects without any type of fixed orthodontic appliances or metal restorations in the mouth.

The exclusion criteria in both groups were:

1. Smoking
2. Pre-existing systemic diseases or medications
3. Associated with oral mucosa changes
4. Intra-oral piercing or metal restorations

The objectives of the study was fully explained and informed consent was obtained.

In total, 20 females and 10 males, from 16-20yrs (mean age 18.2year) agreed to participate in the test group. For the patients in the test group, average period since appliance insertion was 16 months in both the upper and the lower arches at the time of sample collection. Patients wearing different fixed orthodontic appliances

were chosen randomly from the department of orthodontics, at our institution. 20 females and 10 males aged 16-20 years formed the control group.

Sample collection: The participants were asked to rinse their mouth for one minute to remove the exfoliated dead cells. Mucosa samples were collected by gentle brushing of the internal part of right and left buccal mucosa with interdental brush (Fig. 1).



Fig. 1: Sample collection with Interdental brush

The brushes were transferred to polypropylene tubes and stirred in 5 ml of phosphate buffer saline solution (Fig. 2).



Fig. 2: Polypropylene tubes with 5 ml of phosphate buffer saline solution

Metal content determination: Mucosa samples were diluted in water and acidified in nitric acid, kept at 600°C for 10 minutes to dissolve the metal content before analysis. The concentration of Nickel, Chromium and Cobalt ions was quantified using atomic absorption spectrophotometry. (Perkin Elmes Analyst 300 AAS with a graphite furnace). Results were given as ng/ml (Fig. 3).

All metal content determinations were performed at the Indian Institute of Chemical Technology, (Council of Scientific and Industrial Research) Hyderabad, India.



Fig. 3: Atomic absorption spectrophotometry Unit

Statistical analysis: The Student's t-test was applied to assess differences in Nickel, Chromium, and Cobalt mucosa cell contents between orthodontic patients (test group) and the control group. All analyses were carried out using SPSS 12 (Statistical Package for Social sciences: SPSS Inc. Gulbarga, INDIA). Statistical significance was determined at the 0.05 level throughout.

Results

The Nickel content in the buccal mucosa cells was given as mean and standard deviations and are shown in Table 1.

Table 1: Nickel content in the buccal mucosa cells (ng/ml)

Orthodontic treatment	Mean \pm SD	t – value	p – value
With braces	9.51 \pm 10.82	4.19	p <0.001
Without braces	1.21 \pm 0.86		Highly significant

The mean levels of Nickel in control and test group were 1.21 \pm 0.86 and 9.51 \pm 10.82, respectively.

Examining the content of Nickel in the buccal mucosa cells of orthodontic patient (test group) and controls group the Nickel content in mucosa samples of test group was significantly higher (P<0.001) than that in the controls (Table 1).

When compared the content of Cobalt in the buccal mucosa cells of the test group (Table 2) there was a significant increase in the test groups compared to the control group 1.91 \pm 3.06 and 0.5 \pm 1.13 respectively.

Table 2: Cobalt content in the buccal mucosa cells (ng/ml)

Orthodontic treatment	Mean \pm SD	t – value	p – value
With braces	1.91 \pm 3.06	2.25	p <0.05
Without braces	0.57 \pm 1.13		Significant

There was no significant increase in the content of the Chromium in the buccal mucosa cells of the test group (Table 3). The mean levels in the control group were 0.64 \pm 1.07 whereas in the test group 0.26 \pm 0.33, respectively.

Table 3: Chromium content in the buccal mucosa cells (ng/ml)

Orthodontic treatment	Mean \pm SD	t – value	p – value
With braces	0.64 \pm 1.07	1.86	p <0.05
Without braces	0.26 \pm 0.33		Not significant

Discussion

The present study investigated the presence of metal ions in oral mucosa cells in orthodontic patients wearing fixed appliances. Orthodontic appliances are mostly made of stainless steel and Nickel—Titanium alloys. The orthodontic alloy constituents are mostly iron, cobalt, chromium, and nickel. Because the corrosion products from orthodontic appliances can be harmful to the surrounding structure or body, we decided to evaluate the buccal mucosa cell content of three main possibly harmful constituents of orthodontic fixed appliances. Variety of factors can affect the amount of metal released from orthodontic appliances including the corrosion resistance of the material, the brazing or welding effects on the metal, galvanic corrosion of dissimilar metals, the surface of the appliance.

Oral cavity provides an environment that makes aqueous corrosion in metals and alloys more favorable. Saliva as an electrolyte and medium for chemical reactions between metals can cause corrosion. The organic acids and enzymes that microbes produce or the bacteria existing within the mouth can also cause corrosion. The present study used atomic absorption spectrophotometry with a graphite furnace for analysis of metal content in oral tissues. This is a common method used for trace element analysis in the literature.⁽¹³⁾

Metal corrosion may be altered by the use of passivating alloys elements or by coating with another metal. Passivation of steel is obtained by adding 20% Chromium, which forms a surface layer of Chromium oxide.⁽¹⁴⁾

In our study, the Nickel content in buccal mucosa cells of orthodontic patients (test group) was found to be significantly higher than in controls. This in vivo observation is in line with previous study by Amini et al.⁽¹⁵⁾ in which the presence of Nickel has been shown in oral mucosa cells of orthodontic patients. Contrary to the work of Amini et al.⁽¹⁵⁾ we did not find a significant difference in Chromium cell contents in patients with orthodontic appliances compared with their non-appliance controls. In the groups the amount of metal leached was seen to be more in females than in males. The failure to reach statistical significance was

probably due to the wide variation in metal contents and larger number may be required to demonstrate significant difference. Nickel is known allergen. In the study of Finnish adolescents, the prevalence of Nickel allergy was found to be 30% in girls and 3% in boys. This was thought to be related to sensitization to Nickel by ear piercing as the prevalence in adolescents with ear piercing was 31% and only 2% otherwise.

Nickel is very important as it resists corrosion even at high temperature. Nickel compounds are ubiquitous and are consumed as part of a normal diet from foods such as vegetables, with the daily intake estimated to be 100-600 µg/day. Nickel is component of certain enzyme system is in humans and is considered as essential trace element. Nickel is a known hapten, which can bind to proteins and form complete antigens. However, Nickel has to be released from the alloys to be able to act as a hapten.⁽¹⁴⁾

Allergic responses are mediated through the immune system. In a sensitized individual, allergic responses can be entailed by relatively small amounts of the allergen, for example, if Nickel ions are released from a Nickel – plated material following direct and prolonged contact with the skin.

The majority of dental allergies including allergic responses to Nickel containing dental alloys, comprise type IV hypersensitivity reactions, cell mediated by T-lymphocytes.

These toxic reactions are dose dependent. The effects primarily depend on the nature of leachants from the material. Some toxic effects may be initiated by a onetime large dose above threshold or by repeated small doses, provided that the doses are cumulative to above threshold levels. It is not known if this is true for induction or elicitation of Nickel sensitization. Although the dose effect is in disputable toxic reactions, it is important to note that the thresholds for reactions vary from endpoint to endpoint and to some extent from individual to individual. Recent publications have suggested that ‘long-term’ exposure to Nickel - containing dental materials may adversely affect both human monocytes and oral mucosal cells.⁽¹⁶⁾

Data on the prevalence of allergic reactions and positive test results e.g., from skin testing for metal salts are available. The possible causes of oral tissue reactions alleged by related to dental alloys are bacterial adhesion, toxicity, sub toxic effects and allergy.⁽¹⁷⁾

Nickel is released primarily as a soluble compound, while Chromium is released primarily in an insoluble form with corrosion of the simulated orthodontic appliance.⁽¹⁸⁾

The general mechanism for the corrosion and subsequent release of metal ions from stainless steel involves the loss of the passivated layer consisting of Chromium oxides and Chromium hydroxide which forms on the surface of stainless steel upon contact with oxygen. A number of factors facilitate the corrosion of stainless steel. Crevice corrosion is an intensive local attack which occurs in shielded areas on a metallic

surface. Stainless steel is especially susceptible to this form of corrosion and has been implicated as the mechanism involves in the orthodontic brackets.

Halide ions, especially chloride causes pitting corrosion. Mechanical distortion and excessive cold working promote corrosion by making the distorted portion of the wire or band more anodic. The alloy then behaves electrochemically as if two alloys were present.

The presence of dissimilar metals or alloys such as silver solder amalgams, or gold may lead to galvanic corrosion. Heating between 400^o and 900^o C makes stainless steel more susceptible to intergranular corrosion because of loss of Chromium carbide at the grain boundaries.

In the oral cavity such factors as temperature quantity and quality of saliva, plaque pH, protein, physical and chemical properties of food and liquids and general and oral health may influence corrosion by a combination of the mechanism discussed above.

The amount of daily intake of metals from orthodontic appliances over time is a matter of great importance. Metal is released into the oral cavity with saliva as the medium, and this release could be influenced by a high chloride mixture in the saliva or the intake of various organic substances or foods with low pH such as fruit juices and soft drinks. The physical characteristics of saliva are changed according to food intake, health and time of the day. The most important factors in corrosion is the flow rate of saliva.⁽¹⁹⁾ The release of Nickel was seen more due to galvanic corrosion between the brackets and the bands rather than to corrosion of the NiTi arch wire itself, Nickel was released because of the difference in electromotive force (driving force).⁽⁵⁾

Characteristic lesions of contact stomatitis vary from barely visible, mild erythema to a fiery red color with or without edema, symptoms may include loss of taste, numbness, burning sensation and soreness of the involved area, often accompanied by angular cheilitis. Itching is not a frequent symptom. Although it is more difficult to provoke contact stomatitis than contact dermatitis, severe gingivitis associated with orthodontic therapy may be manifestation not only of poor oral hygiene but also of a contact hypersensitivity reaction to Nickel and/or Chromium ions released during the corrosion of stainless steel.⁽²⁰⁾

Nickel can be taken up into cells by diffusion via the Mg⁺² transport system,⁽²¹⁾ or via the calcium and iron channels.⁽²²⁾ The most effective way of Nickel uptake into cells is by phagocytosis of metallic Nickel or Nickel compound dust which has been seen in cultured cells, the efficiency of which depends on the size and surface charge of the Nickel particles.⁽¹⁾ Of the two environmentally available forms of Chromium, hexavalent and trivalent, the hexavalent form has been demonstrated to be associated with the toxic parameters and classified as human, carcinogen and mutagen. Several studies have shown that the cellular uptake of chromate is several fold greater than that of the trivalent

ion, because trivalent Chromium is predominantly octahedral and diffuses slowly. The tetrahedral hexavalent ion has been shown to enter the cell through general anion channels and bind to cellular components, causing disruptions in biochemical pathways.

Reductive metabolism of Chromium within the cell by the cell's redox system leads to the formation of various intermediate forms, Cr (V), Cr (IV), and Cr (III).⁽²³⁾ While there is overwhelming evidence to show that Cr (VI) complexes are mutagenic in bacterial and mammalian cells, most of the Cr (III) complexes are shown to be non-mutagenic. Entry of Cr (III) into cells has also been shown to be diffusion controlled and macrophage mediated, Chromium has been recognized as an essential trace element.⁽²⁴⁾ Interpretation of the metal content of buccal mucosa cells is hampered by inherent limitations of the atomic absorption spectrophotometry to differentiate between oxidation levels of the metal contents. However, the valence of a metal affects its biologic activity, e.g., being mutagenic, hexavalent Cr crossed the cell membrane in contrast to trivalent Cr during in vitro studies. There have been many studies on the amount of metal released from orthodontic appliances under various physical and chemical conditions.⁽²⁰⁾ These studies demonstrated that these metals were released and absorbed by patients during the early stages of orthodontic therapy. They concluded that Nickel ions, released from orthodontic appliances in saliva or blood samples was significantly below the average dietary intake and did not reach toxic concentration. However, a review of the literature reveals that prolonged in vitro exposure to low levels of Nickel ions can alter cellular metabolic activity. Furthermore studies taking oral mucosal cell brushings in orthodontic patients compared with control subjects concluded that Nickel release from fixed orthodontic appliances could induce DNA damage in oral mucosal cells.⁽²²⁾

Therefore, to ensure the safety of patients, further research and continued follow up would be needed to determine the long term significance of Nickel release and other corrosion products.

Conclusion

According to the result attained from this study, it has been shown that there is significant increase in the concentration of nickel and cobalt in the buccal mucosa cells of the patients of test group compared to the control group. Although this change was significant clinically for cobalt and nickel, it was seen that this increase in their levels is quite low to cause any carcinogenic or mutagenic effect.

Currently, there is a lack of data linking directly the prevalence of nickel induced side effects in non-sensitized individuals with the insertion of orthodontic materials. It has not been established what is the threshold amount of nickel necessary to elicit skin or oral mucosal reactions. However, further research should be conducted on the tolerance to these metals

and the recurrence of metal allergies after continuous contact with the oral mucosa cells. More studies are required concerning the amount of metal leached during orthodontic treatment in buccal mucosa cells and their cytotoxic effects.

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Comparative evaluation of pain in vestibular depth extension procedure using scalpel, electrocautery and diode laser

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Abstract

The oral rehabilitation of patients after loss of teeth has made much progress in recent times. Whenever there is an inadequate vestibular depth present to maintain oral hygiene and to increase the retention and stability of the denture, deepening of the vestibule is considered. The vestibular depth depends on various factors such as age, physical status, amount and consistency of mucous membrane, amount of alveolar and basal bone, position and tension of adjacent muscles, presence of bony projections and ridges and neurovascular foramina. One of the main objectives of periodontal therapy is to achieve an area which permits an optimal level of oral hygiene. A shallow labial vestibule hampers the proper placement of a tooth brush. As a result, a decreased depth of the vestibule is often associated with plaque accumulation and consequently marginal gingival inflammation. Vestibuloplasty is the surgical procedure whereby the oral vestibule is deepened by changing the soft tissue attachments. The most common procedures in vestibuloplasty are submucosal vestibuloplasty, secondary epithelial vestibuloplasty, soft tissue graft vestibuloplasty and Edlanplasty. Although vestibular depth extension procedure remains relatively painless under local anesthesia on the first day of surgery, there is a subtle increase in pain on the second day relative to the first. The present study was conducted to measure and compare pain by 3 different scales i.e., visual analogue scale, numerical rating scale, faces rating scale in vestibular extension procedure done by scalpel, laser and electrocautery. The pain was measured at baseline, 1 day post-operative, 1 week post-operative. Data thus collected was put to statistical analysis.

Keywords: Vestibule, Laser, Pain, Scale, Depth, Electrocautery, Scalpel.

Introduction

The oral rehabilitation of patients after loss of teeth has made much progress in recent times. Whenever there is an inadequate vestibular depth present to maintain oral hygiene and to increase the retention and stability of the denture, deepening of the vestibule is considered.⁽¹⁾ The vestibular depth depends on various factors such as age, physical status, amount and consistency of mucous membrane, amount of alveolar and basal bone, position and tension of adjacent muscles, presence of bony projections and ridges and neurovascular foramina.⁽²⁾ One of the main objectives of periodontal therapy is to achieve an area which permits an optimal level of oral hygiene. A shallow labial vestibule hampers the proper placement of a tooth brush. As a result, a decreased depth of the vestibule is often associated with plaque accumulation and consequently marginal gingival inflammation. Vestibuloplasty is the surgical procedure whereby the oral vestibule is deepened by changing the soft tissue attachments.⁽¹⁾

Friedman introduced mucogingival surgeries to describe the surgical procedure to correct the relationship between the gingiva and oral mucous membrane with reference to three areas: attached gingiva, shallow vestibule and frenum interfering with

marginal gingiva.⁽¹⁾ The Schluger “pouch” and the Fox “push back” procedures, were formally introduced into the literature and renamed the “local extension of the vestibular trough” and the “gingival extension operation” respectively. Both procedures introduced bone exposure as an aspect of Periodontics and became basic to subsequent developments in mucogingival surgery.⁽²⁾

Many of the procedures described since 1956 have been refinements of previous techniques, designed to avoid the postoperative pain which results when extensive areas of exposed bone are covered only with a periodontal dressing. These refinements endeavored to retain or create a protective cover of mucosa or periosteum for bone which had been exposed for recontouring. One such modification by Ariaudo and Tyrrell combined Naber’s repositioned flap with a minimal post-operative exposure of bone. The conventional procedure of deepening the vestibule and placing coe pack for prevention of epithelial re-attachment is a successful procedure and literature shows that it is an excellent procedure for gaining the width of attached gingiva.⁽¹⁾

Although vestibular depth extension procedure remains relatively painless under local anesthesia on the first day of surgery, there is a subtle increase in pain on

the second day relative to the first. Pain is referred to as the fifth vital sign and is an important reason for which patients seek health care. Scales to assess pain have been extensively studied.⁽²⁾ Pain can be measured by self-report, biological markers, and behaviour because pain is subjective; self-report is the best if available. It will be useful to know which pain assessment scale is more appropriate to evaluate how the health care professionals perceive the pain in patients undergoing surgical procedure.⁽²⁾

Aim & Objectives

The aim of this study was to measure and compare pain by 3 different scales i.e., visual analogue scale, numerical rating scale, faces rating scale in vestibular extension procedure done by scalpel, laser and electrocautery.

Materials & Method

Patient Selection: 15 subjects (both males and females), in good general health and attending for routine care only, were selected from the outpatient Department of Periodontology and Oral Implantology, National Dental College and Hospital, Derabassi (Punjab).

Inclusion Criteria

- Subjects with shallow vestibular depth.
- Absence of systemic or acute periodontal alterations.
- Subjects should not have undergone any periodontal treatment within 6 months prior to study.
- No antibiotic therapy in the previous 3 months.
- Co-operative subjects showing acceptable oral hygiene.

Exclusion Criteria

- Subjects having any history of chronic systemic disease including diabetes mellitus.
- Subjects on any antimicrobial drug in the previous 3 months.
- Subjects having aggressive periodontitis, periodontal abscess or necrotizing ulcerative gingivitis.

Subject Groups: The subjects so selected were categorized into two groups:

- Group A- 5 patients underwent vestibular depth extension procedure by scalpel.
- Group B- 5 patients underwent vestibular depth extension procedure by laser.
- Group C- 5 patients underwent vestibular depth extension procedure by electrocautery.

Clinical Parameters: The following clinical parameters were evaluated:

Pain measurements by:

- Visual Analogue Scale (VAS).
- Numerical Rating Scale (NRS).
- Faces Rating Scale (FRS).

Study Method: Fifteen patients were selected from Department of Periodontology in National Dental College, Hospital who reported for oral prophylaxis or missing teeth. On examination it was found that the vestibular depth in the anterior region was inadequate. Hence, vestibular deepening was planned. Local anesthesia was first administered bilaterally by using a mandibular nerve block. Incision was made with scalpel, laser and electrocautery.

Scalpel: A horizontal incision was made using a no 15 scalpel blade in 5 patients at the mucogingival junction retaining all the attached gingiva. A split thickness flap was reflected sharply, dissecting muscle fibres and tissue from periosteum. This was then sutured in the depth of vestibule using 3-0 silk sutures. A dressing (Coe-Pack) was then placed over the wound.

Laser: A diode laser of 940 nm (Biolase) at 3.0W power output was used in a pulsed mode.⁽²⁾ A surgical tip of 400 µm was used. The tip was first initiated as per manufacturer's instructions. The cutting of tissue was carried out in a contact mode using paint - brush - like - strokes. The incision was made at the mucogingival junction and the muscle and alveolar mucosal fibres were severed from the periosteum. The wound was then irrigated with saline. No sutures were given. A dressing was placed over the wound.

Electrocautery: An electrocautery in a light brushing stroke was used and the tip was kept moving all the time. Prolonged application of electrode to the tissues was avoided to prevent heat accumulation which could induce undesirable tissue damage. The wound was then irrigated with saline. No sutures were given. A dressing was placed over the wound.

Patients filled out a questionnaire about pain and discomfort, and were asked to score the pain based on visual analogue scale, numeric pain score scale and faces rating scale immediately after and at 1 day & 1 week after surgery.

Statistical Analysis: Mann Whitney U Test and Wilcoxon signed rank test was applied using SPSS 16 software.

Results

A total of 15 subjects were enrolled in the study. Comparison of the mean VAS, FRS and NRS scores of the levels of pain in all the 3 groups were observed at the baseline, 1st day and 1st week of the study as summarized in Table 1.

Table I: Intergroup comparison of VAS, NRS and FRS pain score

Group Parameters	Scalpel	Laser	Electrocautery	p-value
VAS (BASELINE)	7.40 ±1.1	5.40±2.6	5.40±2.1	>0.05
VAS (1 DAY)	5.00 ±1.2	5.00±1.5	4.00±2.0	>0.05
VAS (1 WEEK)	1.40 ±0.8	1.40±1.5	0.80±0.4	>0.05
NRS (BASELINE)	7.20±1.3	5.00±2.4	4.80±1.3	>0.05
NRS (1 DAY)	4.60±1.1	4.80±1.9	3.60±1.6	>0.05
NRS (1 WEEK)	0.80±0.8	0.80±0.8	1.00±0.7	>0.05
FRS (BASELINE)	7.20±1.0	5.00±2.4	4.40±1.8	>0.05
FRS (1 DAY)	4.40±1.8	4.40±1.6	3.60±2.3	>0.05
FRS (1 WEEK)	0.40±0.5	1.20±0.8	0.60±0.5	>0.05

Analysis between the groups showed a significant difference in VAS, NRS and FRS score when compared with baseline and 1 week in all the groups. There was also asignificant difference in electrocautery and scalpel seen at baseline in NRS and FRS. Significant difference in VAS, NRS and FRS was observed when compared with baseline and one day in scalpel group.

Discussion

Lack of an adequate residual alveolar ridge and basal seat severely compromises the success of prosthodontic treatment. It has been suggested that expansion of the denture-bearing area by means of vestibuloplasty would reduce denture load per square unit of supporting bone and thus reduce the bone resorption caused by transfer of occlusal forces.⁽³⁾ Patients who undergo vestibular depth extension procedures using a scalpel often experience postsurgical pain and discomfort, which is further aggravated when sutures come in contact with food.⁽³⁾ One feasible alternative that is considered iselectrocautery and laser, as it offers various advantages, that is, relatively bloodless surgery, sterilization of wound, no suturing required in most cases, less surgical time, no periodontal dressing required, less postsurgical pain and discomfort and increased patient acceptance.⁽⁴⁾

Diode lasers are solid state semiconductor lasers. The diode laser exhibits thermal effects using the “hot-tip” effect, caused by heat accumulation at the end of the fiber, which results in coagulation at the treated surface. Lasers such as Nd: YAG, Co₂, and erbium: YAG have been used for surgical procedures. Diode laser is considered as an excellent soft tissue laser as it doesn't interact with dental hard tissues.⁽⁵⁾ Haytac and Ozcelik⁽⁶⁾ compared 20 frenectomy procedures performed with Co₂ laser to an equal number performed with conventional scalpel surgery and reported that patients treated with laser experienced less pain after 1st day and 7th day. In this study, it was observed that patients treated with the diode laser experienced less

pain and discomfort when compared with those treated with scalpel. It has also been observed that the reduction in pain and discomfort levels from the 1st to the 3rd and further to the 7th day is much more significant for the laser group. The increased pain perception associated with the scalpel frenectomy might be attributed to the fact that it is a more intrusive surgical procedure involving blood loss, wide surgical wound and suturing. The sutures also contribute to the discomfort postoperatively since they interfere with regular functions such as speech and intake of food.

On the contrary, the decreased pain and discomfort in the laser group might be ascribed to the protein coagulum formed over the wound, which acts like a biological dressing, aids in sealing of the ends of sensory nerves. Absence of any sutures post the laser procedure might have contributed to lesser discomfort levels. In this study, it was observed that patients treated with electrocautery experienced less pain and discomfort when compared with those treated with other techniques. It has also been observed that the reduction in pain and discomfort levels from the baseline to day 1 and further to 1week was significant for all the three groups.

Conclusion

The results presented in this paper support the use of electrocautery in soft tissue procedures like vestibular depth extension; as it provides better patient perception in terms of pain and discomfort than that obtained by the scalpel and laser techniques.

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Management of endodontic-periodontic lesion with regenerative procedure: a split-mouth observational comparative case report

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Abstract

The proper diagnosis and treatment plan of endodontic-periodontic lesions is a clinical challenge. This lesion may have unusual presentation and may be present with absence of carious teeth, which makes it more difficult to diagnose. Though the radiographic investigations show periapical radiolucency, which suggests combined lesions, primary involvement is always difficult to diagnose. The treatment of such lesions is always difficult. Platelet-rich fibrin (PRF) is a concentrate from platelets widely used to accelerate soft and hard tissue healing. In addition, bioactive glass, an alloplastic bone graft, has a specific biological response, resulting in the formation of a bond between the tissues and graft thus facilitating bone healing. The purpose of this article is to present a case which was successfully treated by incorporating these novel grafting materials in regeneration of the intra-bony defects found in association with an endodontic-periodontic lesion.

Keywords: Bioactive glass, Bone graft, Platelet Rich Fibrin (PRF), Endodontic- Periodontic Lesion, Regeneration, Intrabony defects

Introduction

The pulp and the periodontium are in close inter-relationship. They communicate through dentinal tubules, lateral and accessory canals and apical foramen. The apical foramen is the most direct way of communication between pulp and periodontium, so infections from deep periodontal pockets reaching the root apex may affect the pulp or vice versa. However, the pulp won't be affected by inflammation until gingival recession opens the communication between the dentinal tubules, accessory and lateral canals towards the pulp. When one of these two tissues is infected, microorganisms circulate between them and the infection from one tissue may cause pathology of another or exacerbate the current disease.⁽¹⁾

According to Simon et al, endo-perio lesions are classified as:⁽²⁾

- Primary endodontic
- Primary periodontal
- Primary endodontic with secondary periodontal involvement
- Primary periodontic with secondary endodontic involvement
- True combined lesions.⁽²⁾

Depending on the type of lesion, root canal treatment or periodontal therapy or combined therapy is given. Correct choice of treatment technique is the key to successful healing. Proper shaping and three dimensional filling of root canal system are the imperatives. Periapical healing can be achieved with successful root canal therapy, but healing of periodontium is not predictable, it depends on severity and spread of combined lesions.⁽¹⁾

The goal of periodontal therapy is to arrest progression of periodontal disease as well as regeneration of vital tissues lost due to the periodontal disease. Several treatment options have been investigated for the management of infra-bony defects. It includes open flap debridement, bio-modification of the root surface and various regenerative procedures, including guided tissue regeneration and bone grafts. To overcome the healing limitation in the endodontic-periodontic lesion, the principles of tissue engineering have been applied by using a purified growth factor to stimulate the patient's own cells towards a regenerative response.^(3,4,5)

Recently platelet-rich plasma (PRP), a first-generation platelet concentrate has been used widely to accelerate soft tissue and hard tissue healing with promising results.⁽⁶⁾ Additionally, there are potential health related risks associated with the use of PRP.

PRF a second-generation platelet concentrate which was first described by Choukroun *et al*, in 2001 has caught the interest of the various specialties in field of dentistry. Its advantages over Platelet Rich Plasma include ease of preparation or application, minimal expense, and lack of biochemical modification (no bovine thrombin or anticoagulant is required). It is an autologous fibrin matrix containing a large quantity of platelet and leukocyte cytokines. Therefore, the purpose of this case report is to discuss the clinical and radiological outcome of true combined endo-perio lesion with severe bilateral bone loss in maxillary canine after regeneration using PRF.⁽⁷⁾

Case Report

A 42-year-old female outpatient reported to the Department of Periodontics complaining of pain and slight mobility in upper right and left front teeth region since 4-5 months. On intra-oral examination, inflammation of the attached gingiva with periodontal abscess with respect to maxillary right canine, lateral incisor and maxillary left canine, lateral incisor were evident. Clinically, the tooth was normal with no evidence of dental caries or trauma, but it was tender on percussion with severe pain and extrusion of pus from gingival sulcus. The presence of deep periodontal pockets measuring 15 mm (right maxillary) and 10 mm (left maxillary) were respectively found in the canine and the lateral incisors respectively. The teeth were found to be grade I mobile. Vital pulp testing was done using vitalometer to access the tooth vitality, which confirmed that the teeth were non-vital. Intra-oral peri-apical radiographs were taken that showed deep intra-bony pockets on the mesial aspect of the maxillary canines. Based on the clinical and radiographical findings, a diagnosis was made as a primary periodontal with secondary endodontic involvement.

Treatment Objectives and Plan: Treatment planning was done in accordance with the clinical examination and radiological investigations. The patient was in good systemic health with no contradiction to endodontic and periodontal surgical therapy. Endodontic treatment of the teeth was planned first. The endodontic treatment of the infected tooth included root canal opening, biomechanical preparation and obturation of canals with gutta-percha and glass ionomer sealer that was accomplished in three consecutive sittings and simultaneously periodontal therapy was started with

scaling, root planing and oral hygiene instructions. The patient was seen 1 month after the endodontic therapy giving enough time for healing of periapical lesion. Periodontal evaluation showed no significant changes so it was decided to do periodontal regenerative therapy using platelet rich fibrin with bioactive glass bone graft in relation to right maxillary teeth and only bioactive glass bone graft in relation to left maxillary teeth.

Surgical Procedure: Under local anesthesia (2% lidocaine with 1:1,00000 epinephrine), a full-thickness buccal and palatal mucoperiosteal flaps were reflected using intra-crevicular incision using periosteal elevator. After reflection, the defect was thoroughly debrided and examined. This was followed by irrigation with betadine and sterile normal saline jet sprays. After debridement, bioactive glass was placed in the bony defect to the level of the surrounding bone walls in relation to left maxillary canine and lateral incisor (Fig. 1) and with platelet rich fibrin mixed with bioactive glass bolus in relation to right maxillary canine and lateral incisor (Fig. 2). Care was taken not to overfill. The muco-periosteal flap was replaced and primary soft tissue closure of the flap was achieved by means of non-resorbable silk sutures.

Following the surgery, the patient was strictly instructed to avoid chewing on the operated site for the first two post-operative days. She was advised to maintain meticulous oral hygiene. The sutures were removed 7 days after surgery. Recall appointments were scheduled every month for first 3 months and then at 3 months and 6 months. The oral hygiene of the patient was checked and reinforced at every recall appointment.

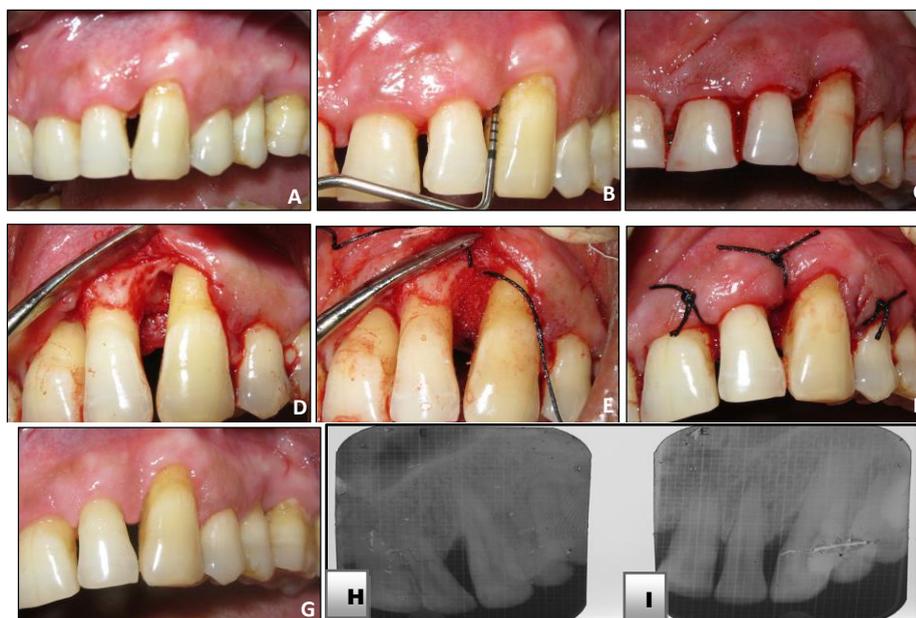


Fig. 1: A: Pre-operative clinical picture B: Probing Depth: 10mm C: Incision D: Reflection and Debridement E: Graft (Bioactive glass) in place F: Sutures taken G: Post-operative clinical picture H: Pre-operative Radiograph I: Post-operative Radiograph

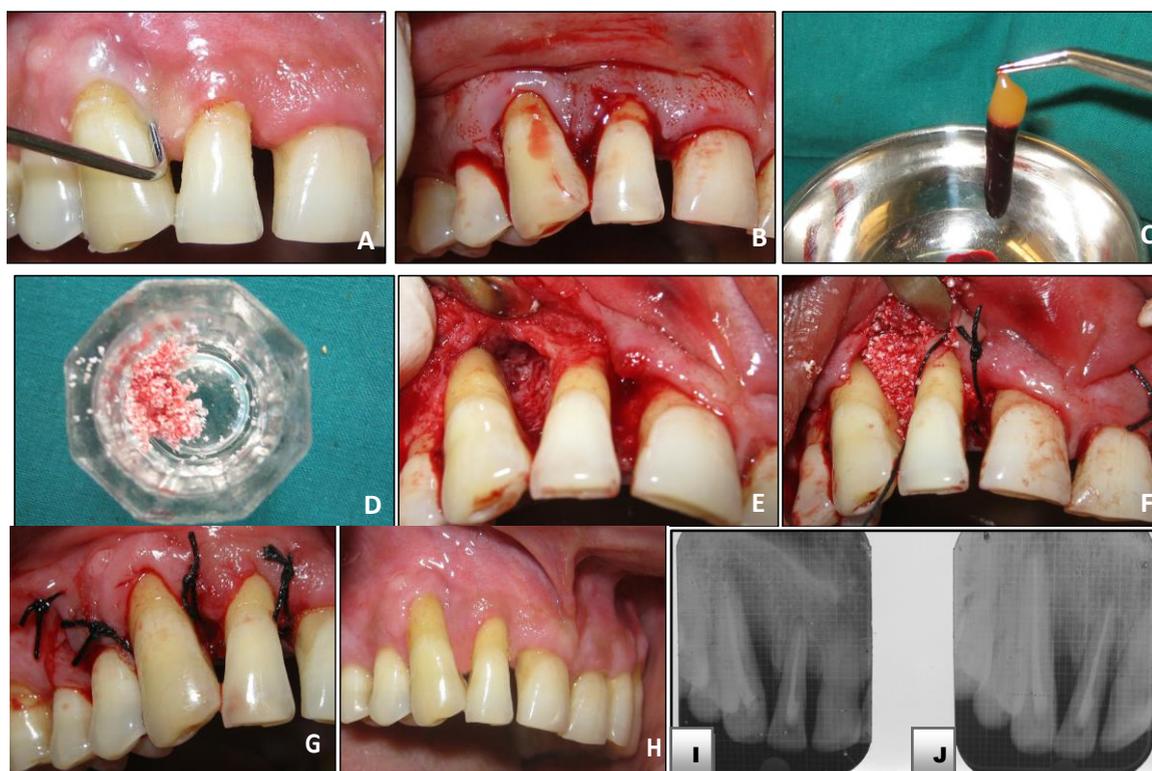


Fig. 2: A: Post-operative clinical picture probing Depth: 15mm B: Incision C: Platelet Rich Fibrin D: PRF mixed with bioactive glass bone graft E: Reflection and Debridement F: Graft (Bioactive glass) in place G: Sutures taken H: Post-operative clinical picture I: Pre-operative Radiograph J: Post-operative Radiograph

Treatment Outcome: Suture removal was done after 1 week of the surgery. Adequate healing was obtained. The patient faced no discomfort. The clinical appearance of periodontium surrounding tooth had improved considerably at the time of evaluation at 3 months and 6 months follow up. The probing depth had decreased considerably and was found reduced to 3 mm (left maxillary canine) and 4mm (right maxillary canine) respectively. Radiographic investigation showed significant bone filled in the defect. At 6 month follow up, considerable bone fill was achieved.

Discussion

Endodontic- periodontic lesions occur due to the communication of pathologic inflammation between the pulpal and periodontal tissues. The treatment of such lesions requires both meticulous root canal therapies along with regenerative periodontal procedure. The role of pulp pathology in etio-pathogenesis of periodontal destruction is not yet clear.

Regenerative procedures have emerged as the gold standard therapy to restore periodontal health and have become an important research topic. Bone regeneration is a multi-factorial process and requires a well-knit sequence of biological events which might include cell adhesion, cell migration, cell multiplication and cell differentiation.⁽⁷⁾ The advent of invention of various

regenerative materials and techniques has interested the researchers in the field of reconstructive surgery.⁽⁸⁾

Numerous studies have shown varying degrees of success of different forms of bone substitutes, guided tissue regeneration and growth factors. Although autogenous bone grafts are being considered as gold standard for grafting procedures; difficulty in procurement and need for an additional surgical site limits their usage.⁽⁹⁾

Bone grafts generally have one or more components of: osteoconductive matrix, which supports the ingrowth of new bone; osteoconductive proteins, which support mitogenesis of undifferentiated cells; osteogenic cells, which are capable of forming new cells. Bioactive glasses are alloplastic materials and act by osteoconduction and osteopromotion. Bioactive bone glass grafting particulate exhibits enhanced new bone formation that is many times faster as compared to hydroxyapatite

Numerous studies have shown that bone regeneration can be improvised by the addition of specific growth factors to the grafting procedure. Platelet rich fibrin was proposed as a method of introduction of various concentrated growth factors like platelet derived growth factor (PDGF), transforming growth factor beta 1 (TGF-B1), and Intrinsic growth factor 1 (IGF-1) to the surgical operative site, thus

enriching the natural blood clot to hasten wound healing and stimulate bone regeneration.⁽⁸⁾

Choukroun et al introduced platelet rich fibrin to overcome the limitations of plasma rich platelets for regenerative procedures. PRF represents a new step in the platelet gel therapeutic concept with simplified processing without artificial biochemical manipulation. It can be considered as an autologous healing biomaterial incorporating leukocyte, platelets and wide range of key healing proteins in a dense fibrin matrix.⁽⁸⁾ The only disadvantage of incorporation of PRF in the regenerative procedure includes the invasive procedure of blood sample collection and specialized equipment required for the procedure.

PRF in conjugation with bone grafts offers several advantages including promoting wound healing, bone growth and maturation, graft stability, wound healing and hemostasis, and improves handling properties of graft materials.⁽¹⁰⁾

Conclusion

Treatment with a combination of bioactive bone graft and platelet rich fibrin led to a significantly greater clinical improvement in intra-bony periodontal defects compared to bioactive bone graft alone.

Current case showed clinical parameters dramatically improved in both the cases whether it may be only bioactive glass or bioactive glass particulates combined with platelet rich fibrin as a grafting material. The combination graft showed better results in improvisation of probing depth and bone fill when compared to bone graft alone. Further studies should be done to justify and authenticate this case result.

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Management of intra alveolar root fracture in primary incisor: A conservative approach and review of literature

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Abstract

Dental traumatic injuries in primary teeth are common in younger children. Root fractures in deciduous teeth are considered as a rare entity among all the dental traumatic injuries. These cases highlight the conservative management of intra alveolar root fracture in primary anterior teeth which were stabilized with multi-flex wire using composite resin. Patients were followed till the eruption of permanent successors. During follow ups, the patients were asymptomatic, roots of the deciduous teeth showed normal physiologic resorption and permanent teeth erupted in their normal position without any developmental defects related to the permanent teeth.

Keywords: Root fracture, Primary incisors, Traumatic injuries, Splinting, Developmental defect

Introduction

Root fractures are the dental traumatic injuries involving the dentin, cementum, and pulp which may affect both primary and permanent teeth. In the permanent dentition, 0.5–7% of the dental traumatic injuries were reported as root fractures and in primary dentition, 2–4% root fractures were reported.⁽¹⁾ The peak prevalence of root fractures in primary dentition occurs at 3–4 years of age.⁽²⁾ Management of root fracture depends on various factors like the time for the exfoliation of the deciduous tooth, child's ability to cope with the emergency situation and occlusion of the dentition.⁽³⁾

The present cases highlight the conservative management of intra alveolar root-fracture of maxillary primary central incisor with semi rigid wire composite splint till the eruption of permanent successors along with review of literature.

Case 1

A 4 year old boy reported to the Unit of Pediatric Dentistry, PGIMER with the pain and mobility in the upper front teeth following an accidental trauma while playing 2 hours back. Extra oral examination revealed swelling and bleeding from the upper lip. Intra oral examination revealed extrusive luxation of 61 by 1 mm compared to the right maxillary central incisor (Fig. 1) and grade II mobility in both the primary central incisors. Radiographic examination revealed a radiolucent line in the apical third of right maxillary central incisor and permanent tooth bud was in Nolla's stage 5 (crown almost completed) (Fig. 2). Based on the radiographic and clinical findings, diagnosis of horizontal root fracture in right maxillary primary central incisor and extrusion of the left primary maxillary central incisor was made. Because of the parent's concern about the loss of the primary incisors

at an early age, it was decided to preserve the tooth rather than the extraction of the offending tooth. The blood clot was debrided with normal saline, the maxillary primary central incisors were repositioned and stabilized with semi rigid wire-composite splint. (Fig. 3) The patient was instructed to take soft diet for 2-3 weeks and oral hygiene instructions were given. Analgesic syrup was prescribed as and when required. After 4 weeks, swelling subsided with Grade I mobility in the affected teeth. After 2 months, when the mobility was reduced, the splint was removed. The permanent successors were regularly evaluated to observe any developmental defects. After 24 months follow up, the patient was clinically asymptomatic and radiographic examination showed normal physiologic resorption of both the teeth. (Fig. 4) After 36 months follow up, normal eruption of permanent successors was observed with no complications. (Fig. 5)



Fig. 1: Preoperative photographs showing traumatized primary central incisors



Fig. 2: IOPAR of 51, 61 showing root fracture



Fig. 3: Primary central incisors stabilized with semi rigid splint using composite resin

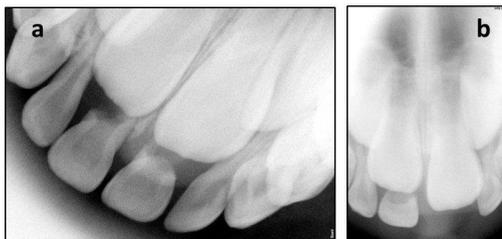


Fig. 4: IOPA of 51, 61 showing normal physiologic root resorption after (a) 18 months and (b) 30 months with no developmental defects



Fig. 5: Permanent successors erupting in normal position after 36 months

Case 2

A 4 year old boy reported to the Unit of Pediatric dentistry with the pain in upper front teeth following an accidental trauma while playing 4 hours back. Extra oral examination revealed bleeding from the upper lip. Intra oral examination revealed Class II mobility in primary incisor, 51. On radiographic examination, there was a radiolucent line in the apical third of right maxillary central incisor and the permanent tooth bud was in Nolla's stage 5 (Fig. 6). Based on the radiographic and clinical findings, a diagnosis of horizontal root fracture in 51 was made. The maxillary primary central incisors were stabilized followed by repositioning with semi-rigid wire composite splint. (Fig. 7) The patient was instructed to take soft diet for 2-3 weeks and oral hygiene instructions were given. Analgesic syrup was prescribed as & when required. After 4 weeks, when the mobility has reduced, the splint was removed. The permanent successors were also followed up regularly to observe any developmental defects. The tooth 61 was symptomatic, root canal was opened and Metapex (Biomed, Korea) was placed and sealed with GIC (GC Fuji II). After 24 months follow up, the patient was clinically asymptomatic and radiographic examination showed normal physiologic resorption of 51. (Fig. 8)



Fig. 6: Preoperative radiograph showing root fracture w.r.t. 51



Fig. 7: IOPAR showing splinting with semi rigid wire using composite resin



Fig. 8: IOPAR showing physiologic root resorption of 51, 61 after 24 months of follow up

Discussion

The root fracture is a rare injury in the primary and permanent dentition among the dental traumatic injuries. In the primary dentition, root fracture is not a common phenomena and most frequently occurs at the age of 3-4 years when the physiologic root resorption has begun, thereby weakening the root and also the resiliency of the surrounding bone makes the primary teeth more vulnerable to displacement injuries.⁽³⁾ The most common etiology for the dental traumatic injuries among younger children is lack of motor coordination between 1-3 years, fall while playing during sports activity followed by motor vehicle accident among 3 year or older. Upper anterior teeth were found to be most commonly traumatized teeth. In the present cases also root fracture occurs due to the fall while playing.⁽⁴⁾

The primary objective of treatment in the deciduous dentition is to allay fear and anxiety in both the children and parents, provide comfort to the patient and to prevent damage to succedaneous tooth.

According to IADT guidelines, the treatment protocol of intra alveolar root fracture occurred is to

extract the coronal fragment if it is mobile and leave the apical fragment intact. If the coronal fragment is stable and the patient cooperates, a semi rigid wire splinting may be indicated. If we follow these guidelines, most of the root fractured incisors would be extracted.⁽⁵⁾ Xin Liu et al managed the root fractures in primary teeth using orthodontic brackets.⁽⁶⁾ The disadvantage with orthodontic brackets are that orthodontic wires are

never passive and generate forces, which may result in tipping of teeth, since the force developed by these wires is higher.⁽⁷⁾ Jang et al stabilized the tooth with the composite wire splint and followed till the eruption of permanent successor.⁽⁸⁾ Endodontic treatment was performed in one of the cases. All the reported cases of intra alveolar root fracture are tabulated with the treatment modality opted for the case. (Table 1)

Table 1: Review of the cases of root fractures of primary anterior teeth and its management in the literature

Author, Year	Age/Sex	Trauma	Tooth affected	Treatment	Follow up
Xin Liu et al, 2012 ⁽⁶⁾	3.5/F	Fall at school (16 hours back)	51- Horizontal root fracture (apical third) 61- Horizontal root fracture (middle third) with extrusion	Splinting with orthodontic brackets for 3 months	2.5 years- Permanent successor erupted
Jang JH et al, 2013 ⁽⁸⁾ Case 1	4/M	Fall while playing	51- Horizontal root fracture (apical third)	Splinting with resin wire splint for 8 weeks	30 months - Permanent successors erupted with no pathologic lesion
Case 2	3.5/M	Fall at home	51,61- Horizontal root fracture (middle third)	Splinting with resin wire splint for 4 weeks	16 months - Permanent successors with no pathologic lesion
Gadicherla P et al, 2016 ⁽⁹⁾	3.5/F	Fall while playing (2 days back)	51- Horizontal root fracture (apical third) 61- Complicated crown root fracture	51- Kept under observation 61- Pulpectomy with restoration	4 months- asymptomatic
(Present Case-1)	4/M	Fall while playing (2 hours back)	51- Horizontal root fracture (apical third)	Splinting with resin wire splint for 8 weeks	3 years follow up- permanent successor erupted with no developmental anomaly
(Case-2)	4/M	Fall while playing (4 hours back)	51- horizontal root fracture (middle third)	Splinting with resin wire splint for 4 weeks	2 years follow up showing normal physiologic root resorption

The treatment of the root fracture in children usually depends on the child cooperation level and the amount of tooth structure lost due to trauma. Extraction of tooth at an early age not only affects the aesthetic, speech problems, psychological impact, but also affects the quality of life of the children. In contrast, the conservative management of primary teeth offers various advantages such as aesthetics, maintains the functions like mastication and prevent psychological trauma to the parents and children. Thus, in the present cases, root fracture with the mobility in the coronal fragment was conservatively managed with semi-rigid splinting using multi-flex wire with composite. Thus, a conservative approach was adopted to maintain the teeth till the eruption of permanent successors.

In cases of intra alveolar root fracture, regular radiographic follow-up is required to rule out the potential risk for permanent successors to be malformed due to position of the permanent tooth germ close to the roots of the primary teeth.⁽⁵⁾ Depending on the type, severity of the injury and the developmental stage of the permanent tooth, a prevalence of 12-69% of the developmental anomalies were found among the permanent teeth.⁽²⁾ Flores MT et al also reported 23 % developmental disturbances in 225 traumatized primary teeth with highest prevalence associated with the intrusive injuries.⁽¹⁰⁾ In the present cases, follow up examination revealed normal eruption of succedaneous teeth with no developmental disturbances (color changes, gingival recession, pulp necrosis, pulp canal obliteration, peri-apical lesion, displacement of

succedaneous teeth, disturbances in the eruption, dilaceration and pathological root resorption) of the permanent teeth. Thus, the present conservative approach proved to be favorable for primary teeth with root fracture as it maintained the primary tooth in the arch without affecting the succedaneous tooth.

Conclusions

Root fracture in the primary dentition is a rare entity which could be managed conservatively till the eruption of succedaneous teeth to prevent psychological trauma to both patient and parents. Semi rigid splinting could be a conservative method in root fracture to prevent extraction at an early age. These cases should be followed radiographically and clinically till the eruption of permanent successors.

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Phenytoin – induced gingival overgrowth: a case report

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Abstract

Drug-induced gingival overgrowth (DIGO) is a common clinical finding which can be treated either by nonsurgical and/or surgical techniques which will reduce the rate of recurrence. Wherever possible the required management strategy should be adopted as per the case. This case report describes the management of a patient with phenytoin-induced gingival overgrowth by both non-surgical and surgical approaches.

Keywords: Drug-induced gingival overgrowth, Phenytoin-induced gingival overgrowth, Gingival enlargement, Gingivectomy.

Introduction

“Gingival enlargement” or “gingival overgrowth” is the preferred term for all medication-related gingival lesions previously termed “gingival hyperplasia” or “gingival hypertrophy.” These earlier terms did not accurately reflect the histologic composition of the pharmacologically modified gingiva.⁽¹⁾

Phenytoin, nifedipine and cyclosporine, are well-known iatrogenic causes of gingival enlargement.^(2,3) Of the above drugs, phenytoin is the most studied, its association with gingival enlargement dating back to 1939.⁽⁴⁾

The prevalence of DIGO varies between drugs though clinically and histologically, DIGO are virtually indistinguishable,^(5,6) with approximately 50% of patients medicated with phenytoin experiencing significant gingival changes,⁽⁷⁾ whilst the figures for cyclosporin and nifedipine are closer to 30% and 20% respectively.⁽⁸⁾ The risk factors identified in the expression of DIGO are age and other demographic factors; drug variables; concomitant medication; periodontal variables and genetic factors.⁽⁵⁾ Severe forms of DIGO leads to disfiguring and interference with speech and mastication.

DIGO appears to be more prevalent in children and adolescents and has a predilection for the anterior gingival tissues. Gingival changes can occur within 3 months of dosage.⁽⁹⁾ The pattern of overgrowth development shows intra-patient variation, but may reach a "state of equilibrium" often within the first year of commencing medication. Changes in drug therapy, or systemic illness may alter this state and lead to further gingival changes.⁽¹⁰⁾

The relationship between the various drugs and gingival tissue components is influenced by several risk factors. DIGO has high recurrence rate due to chronic usage of the listed medications and other risk factors.⁽¹¹⁾ This is a case report of the management of a patient

with phenytoin-induced gingival overgrowth by both non-surgical and surgical approaches.

Case Report

A 20-years old female patient reported to a private clinic, with a chief complaint of swollen gums since 4 years. Patient gave history of epilepsy, which was diagnosed at the age of 14 years and she was on medication, phenytoin 100mg bid since then. Patient first noticed changes in the gingiva after 2 years of starting of medication but ignored it. When the gingival overgrowth exceeded to the extent that she developed pain, bleeding and abscess along with difficulty in mastication, she visited the clinic for treatment.

Extra-oral examination showed facial disfigurement with incompetent lips displaying swollen gums (Fig. 1). Intraoral examination showed gingival overgrowth covering more than two-third of the tooth surface in the anterior teeth and till the occlusal surface of the posterior teeth (Fig. 2).



Fig. 1: Facial disfigurement due to phenytoin-induced gingival overgrowth



Fig. 2: Intraoral view

The gingival overgrowth showed pebbled surface with some areas having firm and leathery consistency while the other areas having soft and oedematous consistency as a result of secondary inflammatory changes due to the presence of abundant local factors with spontaneous bleeding on probing. Generalized periodontal pockets were present with generalized mobility of teeth. Deep carious lesions were present in relation to 26 and 46. Radiographic examination showed generalized bone loss, case was diagnosed as generalized chronic periodontitis with combined (phenytoin – induced and inflammatory) gingival overgrowth.

Patient was referred to the physician for the possible change of antiepileptic drugs. Patient reported after 2 days and the physician changed the medication to Carbamazepine 200mg bid. Scaling was done followed by the extraction of 26 and 46. Patient was asked to report after 2 months.

Following 2 months, moderate reduction in the gingival overgrowth was noticed in maxillary anterior region, but patient was not maintaining the oral hygiene (Fig. 3). Scaling and root planing was performed and oral hygiene instructions were reinforced and patient was motivated to perform good oral hygiene and was asked to report after 2 months.



Fig. 3: Two months after the change of drug and non-surgical periodontal therapy

During patient's subsequent visit, significant reduction in gingival overgrowth was noticed in maxillary posterior and mandibular teeth. Some amount of gingival overgrowth was still present in the maxillary anterior sextant, for which flap surgery was planned (Fig. 4).



Fig. 4: Four months after change of drugs and SRP

Pockets were marked with a pocket marker after anesthetizing the area (Fig. 5a). With a 15 no BP blade, an internal bevel incision and intra-crevicular incisions

were made from 13 to 23 (Fig. 5b) followed by flap elevation, after which an inter-dental incision was given to remove the excess tissue. The area was debrided, root planing was done (Fig. 5c) and sutures were placed after approximation of the flaps (Fig. 5d). Post-operative instructions were given, antibiotics and analgesics were prescribed and patient was recalled after 1 week for suture removal.



Fig. 5: (a) Pockets marked with a pocket marker (b) Internal bevel and intracrevicular incisions given (c) After removal of excess tissue and debridement (d) Sutures placed

Histopathological report revealed hyperplasia of epithelial and connective tissue cells along with the proliferation of blood vessels. Inflammatory cells were seen in the connective tissue. (Fig. 6).

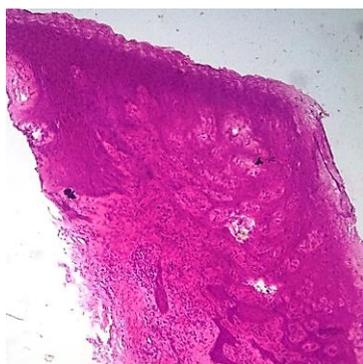


Fig. 6: Histopathological image (H & E staining)

Satisfactory healing was seen one-week post-operative. Significant reduction in gingival overgrowth was seen one-month post-operative with reappearance of the gingival pigmentation (Fig. 7).



Fig. 7: One – month post-operative

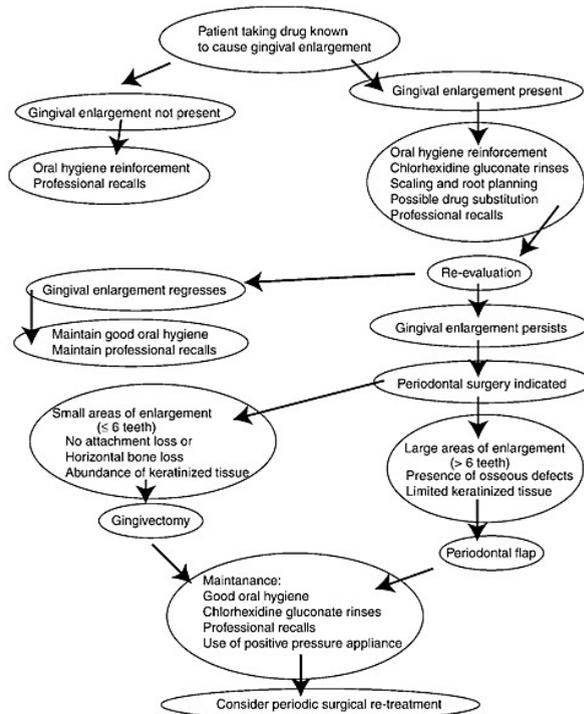


Fig. 8: Treatment of drug-induced gingival overgrowth

Discussion

Phenytoin is a hydantoin, 5,5-diphenylhydantoin, which abolishes post-tetanic hyperpolarization and reduces post-tetanic potentiation of synaptic transmission. This results in a stabilization of excitable membranes and reduces the spread of electrical discharge from an active epileptogenic focus.⁽¹²⁾

A discontinuation of phenytoin should not be recommended simply on the basis of moderate to severe hyperplasia. Conservative periodontal measures include vigorous gingival massage coupled with efficient toothbrushing and gum stimulators.⁽¹³⁾ When surgical measures are indicated, the drug treatment plan of the physician managing the epilepsy should be discussed and the date of surgery postponed if the physician is planning to discontinue the phenytoin.

Neurologic indications for discontinuing phenytoin include the following:⁽¹²⁾

1. Discontinuation of all medications in cases in which the individual may have outgrown the seizure disorder.
2. The patient is antagonistic toward phenytoin and another drug is to be tried.
3. The persistence of seizures despite therapeutic drug levels (A more effective drug is to be tried in place of phenytoin).
4. Inadequate drug levels of phenytoin has prompted a drug alternative.
5. The persistence of oral disfigurement despite active periodontal treatment in a patient with problems relating to self image may prompt a drug alternative.

Carbamazepine and valproic acid, the alternative medications to phenytoin, have shown lesser impact in inducing gingival enlargement.⁽¹⁴⁾ Oral folic acid was found to decrease the incidence of gingival overgrowth in children on phenytoin monotherapy, in a statistically significant and clinically relevant manner.⁽¹⁵⁾

Indications of periodontal flap technique to treat gingival enlargement are; gingival enlargement on larger areas (more than six teeth), areas where attachment loss combined with osseous defects is present, areas which will result in the elimination of all keratinized tissue following gingivectomy and end up with mucogingival problems.⁽¹⁶⁾ Fig. 8 summarizes the treatment of drug induced gingival overgrowth.

Drug induced gingival overgrowth treated surgically do show recurrence, but this can be decreased by proper home care, chlorhexidine gluconate rinses and professional cleaning. Use of bite guard at night has shown to control recurrence.⁽¹⁷⁾ Post-surgical recurrence rate varies from 3-6 months, but in most cases, the results are well maintained for 12 months.⁽¹⁶⁾

Conclusion

A full periodontal assessment should be done of all patients who are about to be medicated with cyclosporin, phenytoin or a calcium channel blocker and if any periodontal disease is present, it should be treated appropriately. But for many of such patients, this is not possible and often present with gingival overgrowth. For most of the patients, surgical approach is the treatment of choice, but prevention of recurrence

is the biggest challenge to the periodontist and the dental team.

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Natal teeth retained for 3 years: A rare case report

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Abstract

Teeth present at the time of birth are termed as natal teeth and most of them represent the early eruption of normal primary teeth. Its occurrence is a rare condition and when present can be associated with numerous clinical complications. Due to this, majority of natal teeth are prematurely lost or extracted and the presence of retained natal teeth is uncommon. The purpose of this case report is to document a rare case of retained natal teeth in a 3 year old child and to highlight the importance of the periodic examination program in such cases.

Keywords: Natal teeth, Child, Hypoplastic Enamel.

Introduction

In 1950, Massler and Savara introduced the commonly used term “natal teeth” for teeth present at birth⁽¹⁾ also known as congenital teeth, fetal teeth, predeciduous teeth, premature teeth, or dentitia praecox.⁽²⁾ The incidence of natal teeth has been studied extensively which ranges from 1:2000-1:3,500 live births.⁽³⁾ The etiology of natal teeth is unknown but several conditions such as infection or malnutrition, trauma, hypovitaminosis, febrile states, hormonal stimulation and maternal exposure to environmental toxins have been implicated as causative factors.^(4,5) However, the current concept proposed that, these teeth are attributed to a superficial position of the developing tooth germ, which predisposes the tooth to erupt early.^(4,5) The majority of the natal teeth represent the early eruption of the normal primary dentition while less than 10% are supernumerary.⁽⁶⁻⁸⁾ Morphologically, it might resemble normal primary dentition in size and shape; though the teeth are often smaller, conical and yellowish, and have hypoplastic enamel and dentin with poor or absent root formation.^(2,8)

The presence of natal teeth can be associated with numerous clinical complications, the most common being the discomfort during suckling, laceration of the mother’s breasts, sublingual laceration (Riga-Fede disease) with resultant feeding refusal, mobility and aspiration of the natal teeth.^(6,7) Due to these complications majority of the natal teeth are being prematurely lost or extracted and as a result the documentation regarding retained natal teeth is rarely reported in dental literature. With this preview, a description of a rare case of retained natal teeth present in the mandibular anterior region of a 3 year old child is reported.

Case Report

A 3-year old healthy male patient was brought to the outpatient Department of Pedodontics by his parents with the chief complaint of black discoloration of his two lower front teeth. The parents reported that both the

teeth were present at the time of birth of the child and since then no further eruption of any new teeth occurred in the central incisor region of the mandibular arch. The parents revealed that the child was born to normal full term pregnancy and was physically normal at the time of birth. The teeth present at the time of birth were associated with no complications, so the parents never consulted a dentist at that time.

The intra oral examination revealed the presence of fully erupted teeth with brownish and blackish discoloration corresponding to position of teeth 71 and 81 (Fig. 1). The teeth were smaller in overall dimension than the corresponding primary teeth with the presence of hypocalcified and hypoplastic enamel that were firmly attached to the alveolus exhibiting no mobility. Moreover, all the other primary teeth showed normal color, appearance and eruption pattern. The radiographic examination revealed the erupted teeth were 71 and 81, the mandibular primary central incisors. These teeth showed thin shell of hypoplastic enamel and dentin with poorly outlined short roots giving a ghost-like appearance. The pulp chambers were large with the wide root canals as the hypoplastic dentin was thin and seemed to be just serving the outline of the image of the root (Fig. 2). Based on the clinical and radiographic findings, a diagnosis of retained natal teeth was made.



Fig. 1: Intra oral examination showing presence of fully erupted teeth with brownish and blackish discoloration corresponding to position of teeth 71 and 81

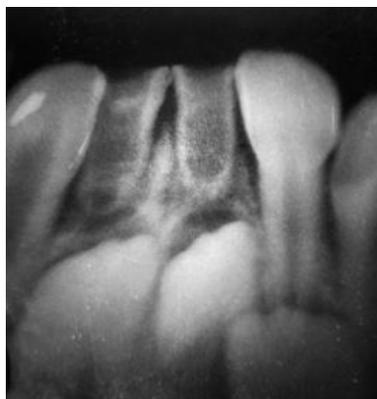


Fig. 2: Radiographic image showing large pulp chambers with wide root canals in relation to 71 and 81

The importance of these teeth in the growth of the child was explained to the parents after the fluoride application and reinforcement of the oral hygiene and home care measures. A regular 6 month periodic recall visit was established.

Discussion

The term natal and neonatal teeth simply represent the time of eruption and not the anatomical, morphological and structural characteristics of these teeth. Spouge and Feasby classified these teeth on the basis of clinical characteristics as “mature” teeth which are almost fully developed with moderately good prognosis, and “immature” which are incompletely formed with a poor prognosis.⁽⁹⁾ Hebling also classified natal teeth into 4 clinical categories: shell shaped crown poorly fixed to the alveolus by gingival tissue and absence of a root; solid crown poorly fixed to alveolus by gingival tissue and little or no root; eruption of the incisal margin of the crown through gingival tissue and edema of gingival tissue with an unerupted but palpable tooth.⁽¹⁰⁾ As per these classifications described above the present case was of immature teeth with shell shaped crown and little root which were firmly fixed to the alveolus by the gingival tissue. However in the present case, these retained teeth presented with very little development of the root still, the teeth were firmly fixated to the underlying alveolus by the gingival tissue. This clinical presentation has never been reported in the dental literature.

The presence of natal and neonatal teeth may be a source of uncertainty about the treatment plan. In the decision of maintenance or removal of these teeth in the oral cavity, there is an agreement in clinical studies that these teeth should be retained because they are most commonly the teeth of normal dentition.^(6,10) As a result, it is strongly recommended that natal and neonatal teeth should be left in place, if possible, and be removed only if extremely mobile. The preservation of these teeth of the normal dentition is imperative, since

the premature loss of a primary tooth may cause loss of space and collapse of the developing mandibular arch resulting in malocclusion of permanent dentition.⁽⁶⁾ In the present case the natal teeth was of normal primary dentition and represented the true normal eruption with no clinical complications, therefore it was decided to periodic follow up the case till the eruption of permanent mandibular incisors.

This case report emphasizes that the periodic examination program in the children with the retained natal teeth should be carried out in order to observe the mobility, shape, color and any associated clinical complications. Moreover, longitudinal studies in order to determine the cause and effect of survival of natal and neonatal teeth should be planned in future.

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Rejuvenating and revitalizing non vital traumatized young permanent teeth: A case series

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Abstract

Treatment of Ellis class IV fracture has been a great challenge. The following case report describes the management of traumatized upper anterior teeth in different patients using revascularization technique. Revascularization is the procedure which promotes apexogenesis in a young immature non vital tooth with limited instrumentation technique. Mineral trioxide aggregate is documented to create a hermetic seal over the coronal opening of the root canal separating the intra-canal clot containing stem cells from the external environment minimizing risk of infection. Revascularization causes continued root growth similar to natural root growth.

Keywords: Revascularization, Ellis class IV fracture, Non vital, Revitalization

Introduction

Young permanent teeth are those recently erupted teeth in which normal physiological apical root closure has not occurred. For many years patient with teeth that were incompletely developed or had open apices with pulpal or periapical pathology offer dentists a great challenge. These patients are usually young and suffered trauma only shortly after eruption, causing discomfort to the child, discolored tooth, mental anguish to the parents and the perplexing attitude to the dentist. The tooth being hard tissue in nature is not as resilient and tends to fracture on trauma.⁽¹⁾ Injury to the permanent teeth occurs secondary to sports injuries, accidents and free fall.⁽²⁾ Due to esthetic reasons, anterior teeth demand fast and natural treatment. In this era of smart dentistry various techniques and materials are available to the dentist in order to provide patient with good esthetic and functional result.⁽³⁾ Regenerative endodontics has been designed as biologically based procedure designed to replace damaged structures such as dentine, root structures and cells of pulp dentine complex using stem cells, growth factor and scaffold.^(4,5) Revascularization is the process of creating a natural environment of scaffold and dental stem cells inside the endodontic system to cause continued root growth.⁽⁵⁾ The aim of such treatment should be relief from pain and restoration of esthetic demand. The present case series present treatment of traumatized anterior maxillary young permanent teeth with Revascularization using Mineral Trioxide Aggregate.

Case Report I

A 9 year old patient was referred to outpatient department of I.T.S. Centre for Dental Studies and Research, Ghaziabad with chief complaint of fracture in upper front tooth region since 3 years. Patient had a history of trauma 3 years back. The tooth did not

respond to electric pulp testing. A diagnosis of necrotic pulp with respect to maxillary right central incisor and lateral incisor i.e. 11 and 12 (Ellis Class IV fracture) was made respectively with no extra or intra oral soft tissue swelling and trauma. The radiographic evaluation showed blunderbuss apex in relation 11, 12. (Fig. 1) Due to the presence of thin root canals and wide open blunderbuss apex, revascularization was planned in relation to 11 and 12 using Mineral Trioxide aggregate (MTA). Local anesthesia was administered and 11 and 12 were isolated with rubber dam, access opening was done, working length was determined followed by pulp extirpation and biomechanical preparation using crown down technique was performed. Thorough irrigation was done with 5% Sodium hypochlorite solution. Canals were dried followed by placement of intra-canal medicament i.e., Triple antibiotic paste and temporary filling was done. Patient was recalled after two weeks. At the second appointment, tooth was opened. Antimicrobial medicament was removed and copious irrigation with 5% sodium hypochlorite was done followed by drying of canal after which a small 10 K file was placed a few mm beyond the apical foramen and was moved up and down to cause laceration of apical tissue causing bleeding inside the canal up to 3mm from cement-enamel junction. Bleeding was controlled up till root canal orifice with saline dabbed pressure cotton for 5 minutes leading to formation of clot inside the canal, after which a small colla plug was placed over the clot to restrict the position of MTA till the pulp chamber followed by 3-4 mm of MTA placement. Dampened cotton plug was placed over the MTA to allow it to set and temporary restoration was done. Patient was recalled the next day for removing the intermittent cotton placed and permanent restoration was placed. After 3 months of follow up continued root growth was observed. (Fig. 2)



Fig. 1: Pre-operative radiograph w.r.t. 11, 12



Fig. 2: Post-Operative radiograph w.r.t. 11, 12

Case Report II

A 12 year old patient was referred to outpatient Department of I.T.S. Centre for Dental Studies and Research with chief complaint of discolored anterior maxillary tooth since 3-4 years. On detailed dental history patient reported history of trauma and dental treatment at 7 years of age. The radiographic evaluation of the traumatized maxillary left central incisor i.e. 21 shows blunderbuss apex with presence of intra-canal medicament (Fig. 3). A diagnosis of attempted pulp therapy by previous dentist in respect to 21 was made with no soft tissue intra or extra-oral swelling. Due to the presence of thin root canals and wide open blunderbuss apex revascularization was planned in relation to 21 using Mineral Trioxide aggregate (MTA). Similar procedure for revascularization was followed as described earlier. Local anesthesia was administered and 21 was isolated with rubber dam, access opening was done, working length was determined followed by cleansing of the canal to remove the already present medicament using irrigation with 5% Sodium hypochlorite solution and rotary K files. Canals were dried followed by placement of intra-canal medicament i.e. Triple antibiotic paste and temporary filling was done. Patient was recalled after two weeks. At the second appointment, root canal was re-entered. Antimicrobial medicament was removed and copious irrigation with 5% sodium hypochlorite was done followed by drying of canal after which a small 10 K file was

placed a few mm beyond the apical foramen and was moved up and down to cause laceration of apical tissue causing bleeding inside the canal up to 3mm from cemento-enamel junction. Bleeding was controlled up till canal orifices with saline dabbed pressure cotton for 5 minutes leading to formation of clot inside the canal. After that we inserted a small colla plug to restrict the position of MTA till the pulp chamber followed by 3-4 mm of MTA placement over the colla plug. Dampened cotton plug was placed over the MTA to allow it to set and temporary restoration was done. Patient was recalled the next day for removing the intermittent cotton placed and permanent restoration was placed. After 3 months of follow up continued root growth was observed in this case as well. (Fig. 4)



Fig. 3: Pre-operative radiograph w.r.t. 21



Fig. 4: Post operative radiograph w.r.t. 21

Discussion

The term revascularization is derived from prefix "re" which means restoration and vascularization that states the vascular system which permits blood to circulate and transport nutrients. Following case series is about analyzing, diagnosing and treating existing diseased vasculature of traumatized, necrotic young permanent anterior maxillary teeth. Affected necrotic pulp contains various aerobic and anaerobic microflora producing toxins causing more tooth damage. Medicament such as triple antibiotic paste is used for effective sterilization and disinfection of necrotic pulp.

Pulp tissue regeneration in vitro, developed by using stem cell, may, in the future, become a reality since the new tissue would be developed in the favorable environment using undifferentiated cells, presenting high potential for differentiated, stimulated by specific growth factors. In the process of revascularization, dental pulp stem cells are artificially brought to colonize inside the root canal by causing laceration of the peri-apical tissue. The success of this process depends on the ability of these stem cells to differentiate into pulp cells, odontoblasts and cementoblasts to cause continued root growth.⁽⁶⁾ MTA root repair material was introduced by Dr. Mahmoud Torabinejad, and was formulated from commercial Portland cement combined with bismuth oxide powder for radio-opacity. MTA has less leakage property than other Root canal filling materials due to which bacterial migration is less. Other alternative of MTA are also there like CME, which is biocompatible when used in vital pulp therapy.⁽⁷⁻⁹⁾ Various other features of CME are good sealing ability, non restorability and minimal leakage around the margins similar to MTA.^(10,11) In this case series, the two cases depicted good prognosis and continued root growth of traumatized non vital young permanent teeth after revascularization using MTA.

Conclusion

Treatment of young permanent teeth with incompletely developed root is difficult and challenging. The potential of bioengineering is huge, and work continues to optimize scaffold that may encourage revascularization of the pulp space, and to explore the option of seeding cell population into properly sterilized pulp spaces of immature teeth. Revascularization procedure proves to be an effective method for treatment of teeth involving Ellis's class IV fractures with blunderbuss apex. Collectively, the emerging body of case reports and the series as a rationale for conducting future prospective clinical trials on such cases comparing conventional endodontic treatment procedure with revascularization using different sealing materials is important.

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Peripheral Ossifying Fibroma: A rare case report

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Abstract

Peripheral ossifying fibroma (POF) is a type of non-neoplastic gingival enlargement which shows areas of calcification or ossification. It is reactive lesion which usually arises from interdental gingiva and mostly in the anterior maxillary region. It is most commonly seen in females of second decade. The etiology can be secondary to trauma or any other local irritating factors. Differential diagnosis of POF includes pyogenic granuloma and peripheral giant cell granuloma. Careful diagnosis of peripheral ossifying fibroma is important to avoid unnecessary aggressive therapy. The definitive diagnosis is done by using histopathological examination. A conservative surgical treatment which includes the excision of lesion provides an excellent prognosis. A rare case of a 21 year old female patient with peripheral ossifying fibroma in lower front tooth region of the mouth is presented here.

Keywords: Gingival enlargement, Differential diagnosis, Peripheral ossifying fibroma, Pyogenic granuloma, Peripheral giant cell granuloma, Prognosis.

Introduction

Peripheral ossifying fibroma is a non-neoplastic enlargement of gingiva which is reactive in nature. It usually originates from the interdental papilla of anterior maxilla. It commonly occurs in females in 2nd and 3rd decades of life.⁽¹⁾ It accounts for 3.1 % of all oral tumors and 9.6% of gingival lesions.⁽¹⁾ The etiology of POF is unknown, however, trauma or local irritating factors can increase the chance of getting POF.⁽¹⁾ After the elimination of local irritating factors surgical excision of the enlargement is preferred.

A rare case report of peripheral ossifying fibroma of the anterior region of mandible is presented here.

Case Report

A 21-year old female patient reported to the Department of Periodontology and Oral Implantology, Coorg Institute of Dental Sciences, Virajpet, Karnataka, with a chief complaint of swelling of the gums and mobile tooth near lower front region of the jaw since 3 years. Initially, the swelling in the lower front tooth region was small and it gradually started increasing in size in the last three years. There was no pain associated with the swelling, but the patient had discomfort during speech and while having food. There was no relevant family and medical history and patient did not give any history of trauma, injury or food impaction. On intraoral examination, a well defined pedunculated gingival growth in the interdental region between 41, 42 and 31 was observed. It involved the marginal gingiva, attached gingiva and interdental gingiva measuring about 1.5 cm × 1 cm in diameter extending from mesial aspect of 31 to 42. (Fig. 1-3)

Color was pale pink with smooth surfaces and well defined edges. Pathologic migration of 31 and 41 was present. On palpation, swelling was non-tender, sessile and firm in consistency.



Fig. 1: Gingival enlargement in lower anterior region



Fig. 2: Horizontal measurement



Fig. 3: Vertical measurement

Radiographic examination in the region of 31, 41 & 42 revealed the presence of irregular radiopacity evident in the mesial aspect of 31 with areas of cuffing evident in crestal region between 31& 41. (Fig. 4)

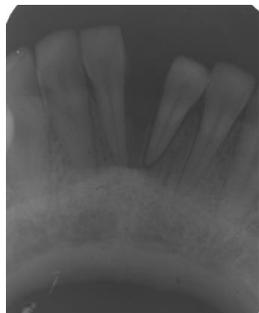


Fig. 4: Radiographic Examination of the lesion

Based on the history, clinical examination and investigations, the case was provisionally diagnosed as POF. The differential diagnosis considered were peripheral giant cell granuloma and pyogenic granuloma. Under local anesthesia, excisional biopsy was performed using scalpel (Fig. 5 and 6) and the tissue was sent to the Department of Oral Pathology for histopathological investigation.

Histologically, the tissue section showed a stratified squamous parakeratinized epithelium overlying fibrous connective tissue stroma which in deeper areas showed numerous areas of ossification. Areas of chronic inflammatory cell infiltrate and plasmacytes was also noticed.



Fig. 5



Fig. 6

Fig. 5 and 6: Postoperative picture after excisional biopsy

On the basis of clinical, histopathological, and radiographic examination, the diagnosis of POF was given. The patient presented for a follow-up examination of 10 days postoperatively. The surgical site appeared to have uneventful healing.

Discussion

Peripheral ossifying fibroma was first described by Menzel⁽¹⁾ and the term was coined by Eversole and Rovin.⁽²⁾ Ossifying fibroma is usually found in craniofacial bone. It is classified as central and peripheral types.⁽³⁾ The central types usually originate from the endosteum or the periodontal ligament adjacent to the root apex and expand from medullary cavity of bone. The peripheral types usually of periodontal ligament origin, occurs in interdental papilla, proximity of gingiva and the periodontal ligament and shows the presence of oxytalan fibres within the mineralized matrix.⁽⁴⁾

In 1982, the term "peripheral ossifying fibroma" was coined by Gardner for a lesion that is reactive in nature; but is not considered to be an extrasosseous counterpart of central ossifying fibroma.⁽⁴⁾

The other names which had been given for peripheral ossifying fibroma includes epulis, peripheral fibroma with calcification, calcifying fibroblastic

granuloma, peripheral cementifying fibroma, peripheral fibroma with cementogenesis and peripheral cemento-ossifying fibroma.⁽⁵⁾

POF is a focal, reactive and non-neoplastic enlargement of gingiva. It may be found as a pedunculated or sessile enlargement with broad attachment base. The color of POF varies from red to pink. Size of most lesions ranges from 1 to 2 cm. The teeth involved usually shows pathologic migration and mobility.⁽⁴⁾

POF is most commonly found in females of second and third decades of life with peak prevalence between the age group of 10 to 19 years.⁽⁵⁾ Commonly it occurs in incisor cuspid region of the maxilla. It is fairly a common lesion comprising nearly of 1% to 3%.⁽⁵⁾

The etiology of POF is unknown. It usually occurs due to local irritation or trauma. Orkin and Amaldas found that there is excessive proliferation of mature fibrous connective tissue in response to gingival injury or irritation.⁽⁶⁾ It most frequently occurs in specific periods of life such as puberty and pregnancy which suggests the existence of hormonal factors in the etiology of POF.⁽⁷⁾ Radiologically it does not show any significant changes.

Differential diagnosis include peripheral giant cell granuloma (PGCG), peripheral odontogenic fibroma and

pyogenic granuloma. The final diagnosis of POF is made by the histological investigation of biopsy specimen. PGCG contains multinuclear giant cells. Peripheral odontogenic fibroma contains odontogenic epithelium and dysplastic dentin. Pyogenic granuloma is more vascular compared with POF.

Nevoid basal cell carcinoma syndrome, Multiple endocrine neoplasia type II, neurofibromatosis and Gardner's syndrome are the syndromes associated with POF.⁽⁸⁾

Treatment of POF is the surgical excision of lesion with its periodontal and periosteal component. Before the excision of the lesion plaque and calculus should be removed by scaling and root planing. Recurrence rate is usually 8.9 to 20% and occurs due to incomplete removal of the lesion.⁽⁹⁾

Conclusion

In the present case report, the clinical, histological and radiological features of POF with a rare case is discussed. POF is considered as one of the commonest pedunculated gingival enlargement which is clinically diagnosed as pyogenic granuloma. For the confirmation of final diagnosis of POF radiological and histopathological evaluation is needed.

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Threat to implants: Peri- implantitis: A case report

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Abstract

The use of dental implants has revolutionized the treatment of partially and fully edentulous patients today. Implants have become a feasible treatment approach for managing a broad range of clinical dilemmas due to their high level of predictability. It promises to sets high hope for patients to 'bite on' along with the best esthetic appearance. However, as every good has a bad along even our peri-implant tissue may develop discomforts due to these foreign bodies or can lose the supportive bone, even in cases of successful osseointegration. Such situation is suggestive of implant failure. One of such reason is 'Peri-implantitis' and probably one of the main causes of implant loss. The term peri-implantitis is described as destructive inflammatory process affecting the soft and hard tissues around osseointegrated implants, leading to the formation of a peri-implant pocket and loss of supporting bone. The current case report elaborates on the introduction, diagnosis of peri-implant diseases and its treatment at peri-implant site after 9 months of implant placement.

Keywords: Peri- Implantitis, Peri-Mucositis, Classification of Peri-Implantitis

Introduction

Dental implants have become an indispensable established therapy in dentistry in order to replace missing teeth in different clinical situations. Scenario of replacing teeth has shifted from denture to the implant placement, for which a number of companies have emerged with economical screws & different implant systems.⁽¹⁾ Under care and attention of indications, anatomical and intra-individual limiting factors, insertion of dental implants appears to represent a "safe" treatment option. Nevertheless, in the last decades increasing evidence raised on the presence of peri-implant inflammations representing one of the most frequent complications affecting both the surrounding soft and hard tissues which can lead to the loss of the implant. This could be due to practitioners negligence, improper care by patients and many other reasons leading to implant failure and peri implant tissues irritation.⁽²⁾ The commonly encountered diseases of implants are: peri-implant mucositis and peri-implantitis.

Peri-implant mucositis is a disease that involves inflammatory lesions of the mucosa that surrounds implants, without supporting bone loss.

Peri-implantitis is the destructive inflammatory process affecting the soft and hard tissues surrounding dental implants. The array of periodontal pathogens found around failing implants (those affected by peri-implantitis) are very similar to those found in association with various forms of periodontal disease.⁽¹⁾ The clinical signs and symptoms⁽²⁾ of peri-implantitis include inflammation, bleeding on probing, pocket more than 4mm, suppuration and progressive bone loss.

Classification of peri-implantitis was proposed by Froum et al in 2012 (Fig. 1).⁽³⁾

CLASSIFICATION OF PERIIMPLANTITIS		
EARLY	MODERATE	ADVANCED
<ul style="list-style-type: none"> • PD \geq 4mm • BONE LOSS 25% OF THE IMPLANT LENGTH 	<ul style="list-style-type: none"> • PD \leq 6mm • BONE LOSS 25% TO 50% OF IMPLANT LENGTH 	<ul style="list-style-type: none"> • PD \geq 8mm • BONE LOSS > 8mm

Fig. 1: Classification of Peri-implantitis

Management^(4,5)

The treatment of peri-implant infections comprises conservative (non-surgical) and surgical approaches. Depending on the severity of the peri-implant disease (mucositis, moderate or severe peri-implantitis) a nonsurgical therapy alone might be sufficient or a step-wise approach with a non-surgical therapy followed by a surgical treatment may be necessary. Non-surgical treatment includes mechanical and surgical therapy along with antimicrobials.

The surgical treatments can be done using resective or regenerative approaches. Intervention should be performed if probing depths exceed 5 mm or are progressive as well as under occurrence of local inflammation signs.

Resective surgical therapy may result in re-osseointegration in only minor superficial defects. From functional, esthetic and long-time-survival point of views, full regeneration and re-osseointegration is desirable. Studies have shown that it is possible to regenerate experimentally induced defects using various graft materials and/or resorbable membranes following the principles of guided bone regeneration. Management

of Peri-implantitis has been described by Lang et al (Fig. 2).⁽⁶⁾

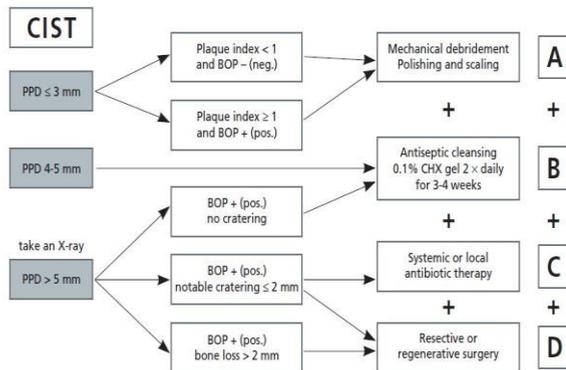


Fig. 2: Management of Peri-implantitis Cumulative Interceptive Supportive Therapy- CIST (Lang et al 2004)

Case Report

A 36 yr old male patient reported to the Dept. of Periodontology with a complaint of pain in lower left back region of jaw since a week. We gathered his medical as well as dental history of implant placement 6 months back. It seemed that patient did not observe any prior discomfort related to the implant site. On

examination implant was found to be at the same site of jaw where patient complained of pain. Probing pocket depth around the implant was 6 mm accompanied by bleeding on probing. It was diagnosed as a case of moderate peri-implantitis.

Treatment: At first all the pre-operative preparations were completed and a surgical intervention was planned, 2% lignocaine with 1:2,00,000 adrenaline was used to anesthetize the surgical site. Initially, crevicular incision was given along with vertical incision, the flap was reflected so is to appreciate the defect site. Along with the thorough debridement at the surgical site, decortication was performed to promoted osteogenesis. The collagen membrane (Healiguide®) was pre-sutured followed by placement of Nova Bone® (Bioactive Bone graft). The site was sutured with non-resorbable silk suture 3/0. The standard post-operative instructions were given to patient and recalled after 7 days for suture removal. On the day of follow up sutures were removed and povidone iodine irrigation was done. At each visit after 20 days, oral hygiene instructions were reinforced. 9 months postoperatively, the crown was given after observing the absence mobility and probing depth. Intra oral radiographs were taken at the 1 day and after 9 months of the surgery for peri-implantitis which showed good bone regeneration. (Fig. 3-11)



Fig. 3: Preoperative view



Fig. 4: Incision given at the site



Fig. 5: Flap reflection and decortications



Figure 6: Healiguide Collagen membrane Presutured



Figure 7: Bone Graft placed (Novabone)



Figure 8: Post-operative view



Figure 9: 9 month follow up

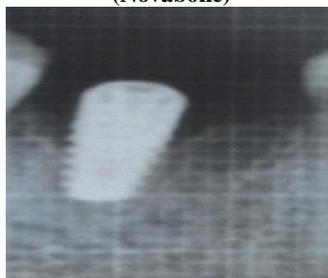


Figure 10: Preoperative radiograph



Figure 11: Post-operative radiograph

Discussion

The mode of treatment differs for both the situations i.e., Peri-implant mucositis and peri-implantitis. According to the literature, it is proved that peri-implant mucositis can be successfully treated if detected at initial to moderate phase.^(7,8) Non-surgical therapy has not been shown to be effective for the treatment of peri-implantitis.^(9,10) The surgical treatment proposed for such mucositis have given convincing results. However, longitudinal studies are yet to validate, the treatment modality which may be optimal, given the different clinical scenario. Apart from all surgical modalities, routine monitoring of dental implants act as the essential part of this treatment. Thus, periodontal evaluation and maintenance is mandatory. Moreover, patient's motivation for the oral hygiene care and his positive attitude towards the treatment helps to overcome the peri-implant complications immediately after implant placement.^(11,12) The updated knowledge of the clinician and his effective handling of implants as well as the tissue increases the chances of implant longevity and decreases the peri implant complications.

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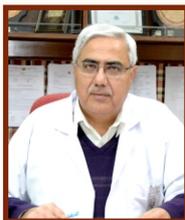
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