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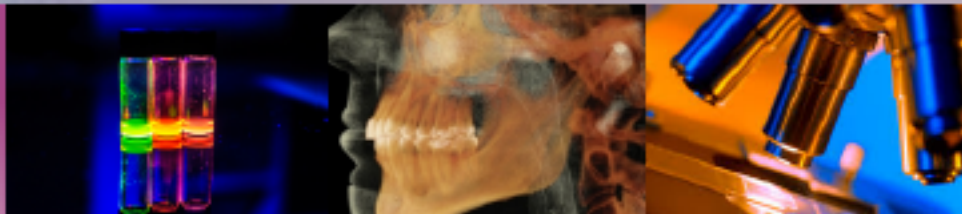


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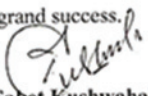
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Message

I am indeed delighted to know that Mithila Minority Dental College & Hospital, Laheriasarai, Darbhanga is bringing out the new issue of its journal. I appreciate historic and glorious efforts of the Institution. Its heartening to announce the Journal of Oral and Dental Health is going to be the official publication of L. N. Mithila University, Darbhanga.

Widespread circulation of the journal is earnestly expected within the state and outside as well. The vast area of dentistry encompassing a wide range of diseases and processes starting from dental caries to oral cancers require constant novel research and updation of knowledge. Epidemiological studies, collection of data in the form of publications will definitely enlighten future research scholars and dental professionals.

I congratulate the editorial board and wish for its grand success.


(Saket-Kushwaha)
Vice-Chancellor

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MESSAGE FROM THE MANAGING DIRECTOR

I am delighted to introduce this issue of Journal of Oral and Dental Health.

The objective of the journal is to publish high quality original research papers along with relevant and insightful reviews and interesting case presentations.

With every new issue, we expect to elevate the benchmark a little bit to motivate our readers and contributors to sharpen their skills to explore further in the research fields opening new horizons and setting new goals in the field of dentistry.

I am thankful to all my faculties and specially to the editorial board for their relentless effort to bring out this Journal.



I. Shaukat
Managing Director
Mithila Minority Dental College & Hospital
Darbhanga

MESSAGE FROM THE EDITOR

“Equipped with his five senses, man explores the universe around him and calls the adventure Science.” Edwin Powell Hubble

I welcome you all to this adventurous journey of science of oral and dental health exploring through interdisciplinary approach by all branches of dentistry.

I would like to express my considerable appreciation to all authors of the articles in this issue of the Journal of Oral and Dental Health. It is their generous contributions of time and effort that made this issue possible. At the same time I would like to encourage all our readers to consider sharing their special insights with the JODH community by submitting an article.

We intend to have a high Impact Factor (IF) in terms of citations for this journal. Citations result when we are mainly compiling original research specially for a publication.

Finally, we wish to encourage more contributions from the scientific community and practitioners to ensure a continued success of the journal. Authors, reviewers and are always welcome. We also welcome comments and suggestions that could improve the quality of the journal.

Thank you. We hope you will find JODH informative. Happy Reading



Prof (Dr) Dipto De
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Contents

ORIGINAL ARTICLES

- Smoker's Palate: Comparison of Prevalence in Beedi versus Cigarette Smokers in Western Punjab Population
Smit Singla, Akhilesh Verma, Amit Kumar Singh, Snehil Goyal, Itika Singla, Anjali Shetty 1
- Estimation of dmft and DMFT and Correlating with Salivary Urea Levels in Thalassemia Patients
Payel Karmakar 3
- Comparison of Therapeutic Effect of Topical Amlexanox (5%), and Oral Rebamipide (100 mg) in the Management of Oral Aphthous Ulceration
Priya Uppalwar, Girija Kunjir, R. Krishna Kumar, Roshan Chandwani, Deepak Kelgandre, Pavani Donempudi 6
- Evaluation of the Effect of Temperature Changes on the Dimensional Stability of Poly (Vinyl Siloxane) Impression Material
Sunil Ronad, Girija Dodamani, Suresh Nagral, Savita Akki, Hemant Gadge 9
- Applicability of Various Laws of Pulp Chamber in Deciduous Molars
Vishwas Chaugule, Ritika Kriplani, Ashish Kulsunge 14

REVIEW ARTICLES

- Current Concept of Relapse in Orthodontic Treatment - A Literature Review
Abhishek Sinha, Satyapriya Pal, Subhasis Sheet 18
- Role of Minerals and Trace Elements in Oral Health- A Review
Abhishek Ghosh, Bhuvan Nagpal, Vivek Kumar, Kamal Nayan 22
- Periodontally Accelerated Osteogenic Orthodontics: A Review
Anuranjan Das, Ali Asger Nakib, Satya Priya Pal, Nidhi Malik 24
- Customized Temporary Bonded Bite-raising Occlusal Blocks: A Boon for Clinicians
Amol A. Verulkar, Rishi Joshi, Anand A. Tripathi, Shailendra Kumar Singh 27

CASE REPORTS

Peripheral Ossifying Fibroma: A Local Reactive Focal Overgrowth

Vivek Kumar, Neelu Verma, Swarnalatha J. Wesley, Kamal Nayan, Abhishek Ghosh

30

Hibernating within, Odontome- A Case Report

Saurabh Satyarth, Anupam Tiwary, Nidhi Malik, Sonia Tiwari

33

Finger Prosthesis – A Divine Creation

Kamal Nayan, Bhaskar Sen Gupta, Lalima Kumari, Vivek Kumar, Abhishek Ghosh

36

Endodontic Treatment of Three Rooted Maxillary First and Second Premolar- A Case Report

Rajneesh Kumar, Rohit Miglani, Anamika Thakur

40

Smoker's Palate: Comparison of Prevalence in Beedi versus Cigarette Smokers in Western Punjab Population

Abstract

Introduction: Smoker's palate or nicotina stomatitis palatine is usually asymptomatic lesion and sometime associated with etching or burning sensation. **Aim:** To evaluate the smoking habit in patients with different grades of smoker's palate depending on the type of smoking, duration and its frequency of use. **Methods:** A total of 650 male subjects were assessed undergoing routine dental checkup in the dental centre. The assessment of the relation between duration and frequency of smoking habit with grading of the smokers palate was done. **Results:** Beedi is more commonly smoked as compared to cigarette smoking. Out of 650 smokers we found smokers palate in 590 patients and grades of smoker's palate increases with increase in duration and frequency of smoking. **Conclusion:** In present study beedi smoking is more common than cigarette smoking; we found a strong correlation of smoker's palate with frequency and duration of smoking.

Key words: Smoking, Smoker's palate, Beedi, Cigarette

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INTRODUCTION

Together cigarette and beedi smoking positively and negatively associated with 50 type of diseases.^{1,2} Epidemiological studies have proved that approximately 90% of oral cancers in South East Asia, which is a high risk region, can be attributed to tobacco and related habits. It is estimated that 8% of the cancers can be attributed to smoking alone.^{3,4} Tobacco products when either chewed, dipped or when smoked is the major source of intraoral carcinogen on a global scale. It is estimated that among the 400 million individuals aged 15 years and above in India, 47% use tobacco in one form or the other form. 72% people smoke bidis and 12% smoke cigarettes.^{3,5} Smoking is a peculiar custom in some group with low socio-economic status. Smoking is associated with many oral lesions like leukoplakia, smoker's melanosis, smoker's palate or nicotinic stomatitis, black hairy tongue and even with malignant changes.^{1,6,7}

Smoker's palate or nicotina stomatitis palatine is usually asymptomatic lesion and sometime associated with etching or burning sensation. It is usually associated with cigar, heavy pipe and reverse smoking, but now in these days it is frequently found in smokers as we found in our study. Hard palate shows change in color to white with multiple red dots located centrally in small elevated nodule. The opening of minor salivary glands become inflamed due to chronic heat produced during smoking and are painless. In severe cases the mucosa shows the crack mud like appearance. In this study evaluation of smoking habit with different grades of smoker's palate is done.

MATERIAL AND METHODS

A total of 650 male subjects participated in this study. Subjects who came for routine dental check up at private dental centre from last one year were included in the study. Healthy participants without any systemic disease, does not have habit of alcohol consumption and should not be under any medication were included in this study. Only those subjects were included who used to smoke at least five cigarettes or bidies per day, since at least from last five years. All the participants were informed about the goals of the study and asked to provide informed consent for their participation in the study.

All the subjects were examined by single trained dental surgeon using light, mouth mirror, gauze and all the necessary information relevant to this study like medical history, type of smoking (cigarette or beedi), duration and frequency of the habit and clinical examination of the palate were recorded.

Smoker's palate were examined and classified into three grades.⁷

1. Mild (grade-I): consisting of red, dot-like opening on blanched area.
2. Moderate (grade-II): characterized by well-defined elevation with central umbilication.
3. Severe (grade-III): marked by papules of 5mm or more with umbilication of 2-3 mm.

RESULTS

The study consisted of 650 subjects with smoking habit out of all we found smoker's palate in 590 subjects which means about 90.7%

Table 1: Comparison between grades of smoker's palate and type of smoking

| Type of smoking | Grade-I | Grade-II | Grade-III | Total (%) |
|-----------------|---------|----------|-----------|-----------|
| Beedi | 95 | 210 | 90 | 395 (67) |
| Cigarette | 60 | 80 | 55 | 195 (33) |
| Total | 155 | 290 | 145 | 590 (100) |

Table 2: Association of different grades of smoker's palate with duration and frequency of smoking habit

| Duration and frequency of smoking | Grade-I | Grade-II | Grade-III | Total (%) |
|---|------------|------------|------------|------------|
| 6-10 years and 1-5 times daily | 80 | 30 | 5 | 115 (19.5) |
| 11-15 years and 5-10 times daily | 90 | 85 | 35 | 210 (35.5) |
| More than 10 years and more than 10 times daily | 85 | 70 | 110 | 265 (45) |
| Total (%) | 255 (43.2) | 185 (31.3) | 150 (25.4) | 590 (100) |

smokers who use to smoke 5 times a day from at least five years have smoker's palate. In our study we found that smoking of beedies causes more smoker's palate as compared to cigarette as out of 650 patients 590 have smoker's palate and 60 patients does not have a smoker's palate and all are cigarette smokers. Out of 590 smoker's palate case 395 is found in beedi smokers as compared to 195 in cigarette smoker's which constitute 67% in beedi smoker's where as only 33% in cigarette smokers. Results have been summarized in the tables below (Tables 1 and 2).

From these results we can say that as the severity of duration and frequency of smoking habit increases then the severity of the lesion also increases.

DISCUSSIONS

From our study, an analysis of the type of smoking habit revealed beedi smoking manifested smoker's palate more often than the cigarette smoking. This may be due to beedies does not have filter as compared to cigarette. Beedies contain more amount of ammonia, phenol, hydrogen cyanide chemicals as compared to cigarettes. Beedies contain less amount of tobacco, but the concentration of nicotine is much more in beedies as compared to cigarette. A lot of people think that beedies are less harmful as it contains leaf and it is herbal but it is misconception. But actually biidies are more harmful as compared to cigarette as smokers have to take deeper puffs while smoking as compared to cigarette. Beedies are available easily and more economical i.e cheaply available as compared to cigarette. So, beedies are more prone toward addiction as compared to cigarette.

R. Kumar et al in 2010 concluded that bidis are equally or more harmful than cigarette smoking.⁸ Our study also got the similar results that beedies are more harmful than cigarette smoking. In our study we found the strong correlation between duration and frequency of smoking habit with the severity of the palatal lesions. The severity of the grade of the lesion also increased as the duration and frequency of smoking increased.

Alvarez Gomez et al in 2008 studied reverse smoking in Colombia and found the positive correlation of smoking with palatal changes.⁹ Ahmadi-Motamayel et al in 2013 concluded that smokers had more oral mucosal lesions as compared to nonsmokers.¹⁰ Gonul M et al in 2011 observed many dental anomalies in smokers as compared to nonsmokers.¹¹

CONCLUSION

In our study we found the severity of smoker's palate increases with the increase in duration and frequency of smoking habit. Oral phycian should be careful while examining the oral cavity especially in smoker's to prevent the effect on quality of life by detecting the early changes and prevent these changes to transfer to malignant ones.

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Estimation of dmft and DMFT and Correlating with Salivary Urea Levels in Thalassemia Patients

Abstract

Introduction: Thalassemias are a group of inherited defects in the synthesis of either alpha or beta polypeptide chains of the globin portion of the haemoglobin. Based on their clinical and genetic orders, thalassemias are classified mainly into major (homozygous) and minor (heterozygous) types. It has been found in earlier studies that there is an increase in oral diseases in thalassemic patients. **Aim:** The aim of the study was to determine the caries experience among the thalassemic patients their dmft (decayed missing filled score in deciduous dentition) as well as DMFT (decayed missing filled score in permanent dentition) score and urea levels in the saliva of thalassemic patients in comparison to age and sex matched 30 healthy control children. **Materials and method:** Dental caries score were recorded for 30 thalassemic patients. Saliva was collected and urea levels were determined. The results were compared with 30 healthy matched controls. The results were subjected to Chi square test and unpaired t test. **Results:** The mean caries experience in primary dentition was 3.57 ± 3.28 and in control group, it was 1.97 ± 0.99 , the difference being statistically significant ($p < 0.05$). Similarly, the mean caries experience in the permanent dentition of the study group (1.27 ± 1.53) was significantly ($p < 0.05$) higher than the control group (1.03 ± 0.18). The urea level was found to be 44.60 ± 9.96 mg/dl. The urea levels were found higher for the control group. **Conclusion:** The theoretical risk of oral disease in thalassemic patients remains high. Dental caries score in both primary and permanent dentition of thalassemic patients was higher than the control group and the result was statistically significant. ($p < 0.05$). The urea levels among thalassemic group was lower than the control group

Key words: Dmft, DMFT, Caries, Thalassemia, Saliva, Urea Levels

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INTRODUCTION

The word Thalassemia is a Greek term derived from thalassa, which means "the sea" (referring to the Mediterranean), and emia, which means "related to blood." Hemoglobin is made of two proteins: Alpha globin and beta globin. Thalassemia occurs when there is a defect in a gene that helps control production of one of these proteins.

There are two main types of thalassemia:

Alpha thalassemia occurs when a gene or genes related to the alpha globin protein are missing or changed (mutated). Beta thalassemia occurs when similar gene defects affect production of the beta globin protein. Alpha thalassemias occur most commonly in persons from southeast Asia, the Middle East, China, and in those of African descent. Beta thalassemias occur in persons of Mediterranean origin, and to a lesser extent, Chinese, other Asians, and African Americans. There are many forms of thalassemia.

Each type has many different subtypes. Both alpha and beta thalassemia include the following two forms: Thalassemia major and Thalassemia minor. The person who inherits the defective gene from both parents develop thalassemia major.¹⁻⁴

Thalassemia minor occurs if you receive the defective gene from only one parent. Persons with this form of the disorder are carriers of the disease and usually do not have symptoms.

β -Thalassemia major (β -TM) was first described by a Detroit pediatrician, Thomas Cooley, in 1925. The disease also has names

such as "Mediterranean anemia", (Whipple et al) Cooley anemia "Thomas Cooley", or β thalassemia.

The concentrations of the biochemical components in saliva play an important role in oral diseases, but there have been very few studies which has examined this in connection with thalassemic patients. There have been numerous attempts to show a relation between dental caries and the amount of calcium in the saliva. Fewer studies have considered the phosphorus content as well. Very small amounts of study have been conducted to determine whether salivary urea played any role in caries condition of thalassemic patients. Moreover an increase in salivary urea and ammonia concentrations have been found to correlate with marked reductions in the extent and duration of plaque acidification following a carbohydrate challenge. (Kleinberg I, Kanapka JA, Craw D (1976). The purpose of this study was thus to study the prevalence of dental caries among 30 thalassemic patients and 30 age and sex matched controls and to estimate the concentrations of salivary urea among them.⁵⁻⁷

MATERIALS AND METHODS

Sample Selection

The study group used in this study were child patients between the age group of 4 and 14 years coming for blood transfusion at the Department of Pediatrics, Government Medical College in Udaipur city, India. The control group consisted of 30 healthy primary school

children who were matched for age and gender with the study group. In addition, the socio-economic status and oral hygiene habits of the control group resembled that of the study group. Ethical committee approval was obtained from the concerned authorities of the above hospitals. Written informed consent was obtained from the parents of the children.

Collection of Saliva

Unstimulated whole saliva was collected at least two hours after a meal. First the subjects were asked to rinse their mouth several times with tap water. 1 or 2 minute time gap was given to allow clearance of the tap water so that the impurities in the water don't contaminate the collected saliva. The subjects were then asked to expectorate into a sterile polystyrene container for a period of 10 minutes until 3 ml of saliva had been collected in the beaker. The cap of the polystyrene container was then replaced and saliva was sent to the laboratory within two hours of collection. The saliva was collected between 10-11 am in order to prevent any bias in the concentration of the saliva due to the circadian rhythm.

Clinical Parameters

The study was carried out by a single examiner to rule out interexaminer bias. Proforma was prepared to gather adequate information of each child of study and control group. Part A consisted of general information i.e. name, age, gender and residential address. Part B of the proforma was meant to record DMFT/dmft index for evaluation of dental caries and estimation of salivary urea levels in mg/dl. Oral examination was carried out using a mouth mirror and a probe according to the criteria of the World Health Organization, 1997 in study as well as control group. Caries status was determined by recording the number of decayed (d, D), missing (m, M), and filled (f, F) teeth in the primary and permanent dentitions and were referred to as dmft and DMFT scores, respectively.

Urea Estimation

Urea examination was done by an automated analyzer. (Coba's Integra 400, Roche). (Nandan RK, Sivaprasadhasundaram B *et al.* 2005)

Statistical software SPSS-17 was used for statistical analysis. Chi square test was used to estimate the statistical difference for prevalence of dental caries between the study and control groups. Comparisons between control and test groups for salivary urea levels and caries experience were made using unpaired t test

RESULTS

Among the 30 thalassemic patients mean decayed, missing and filled teeth (dmft) value in the primary dentition was found to be 3.57 ± 3.28 and the decayed missing and filled teeth (DMFT) value in the permanent dentition was found to be 1.27 ± 1.53 (Table 1). The dmft value between 1-4 was found in 22 thalassemic patients out of which 7 (31.8%) belonged to the age range of 4-7 years, 9 (40.9%) belonged to the age range of 8-11 years and 6 (27.3%) belonged to the age range of 12 to 14 years. There were 8 children who were caries active having decayed missing and filled teeth value of 5 and more than 5. The highest value of decayed missing and filled teeth among the permanent dentition in these children was found to be 4 and was seen in the age group of 4-7 year olds and 12 to 14 years old.

Table 1: Comparison of Dmft and DMFT in test and control group

| Test group | dmft | DMFT |
|---------------|------|------|
| Mean | 3.57 | 1.27 |
| S.D. | 3.28 | 1.53 |
| N | 30 | 30 |
| Median | 2.00 | 0.50 |
| Control group | dmft | DMFT |
| Mean | 1.97 | 1.03 |
| S.D. | 0.99 | 0.18 |
| N | 30 | 30 |
| Median | 0.00 | 0.00 |

Table 2: Comparison of Salivary Urea Levels in Test and Control Group

| Group | Urea (mg/dl) | |
|---------|--------------|-------|
| Test | 44.60±9.96 | |
| Control | 73.53±14.37 | |
| p value | 0.003 | 0.377 |

The children belonging in the control group had the highest dmft value of 4 in the primary dentition and 17 children were found to be caries free. The highest permanent dentition caries value among the control group was found to be 2 and most of them were caries free.

Thus the mean caries experience in primary dentition was 3.57 ± 3.28 and in control group, it was 1.97 ± 0.99 , the difference being statistically significant ($p < 0.05$). Similarly, the mean caries experience in the permanent dentition of the study group (1.27 ± 1.53) was significantly ($p < 0.05$) higher than the control group (1.03 ± 0.18).

The mean urea level was found to be 44.60 ± 9.96 mg/dl. The control group children had the mean urea level of 73.53 ± 14.37 mg/dl. The results were statistically significant for urea levels among the two groups. (Table 2)

DISCUSSION

The main purpose of the study was to determine relationships between the oral conditions and urea levels in saliva of Thalassemia patients. The dmft (3.57 ± 3.28) and DMFT (1.27 ± 1.53) index showed a higher mean value in the thalassemia group with a statistically significant difference. This may be due to the poor oral hygiene status of the patients as well as preference for sweet consumption which was observed in the thalassemic patients. P. F. Luglie *et al.* in 2002 found a higher streptococcus mutans count in saliva of thalassemic patients with a higher caries status for such patients. The first line of defence against dental caries is the saliva. Saliva is saturated with Calcium and Phosphorous which maintains the solubility constant and prevent dissolution of teeth. (Aldons JA, 1964). In the present study it was observed that calcium (4.25 ± 1.53) of saliva was statistically lower in the test group with a much higher caries status.

The control group had a lower caries status with a higher salivary calcium levels. The results were similar to the finding of Horton, Marrack and Price in 1977. They after examining salivas of several hundred children with varying numbers of carious teeth, reported that as the number of carious teeth increased, the calcium of the

saliva decreased. Phosphorous levels was found to be slightly lower in Thalassemia group (15.12 ± 2.66) though the difference was found statistically non significant. In a study conducted by Shahrabi M, Nikfarjam J, Alikhani A in 2008 similar results were found. The urea concentrations in the saliva was found to be statistically lower in the thalassemic group than in normal healthy control group. Increase in salivary urea and ammonia concentrations have been found to correlate with marked reductions in the extent and duration of plaque acidification following a carbohydrate challenge. (Kleinberg I, Kanapka JA, Craw D (1976) Urea is secreted continuously in the range of 3-10 mM in saliva and crevicular fluids of healthy individuals and is rapidly hydrolyzed by the urease enzymes of oral microflora. Existing data indirectly supports a major role for ureolysis in plaque pH homeostasis. Urea hydrolysis can neutralize plaque acids and may positively influence plaque ecology by preventing the pH from falling to levels that select for the outgrowth of aciduric, cariogenic micro-organisms. In addition, ammonia released by ureolysis can promote remineralization of the tooth enamel. (Pearce EI, Wakefield JS, Sissons CH (1991). The lowered urea concentration in the saliva found in this study may have resulted in the higher mean dmft and DMFT values for thalassemic patients. The lower salivary urea concentration detected in the thalassemia group was similar to results by Siamopoulou-Mavridou A, Mavridis A, Galanakis E et al (1992). So the clinical and salivary data allow us to affirm that thalassemia patients might be considered at risk for caries. However, it is very questionable to state whether this difference is related to the systemic disease. De Mattia et al. In 1996 correlated decay level and thalassemia parameters (mean ferritin value, splenectomy, etc.), but statistically significant results were found only for mixed dentition.⁸⁻¹³

CONCLUSION

In conclusion it can be stated that the risk of oral disease in Thalassemia patients remains high. Dental caries remains a major threat for the thalassemic patients than in their age and sex matched control. Moreover the biochemical composition of urea were lower for the thalassemic patients than the control group and statistically significant results were found in urea levels for the test group. Further investigations are needed to determine the theoretical risk of oral

disease in thalassemic patients and whether saliva can be a useful tool in determining this risk.

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Comparison of Therapeutic Effect of Topical Amlexanox (5%), and Oral Rebamipide (100 mg) in the Management of Oral Aphthous Ulceration

Abstract

Background: Aphthous ulcers are a relatively common condition that causes ulcerations in the oral cavity. It can affect men and women of all ages, races, and geographic regions. Local and systemic conditions, genetic, immunologic, microbial and life style factors all may play a role in the pathogenesis of aphthae. In the past many agents have been tried in their treatment. The study will be aimed at evaluation of the therapeutic efficiency of the following drugs, Amlexanox which inhibits the release of histamine and Rebamipide which acts by enhancing mucosal defense and also their combined efficacy. **Aim:** To compare the effectiveness of Topical Amlexanox (5%), and Oral Rebamipide (100 mg) individually and Topical Amlexanox (5%) given with Oral Rebamipide (100 mg) in the management of oral aphthous ulcerations. **Materials & Methods:** The study comprises of 30 patients, which were clinically diagnosed of aphthous ulcers. They are randomly divided into 3 groups. Group A - Amlexanox (5%), Group B- Rebamipide (100 mg), Group-C - Amlexanox (5%) and Oral Rebamipide (100 mg) and the outcome will be evaluated. **Results:** Amlexanox and Rebamipide together showed better results than administered alone. Amlexanox alone gave adequate pain reduction. **Conclusion:** Use of combination, Amlexanox and Rebamipide can lead to significant pain and ulcer size reduction.

Key words: Amlexanox, RAS, Redamipide

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INTRODUCTION

Recurrent aphthous stomatitis (RAS) is one of the most common oral mucosa diseases. Although RAS represents a very common oral lesion, its etiology is unknown. Some studies^{1,2} have showed that several local and systemic factors, such as local trauma, immunodeficiency, haematinic or zinc deficiency and hormonal changes may play a role in the pathogenesis of RAS. Suspected bacteria and viruses may also associated with RAS.³ Since the etiology is unknown, no curative therapy is available at present. All available systemic or topical treatment methods now a days are to relieve symptom and accelerate healing. Most systemic medications, although effective, have side effects that limit their general use. Therefore, topical agents remain the first choice for the treatment of RAS, due to their effectiveness and safety. Amlexanox (C16H14N2O4) is a topical anti-inflammatory, anti-allergic drug. It has been developed as a 5% topical oral paste for the treatment of patients with RAS⁴⁻⁶ and is currently the only clinically proven product approved by the US FDA for the treatment of aphthous ulcers.⁷ Rebamipide is a new mucoprotective agent and has both gastro-protective effect and ulcer healing actions. Rebamipide enhances preservation of existing epithelial cells and replacement of lost tissue through a multifactorial mode of action⁸.

AIM

The aim of the study was to compare the effectiveness of Topical Amlexanox (5%), and Oral Rebamipide (100 mg) individually and Topical Amlexanox (5%) given with Oral Rebamipide (100 mg) in the management of oral aphthous ulcerations

METHODS AND MATERIALS

The study comprised of 30 patients, which were clinically diagnosed of aphthous ulcers.

The following were the Selection criteria:

Patient with in an age range of 18-65 with clinically diagnosed aphthous ulcerations

Exclusion criteria were as follows:

- Pregnant or lactating females
- Patient with known or suspected history of hypersensitivity to either drug
- Patients with clinically significant findings indicating major systemic diseases

All patients underwent a routine hematological investigation to rule out any hematological abnormalities. An informed consent

was obtained and randomized controlled study was performed. Patient details were recorded on pro-forma designed for this study. A Clinical examination was performed to assess the number, site, size with calibrated periodontal probe and Pain using Visual Analogue Scale (VAS) from 1 to 10 (with 10 being the most severe). 10 patients were randomly selected to receive 5% amlexanox oral paste at the first visit with instructions to apply four times daily, preferably following oral hygiene procedures, till the ulcer heals, they formed Group A. 10 patients were randomly selected to receive Rebamipide (100 mg), at the first visit with instructions to be taken three times daily, till the ulcer heals, they formed Group B. 10 patients were randomly selected to receive 5% amlexanox oral paste at the first visit with instructions to apply four times daily, preferably following oral hygiene procedures, and Rebamipide (100 mg) thrice daily till the ulcer heals, they formed Group C. Patients were dispensed with the medication and asked to return for follow up on day 3 and day 7. The effectiveness of the treatment in all the groups were assessed on the basis of reduction in size and maximum VAS scores. Statistical test, paired t-test for comparison of parameters obtained at different time periods with the baseline values within the group itself was used. A p-value of ≤ 0.05 was taken as statistically significant.

RESULTS

All the patients in our study tolerated the treatment regimens well. None of the patients reported any allergic reactions or toxicity symptoms. The average ulcer size at day 0 was significantly higher in Groups A and C compared to Group B (P-value <0.01 for both). The average ulcer size at day 0 did not differ significantly between Groups A and C (P-value >0.05). The average ulcer size at day 4 was significantly higher in Groups A and C compared to Group B (P-value <0.01 for both). The average ulcer size at day 4 did not differ significantly between Groups A and C (P-value >0.05). The average % change at Day 4 is significantly higher in Group B compared to Group A (P-value <0.05). The average ulcer size at day 7 was significantly higher in Groups A and B compared to Group C (P-value <0.05 for both). The average ulcer size at day 7 did not differ significantly between Groups A and B (P-value >0.05). The average % change at Day 7 is significantly higher in Group C compared to Group B (P-value <0.01) (Figure 1). Thus amlexanox and rebamipide together show maximum decrease in ulcer size.

The average pain score at day 0 did not differ significantly across three study groups (P-value >0.05 for all). The average pain score at day 4 was significantly higher in Groups B and C compared to Group A (P-value <0.01 for both). The average pain score at day 4 did not differ significantly between Groups B and C (P-value >0.05). The average % change at Day 4 was significantly higher in Group A compared to Groups B and C (P-value <0.05 for both). The average pain score at day 7 was significantly higher in Group B compared to Groups A and C (P-value <0.001 for both). The average pain score at day 7 did not differ significantly between Groups A and C (P-value >0.05) (Figure 5). The average % change at Day 7 was significantly higher in Groups A and C compared to Group B (P-value <0.001 for both). So the results indicated that amlexanox and rebamipide together, and also amlexanox alone lead to significant pain resolution.

So, to summarize, Combination of Amlexanox paste and Ribamipide tablet together more efficiently accelerate the healing time, reduce ulcer size, reduce the duration of pain.

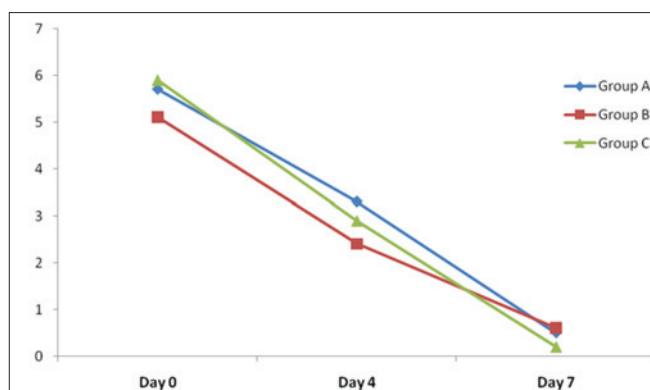


Figure 1: The distribution of ulcer size at each stage across three study groups

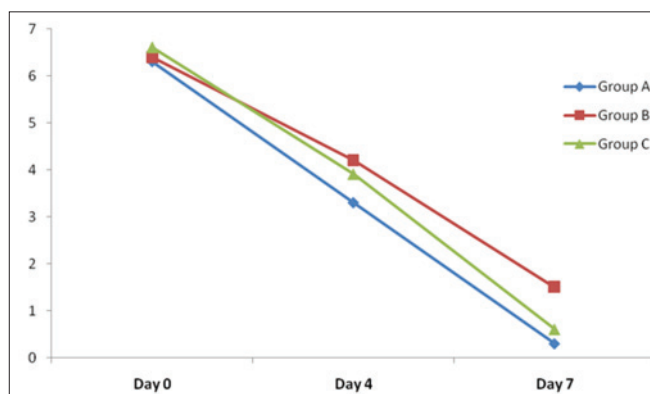


Figure 2: The distribution of pain score at each stage across three study groups

DISCUSSION

Recurrent aphthous stomatitis is one of the most common oral ailments. The patient of RAS presents with painful, recurring ulcers of the oral cavity. Diagnosis of RAS rests on features: A history of recurrent ulcers since childhood or adolescence and presence of typical multiple round or ovoid ulcers on examination.

If the history and clinical examination are characteristic of RAS, routine laboratory testing is not necessary in most individuals. Amlexanox is 2-amino -7-isopropyl-5-oxo 5H benzopyrano pyridine-3-carboxylic acid. It is a drug approved by US FDA for the treatment of aphthous ulcerations.⁹ Mechanism of action-It inhibits the release of histamine and leukotrienes from mast cells, basophils and neutrophils, possibly through increasing intracellular cyclic AMP content in inflammatory cells, a membrane stabilizing effect or inhibition of calcium influx.¹⁰ Rebamipide is a new mucoprotective agent and is chemically 2-4-chlorobenzoylamino-3-quinolinone propionic acid.¹¹ It has both gastro-protective effect and ulcer healing actions. Rebamipide enhances preservation of existing, epithelial cells and replacement of lost tissue through a multifactorial mode of action. Mechanism of action- enhances the mucus secretion by 160% thus increasing the protective ability of mucosal barrier and improves quality of mucus, Stimulates bicarbonate secretion for maintenance of pH, Diminishes release of inflammatory cytokines.¹²

CONCLUSION DERIVED FROM THE STUDY

The findings of the study indicate that Amlexanox oral paste given alone is more effective than rebamipide given alone. Also Amlexanox

along with Rebamipide tablet was found to be more efficacious than Amlexanox and Rebamipide given alone in the treatment of oral aphthous ulcerations. Thus the concurrent use of Amlexanox with Rebamipide and also Amlexanox alone can be used safely for the treatment of oral aphthous ulcerations.

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Evaluation of the Effect of Temperature Changes on the Dimensional Stability of Poly (Vinyl Siloxane) Impression Material

Abstract

Background: When precision impression is required, Poly vinyl siloxane impression material is preferred. The main variable affecting the accuracy is thermal contraction to which the impression material is subjected while making the impression. In this research study the effect of temperature changes on the dimensional stability is investigated. **Materials and Methods:** Dentsply's Reprosil and Heraeus Kulzer's Provil (novo) were tested for the stability at 2°C, 28°C and 40°C. Impressions were made at 37°C ±1°C which was mouth temperature by injecting low viscosity material on the die and loading the custom tray with medium viscosity. Impressions were poured at room temperatures of 28°C and 40°C. Impressions were poured in type IV die stone (Pearlstone, Asian Chemicals, Gujarat, India) following manufacturers' instructions. The impressions and dies were divided into 4 groups of six samples each. A total of 48 impressions were made (2 materials × 4 groups × 6 impressions each). For measurements traveling microscope that can measure up to 0.001 mm was used. The data were tabulated, and subjected to statistical analysis using the ANOVA and Duncan multiple range tests. **Results:** Temperature had a significant effect on the dimensional stability of the poly (vinyl siloxane) impression materials. **Conclusion:** At 28°C, the materials showed contraction and at 40°C, both the materials showed expansion. On cooling both the materials differed in their behavior. It can be concluded that temperature as well as the material used influence the dimensional stability of poly (vinyl siloxane) impression materials.

Key words: Impression materials, Addition silicones, Elastomeric impression material, Effect of temperature on addition silicone impression materials

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INTRODUCTION

The accuracy and dimensional stability of addition silicone impression materials have been the subject of numerous investigations and is well established.¹⁻⁷ Research has primarily focused on 1) degree of polymerization shrinkage⁸ 2) length of storage time⁹ 3) effect of humidity.¹⁰ Few studies have addressed the effect of temperature on the dimensional stability of impression material.

Mccabe JF¹¹ stated that addition curing silicone do not produce a by-product during polymerization so that any change in dimension depends on thermal contraction of the material when the temperature is reduced from the mouth temperature of 37°C to room temperature of 23°C. Marco corso¹² reported that though poly vinyl siloxane showed less consistent results when impressions were heated to 40°C followed by allowing the impressions to reach room temperature of 23°C, it tended to improve the accuracy of the impression by expansion.

The investigations have mainly focused on the manipulation of the elastomeric impression materials at room temperature of 23°C.

The purpose of the study was to investigate the effect of extreme heat and cold ranging from 28°C to 40°C of room temperatures on the dimensional stability of two commonly used elastomeric impression

materials as the impression may be subjected to different temperature while making impression namely, the storage temperature, mouth temperature (while making the impression) and room temperature (while pouring the cast). The effect of refrigeration (2°C ± 1°C) was also evaluated.

MATERIALS AND METHODS

The dimensional stability of impressions was assessed indirectly by measuring vertical and horizontal grooves on the gypsum casts recovered from impressions of master model that consisted of metal die according to the ADA specification number 19, in the form of cone that represented a premolar crown preparation having a base of 10 mm diameter and the height of 12 mm. The combined taper from the base of the cone to the tip was 7°C. The dimensions measured on the master die were 1) Diameter (a-b) 2) Vertical height (line c-d). Three measurements were made of each distance with a traveling microscope having a variability of ± 2 micrometer and the mean values were calculated. Line a-b measured 5.953 mm. Line c-d measured 10.04 mm. The width of lines was 0.02 mm (Figures 1-3). The dimensions of the gypsum dies were then compared with those of the metal master die (control).^{13,14}

Two commercially available poly vinyl siloxane impression materials were selected. 1) Provil (novo).

Heraeus Kulzer GmbH and COkg. Germany - Medium viscosity (batch no-EN 24823) And Light Bodied Consistency (Batch No En4823). 2) Reprosil Dentsply/Caulk, De - Medium Body Viscosity (Batch No 026402(6/95) And Light Bodied Consistency (026400(6/95). A total of Forty eight impressions were made of standardized master die. A prototype custom tray was fabricated with acrylic resin 48 hours prior to use on the master die and a uniform thickness of 2 mm of impression material was provided¹⁵ with the handles on either side of top edge of the tray to hold. Mechanical retention was provided with perforations

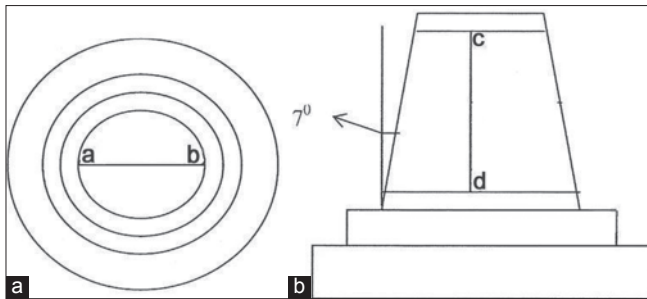


Figure 1: Schematic diagram of the master die. (a) Top view of the cone, (b) Side view of the cone



Figure 2: Steel master die: Showing vertical groove



Figure 3: Top view of master die showing horizontal groove

(Figure 4). It was stored in water at room temperature. Tray adhesive was applied evenly to the tray 30 minutes prior to making impressions.

Polyvinyl siloxane impressions were made by loading the custom tray with medium viscosity material and injecting low viscosity material on the die and placed in a temperature controlled room at $37^{\circ}\text{C} \pm 1^{\circ}\text{C}$ to reproduce the intraoral temperature for 10 minutes prior to separation from master die. After separation the impressions were rinsed with room temperature distilled water for 20 seconds and air-dried. They were poured using type IV Dental Stone with water powder ratio following manufacturer's instructions. Dies were separated from the impression 60 minutes after pouring. A traveling microscope with resolution of 0.5 micrometer was used to measure the horizontal and vertical lines. The impressions and dies were divided in to 4 groups for each impression material of six samples each.

In group -A impression materials were stored at $28^{\circ}\text{C} \pm 1^{\circ}\text{C}$ for 24 hours. After pouring the cast, impressions were allowed to set at $28^{\circ}\text{C} \pm 1^{\circ}\text{C}$ for one hour.

In group -B impression materials were stored at $2^{\circ}\text{C} \pm 1^{\circ}\text{C}$ for 30 minutes before making impression. After pouring the cast, impressions were allowed to set at $28^{\circ}\text{C} \pm 1^{\circ}\text{C}$ for one hour.

In group - C impressions were made at 37°C with impression materials stored at $40^{\circ}\text{C} \pm 1^{\circ}\text{C}$ for 24 hours.

After pouring the cast, impressions were allowed to set at $40^{\circ}\text{C} \pm 1^{\circ}\text{C}$ for one hour.

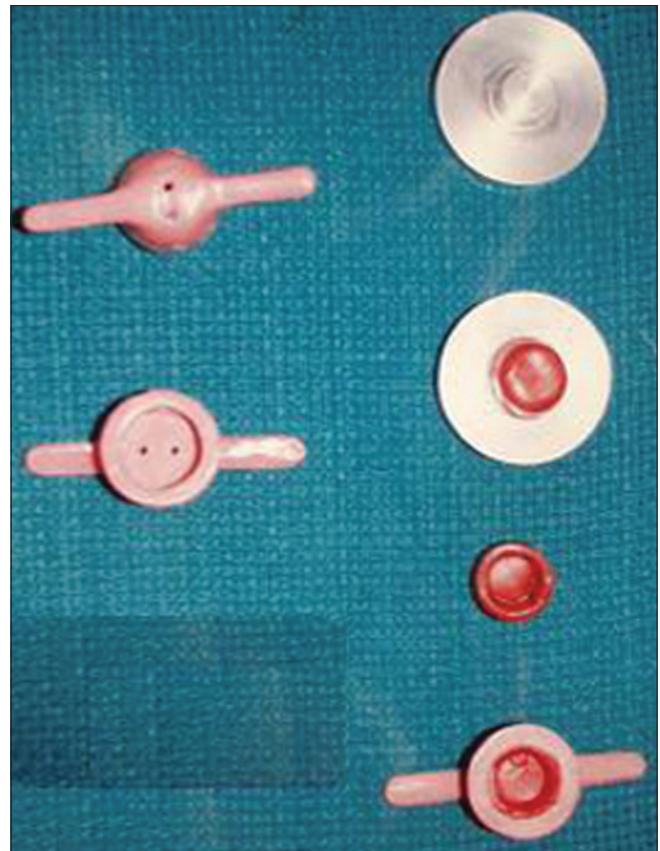


Figure 4: Steps in making custom tray

In group -D impression materials were stored at $2^{\circ}\text{C} \pm 1^{\circ}\text{C}$ for 30 minutes and then impressions were allowed to set at $40^{\circ}\text{C} \pm 1^{\circ}\text{C}$ for one hour (Figure 5).

After recovery of the stone dies, the dimensions of lines a- b and c-d were measured using traveling microscope. Three measurements were made for each line and means were calculated. The dimensions of each group were compared to those of the master die. Data analyzed using the ANOVA and Duncan Multiple Test.



Figure 5: Dies prepared at different temperatures

RESULTS

All the recorded means in Table 1 represent average of three readings of horizontal lines and vertical lines.

The dimensional variation in the stone dies in comparison to those of master die were recorded and calculated as the percent deviation from the standard.

Table 1 shows standard deviation values and percent deviation. Group A produced contraction for both the materials at 28°C .

Group B produced greater dimensions of stone dies than the steel die for both the materials.

Group C produced greater dimensions of stone dies than the steel die for both the materials.

Group D produced greater dimensions of stone dies than the steel die for Provil (novo) and smaller dimensions for Reprisil.

A one factor ANOVA (Table 2) with stain less model as a control was used to test the differences between the groups. After finding the significant differences, a comparison of individual means was performed by the Duncan Multiple Range Test (Table 3). Standard 't' test was used to compare between the groups (Table 4a and 4b). Storage temperatures were statistically significant for Reprisil ($p < 0.05$) that showed significant group differences for the vertical line. For the horizontal line significant difference was found between group A and B. For Provil (novo) p-value was insignificant ($p > 0.05$) for horizontal line where as significant for vertical line between group A and C.

DISCUSSION

Numerous factors influence the physical and mechanical properties of the elastomeric impression materials. Various factors such as size, rigidity of impression tray, manipulation of material itself, impression technique, temperature, humidity, length of storage time etc. are the factors need to be considered.

In the investigation the effects of storage temperature of two commercially available polyvinyl siloxane impression materials at two different temperatures were evaluated by using a precision steel

Table 1: SD values and percentage deviation

| Groups | Provil (novo) | | | Reprisil | | |
|----------------------------------|---------------|---------|-------------|-----------|---------|-------------|
| | Mean (mm) | SD | % Deviation | Mean (mm) | SD | % Deviation |
| a) For horizontal line | | | | | | |
| Group-A (28°C) | 5.9850 | 0.05958 | 0.5375 | -5.9457* | 0.06662 | -0.1226* |
| Group-B (2°C) | 6.1583 | 0.40167 | 3.4486 | 6.1017 | 0.13438 | 2.4979 |
| Group-C (40°C) | 6.0483 | 0.09704 | 1.6008 | 6.0467 | 0.09048 | 1.5739 |
| Group-D (2°C) | 6.000 | 0.07510 | 0.7895 | -5.9517* | 0.12123 | -0.13* |
| Baseline reading | 5.9530 | 0.00000 | | 5.9530 | 0.00000 | |
| b) For vertical line | | | | | | |
| Group-A (28°C) | -9.7600 | 0.36000 | -2.7888 | -9.9767* | 0.07815 | -0.6304* |
| Group-B (2°C) | -10.0133 | 0.23746 | -0.2655 | 10.1500 | 0.08532 | 1.0959 |
| Group-C (40°C) | 10.0983 | 0.07111 | 0.5806 | 10.1233 | 0.09201 | 0.8296 |
| Group-D (2°C) | 10.0600 | 0.09940 | 0.1992 | -9.8717* | 0.12608 | -1.6762* |
| Baseline reading | 10.0400 | 0.00000 | | 10.040 | 0.00000 | |

SD: Standard deviation

Table 2: Results of one way analysis of variance

| Dependent variable | Source | Sum of squares | Df | Mean square | F | Sig. |
|--------------------------------|----------------|----------------|----|-------------|--------|------|
| Provil: Horizontal line (mm) | Between groups | 0.154 | 4 | 0.038 | 1.069 | 0.39 |
| | Within groups | 0.900 | 25 | 0.036 | | |
| | Total | 1.054 | 29 | | | |
| Provil: Vertical line (mm) | Between groups | 0.435 | 4 | 0.109 | 2.706 | 0.05 |
| | Within groups | 1.005 | 25 | 0.040 | | |
| | Total | 1.440 | 29 | | | |
| Reprosil: Horizontal line (mm) | Between groups | 0.120 | 4 | 0.030 | 3.307 | 0.02 |
| | Within groups | 0.227 | 25 | 0.009 | | |
| | Total | 0.347 | 29 | | | |
| Reprosil: Vertical line (mm) | Between groups | 0.307 | 4 | 0.077 | 10.152 | 0.00 |
| | Within groups | 0.189 | 25 | 0.008 | | |
| | Total | 0.495 | 29 | | | |

Note: Small significance values (<0.05) indicate group differences

Table 3: Descriptive statistics along with the results of duncan multiple range test (DMRT)

| Groups | Provil (novo) | | | | Reprosil | | | |
|---------------------|----------------------|------------|-----------------------|------------|----------------------|------------|-----------------------|------------|
| | Horizontal line (mm) | | Vertical line (mm) | | Horizontal line (mm) | | Vertical line (mm) | |
| | Mean | Std. error | Mean | Std. error | Mean | Std. error | Mean | Std. error |
| Group-A (28°C) | 5.9850 ^a | 0.02432 | -9.7600 ^a | 0.14697 | -5.9457 ^a | 0.02720 | -9.9767 ^b | 0.03190 |
| Group-B (28°C+2°C) | 6.1583 ^a | 0.16398 | -10.0133 ^b | 0.09694 | 6.1017 ^b | 0.05486 | 10.1500 ^d | 0.03483 |
| Group-C (40°C) | 6.0483 ^a | 0.03962 | 10.0983 ^b | 0.02903 | 6.0467 ^{ab} | 0.03694 | 10.1233 ^{cd} | 0.03756 |
| Group-D (40°C+2°C) | 6.0000 ^a | 0.03066 | 10.0600 ^b | 0.04058 | -5.9517 ^a | 0.04949 | -9.8717 ^a | 0.05147 |
| Group- E (Baseline) | 5.9530 ^a | 0.00000 | 10.0400 ^b | 0.00000 | 5.9530 ^a | 0.00000 | 10.040 ^{bc} | 0.00000 |

Note: Duncan multiple range test (DMRT): The same superscripts in the columns indicate no significant difference

die with a horizontal groove measuring 5.953 mm in length on the top of the cone and vertical groove measuring 10.04 mm in length. Impression materials were stored at 2°C, 28°C, and 40°C. Polyvinyl siloxane impression were made with single stage impression technique at 37°C±1°C by injecting low viscosity material on the die and loading the custom tray with medium viscosity. Impressions were poured at room temperatures of 28°C and 40°C. The impressions and dies were divided into 4 groups of six samples each. A total of 48 impressions were made. A travelling microscope with a resolution of 0.5 micrometer was used to measure the horizontal and vertical lines.

Cooling of the impression from mouth temperature to room temperature has been correlated with decrease in dimensional accuracy because of high coefficient of thermal contraction of elastomeric impression materials.¹⁶ In this study the dimensions of the dies were small at 28°C and agree with the previous works¹² and larger at higher temperature (40°C) than the mouth temperature.

Storage of impression at 2°C followed by allowing the impression to reach room temperatures (28°C, 40°C) resulted in inconsistent results between both materials. Marco corso et al¹² reported that when elastomeric impression materials were stored at 23°C, they showed decrease in the dimensions. Chee et al¹⁴ observations differed in that all the gypsum dies were larger in dimensions when stored at 2°C & 23°C and poured at 23°C. Chee et al,¹⁴ Araujo and Jorgensen¹⁷ reported that reheating an elastomeric impression to 37°C for 15 minutes before pouring the master cast improved accuracy. The magnitude of changes observed varied in the studies.

The measurements in Table 1 show a significant difference in the dimensions of stone dies as compared to those of master die at 28°C and 40°C. The scatter of percent variation varied from -0.1348% to +0.5375% for horizontal line and -2.788% to -0.6304% for vertical line in case of stone dies retrieved from group-A impressions. Among all groups Group A (at 28°C) produced least dimensional changes in the diameters.

Horizontal line

Reprosil

The material demonstrated contraction at 28°C and expansion at 40°C. Refrigeration of the material at 2°C showed expansion with the room temperature 28°C and contraction with the room temperature 40°C.

Provil (NOVO)

The material demonstrated expansion at 2°C, 28°C, 40°C. Storage temperatures were statistically insignificant (p>0.005).

Vertical line

Both the materials demonstrated contraction after storage at 28°C and expansion at 40°C. After storage at 2°C both materials differed in their behaviour. The standard't' test revealed significant differences between 28°C and 40°C for both materials (p<0.005) However refrigeration of the material did not had any significant effect on Provil (p>0.005). The material showed contraction in group-B

Table 4: Standard 't' test between groups

| Groups | Provil (novo) | | | Reprosil | | |
|------------------------|---------------|---------|--------------|----------|---------|--------------|
| | t-value | p-value | Significance | t-value | p-value | Significance |
| a) For horizontal line | | | | | | |
| Gp-A & Gp-C | 1.18 | P>0.05 | NS | 2.216 | P>0.05 | NS |
| Gp-A & Gp-B | 1.055 | P>0.05 | NS | 2.55 | P>0.05 | S |
| Gp-C & Gp-D | 0.86 | P>0.05 | NS | 1.56 | P>0.05 | NS |
| b) For vertical line | | | | | | |
| Gp-A & Gp-C | 2.27 | P>0.05 | S | 2.992 | P>0.05 | S |
| Gp-A & Gp-B | 1.45 | P>0.05 | NS | 3.70 | P>0.05 | S |
| Gp-C & Gp-D | 0.78 | P>0.05 | NS | 3.97 | P>0.05 | S |

S: Significance, NS: Nonsignificance

and expansion at group-D. Where as refrigeration had statistically significant effect on Reprosil ($p < 0.005$). It showed expansion in group-B & contraction in group-D (Table 4b).

Overall dimensional changes observed did not differ greatly from master die measurements ($p > 0.005$) in all the groups for both materials.

In the study for the horizontal and vertical lines, both the variables - the material used and storage temperature influenced the results. However differences were extremely small and not clinically relevant.

The horizontal measurements in group-A showed decrease in diameter up to 7-63 micrometer. The C-group showed increase in diameter from 58-95 micrometer. Gordon et al.¹⁸ reported that the deviation of 60 micrometer increase in diameter could adequately provide die space needed for fabrication of crowns without need of applying spacer.

CONCLUSION

A full arch impression may distort in three dimensions and distortion in this third dimension was not evaluated in this study. Within the limitation of this study with the assumption that the linear expansion of the die stone is negligible it could be concluded that dimensional stability of the polyvinyl siloxane impression materials at different temperatures differed. Dimensional changes were not only related to the temperature but also it was related to the material used.

Though each group differed individually, there was no significant difference from the master die measurements. Both the materials were comparatively accurate when compared with the master die. However Provil produced consistent results between groups than Reprosil. Within the limitation of the study following conclusions were drawn:

1. Storing and pouring the impression at 28°C resulted in the decreased dimensions.
2. When materials were stored and poured at 40°C resulted in expansion that compensated partially for the polymerization shrinkage.
3. Though cooling the impression material produced inconsistent results, it did not decrease the accuracy of gypsum dies. Thus

this method would be an acceptable means of extending working time when this would prove clinically advantageous.

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Applicability of Various Laws of Pulp Chamber in Deciduous Molars

Abstract

Background: The pulp chamber anatomy of deciduous molars has been very perplexing even for a well-trained Pedodontist. There is a large difference between the pulp chamber anatomy of the primary and the permanent teeth. **Aim:** The aim of this in vitro study was to find out the applicability of the Krasner's Laws of pulp chamber anatomy to deciduous teeth. This study also tested the hypothesis whether the Krasner and Rankow's laws of pulp chamber anatomy were similar for primary teeth in comparison with permanent teeth. **Methodology:** 40 Extracted primary molar teeth were used. Teeth were sectioned at the level of the CEJ and observed under Stereomicroscope. Photographs were taken and examined for the applicability of the laws of Pulp chamber anatomy and measurements from the images were made. For intergroup comparison One way Anova test was done followed by Post Hoc Turkeys test for Pair wise comparison. **Results:** There was no statistical difference between the individual distances measured from pulp chamber wall to the external tooth surface, thus proving the Law of Concentricity. **Conclusion:** Laws of centrality, concentricity, CEJ, colour change and orifice location were applicable to all primary teeth. The law of symmetry can be applied for the mandibular second molar.

Key words: Pulp chamber, Anatomy, Deciduous molars

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INTRODUCTION

Endodontic therapy is a microneurologic surgical procedure. In order to perform this surgical procedure, there must be a thorough understanding of the anatomy of both pulp chamber and root canal system.¹ The thin line between conservative zone and endodontic zone is to be maintained by accurate detection of pulp space. The access to the pulp chamber is also determined by a preset and well defined set of laws.² The correlation of occlusal anatomy with the locations of the root canal orifice has been used to facilitate access cavity design. The cement-enamel junction (CEJ) is also a consistent landmark in the primary as well as permanent teeth in comparison with the occlusal surface. The correlation of CEJ with the locations of the root canal orifices has been studied by Krasner and Rankow¹ in permanent teeth. There is scarcity of literature on the Laws of Pulp chamber anatomy in deciduous. Hence, this study was undertaken to find out if the laws of pulp chamber anatomy of permanent molars can be made applicable to the pulp chamber anatomy of deciduous molars.

MATERIALS AND METHODS

A total of 40 extracted deciduous molars were used. Teeth were randomly divided into maxillary and mandibular molars. Carious teeth indicated for extraction and teeth with resorbed roots were included in the study. Teeth with extensive carious destruction reaching beyond the pulp chamber were excluded. The teeth had a wide variety of crown conditions namely; virgin crowns, restorations, attrited teeth, caries affected teeth.

All extracted teeth were stored in water to prevent desiccation and were sectioned at the level of CEJ with a water cool diamond disc

so that the outline of the pulp chamber relative to the external surface of the tooth could be observed. Each cut section were irrigated with water, dried and examined. 20 sections were observed under stereomicroscope (10X magnification) and remaining 20 sections were observed under surgical operating microscope (8X magnification).

Photographs of all 40 sections were captured with Canon EOS SLR camera (macrolens) for the applicability of the laws of pulp chamber anatomy and measurements were made using the software "Chroma Image analyzer (MVIC 2005)".

For the purpose of statistical analysis 2 separate groups were made. 20 samples were analyzed for the applicability of law of concentricity and rests were analyzed for applicability of law of symmetry. Teeth were categorized in to group 1 and 2 as

Group 1 – Teeth in which 3 orifices were located.

Group 2 – Teeth in which 4 orifices were located.

Data was compiled on Microsoft Excel sheet. Mean and standard deviation were calculated. For statistical tests SPSS (Standard Package for Social Sciences) Chicago Iu version 7 software was used. For intergroup comparison One way Anova test was used followed by Post Hoc Turkeys test for Pair wise comparison. P value < 0.5 was considered to be statistically significant.

RESULTS

The results showed that the p value in group 1 for intergroup variance and within the group, both of which are non-significant as observed in Table 1, Graph 1. Thus it is confirmed that within the 20 teeth

used there was no statistical difference between the three individual distances measured from pulp chamber wall to the external tooth surface in relation to either of the orifices, thus proving the Laws of Concentricity.

Similarly for group 2 the intergroup variance and for within the group variance both of which were also non-significant as in Table 2, Graph 2.

DISCUSSION:

Primary teeth exhibit anatomical differences in comparison with the permanent teeth in terms of size, morphology and relative size of the pulp chamber. Nevertheless, definite patterns and relationships of the pulp chamber and the CEJ were observed. The results of this study showed that the Krasners laws of pulp chamber were applicable when the relationship of the pulp chamber to the clinical crown was at the CEJ in primary teeth. The Law of centrality, concentricity and CEJ were applicable.

Law of centrality: The floor of the pulp chamber is always located in the center of the tooth at the level of the CEJ (Figure 1). This law will help prevent crown perforations in a lateral direction. Because the pulp chamber is always centrally located at the level of the CEJ, the clinician can use this as a circular target regardless of how non anatomic the clinical crown or restoration may be. Even if the crown sits at an obtuse angle to the root, the CEJ can still be a reliable landmark for locating the pulp chamber.³

Law of concentricity: The walls of the pulp chamber are always concentric to the external surface of the tooth at the level of the CEJ (Figure 2a and 2b). It helps to determine the outline form of the access cavity preparation. When the bulge of CEJ is seen mesiobuccally,

pulp chamber extends in that direction. If the tooth is narrow mesiodistally, it means pulp chamber is also narrow mesiodistally.⁴

Law of the CEJ: The CEJ was the most consistent anatomic landmark observed in primary teeth similar to the permanent teeth. (Figure 3). The roof of the pulp chamber coincided with the CEJ. This is consistent with findings in permanent teeth as seen in previous studies. Thus the clinician can use the CEJ as a landmark regardless of absence of anatomic details on the clinical crown or restoration and drifting of the primary tooth. A common error of over enlargement internally is by starting an access too far mesially leading to perforations. This is prevented by using CEJ as the guide line.⁵

Law of Symmetry 2: Except for the maxillary molars, the orifices of the canals lie on a line perpendicular to a line drawn in a mesial-distal direction across the centre of the floor of the pulp chamber. (Figure 4a and b). Laws of symmetry in permanent teeth are applicable for first molars than second molars in the mandibular teeth. But the scenario in primary teeth was completely different. Second molars followed laws of symmetry rather than the primary first molars.

This study corresponds to direct observations of anatomic elements like crown, pulp chamber floor, colour of floor, location of the canals, and their relationships to each other.

Other findings in this study were-

Law of colour change: Colour of the pulp chamber floor is always darker than the walls (Figure 5).

Law of orifice location 1: The orifices of the root canals are always located at the junction of the walls and the floor (Figure 6).

Law of orifice location 2: The orifices of the root canals are located at the angles in the floor-wall junction (Figure 7).

Table 1: Differences between 3 Distance Measurements from Pulpal Chamber Wall to External Tooth Surface

| | Mean | Standard deviation | P value of ANOVA |
|------------------------------|----------|--------------------|------------------|
| Distance 1 | 2.000600 | 4077625 | 0.7* |
| Distance 2 | 1.910000 | .3510302 | |
| Distance 3 | 1.880000 | .3047768 | |
| * = p>0.05 = Non Significant | | | |

Table 2: Difference between 4 Distance Measurements from Pulpal Chamber Wall to External Tooth Surface

| | Mean | Standard deviation | P value of ANOVA |
|------------------------------|----------|--------------------|------------------|
| Distance 1 | 2.020000 | .2097618 | 0.818* |
| Distance 2 | 2.040000 | .1837873 | |
| Distance 3 | 1.970000 | .1337494 | |
| Distance 4 | 2.020000 | .1398412 | |
| * = p>0.05 = Non Significant | | | |



Figure 1: Mandibular 1st molar)

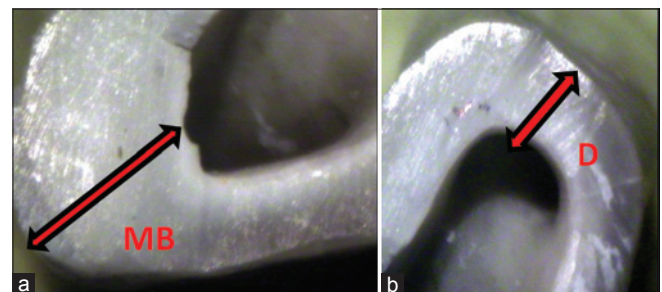


Figure 2: (a and b) Mandibular 1st molar



Figure 3: Maxillary 2nd molar

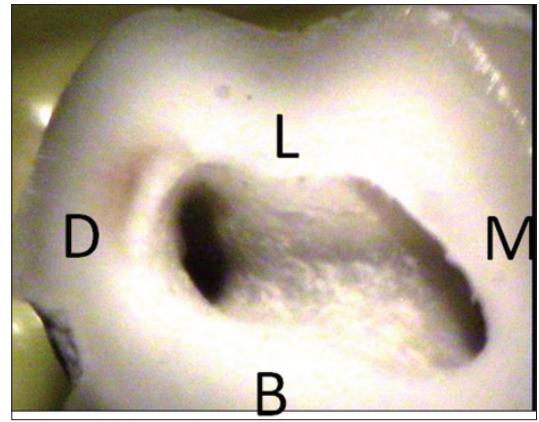


Figure 7: Mandibular 1st molar

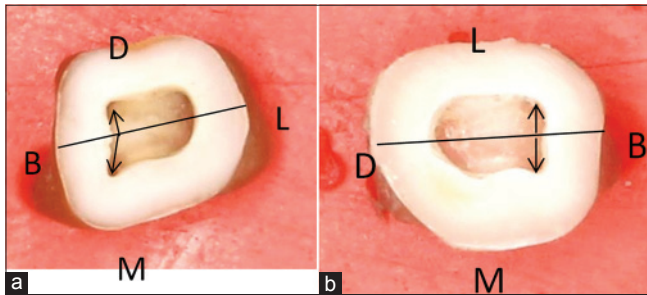


Figure 4: (a and b) Maxillary 2nd Molar. Mandibular 2nd molar

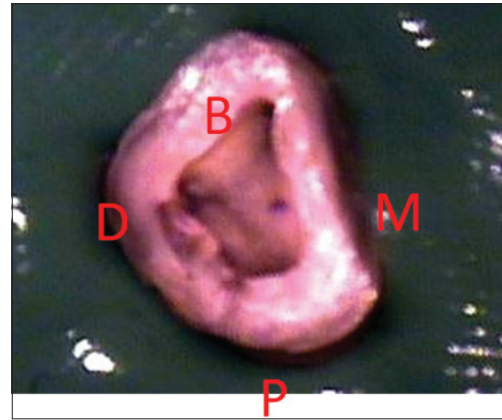
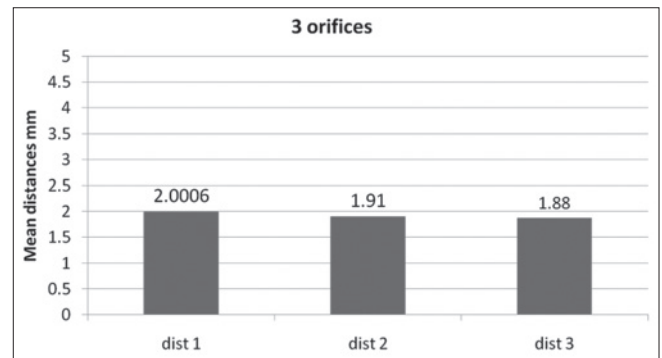


Figure 8: Maxillary 2nd Molar



Figure 5: Maxillary 2nd Molar



Graph 1: Mean of distances in teeth with 3 orifices

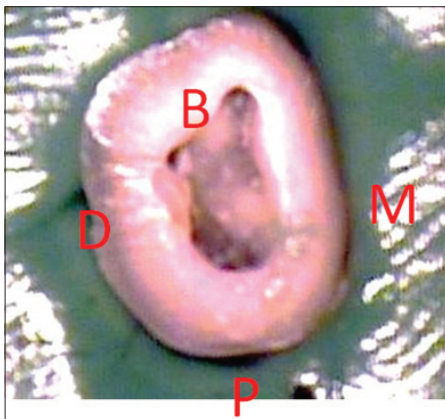
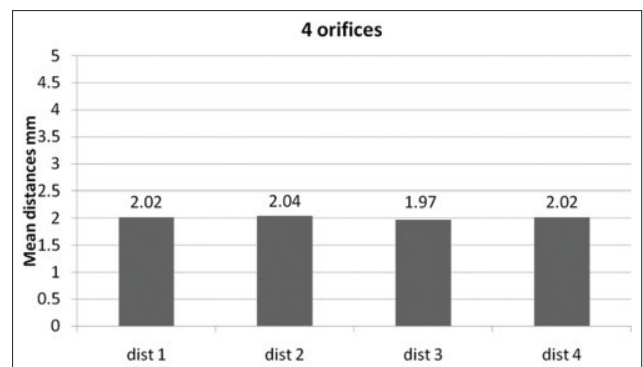


Figure 6: Maxillary 2nd Molar



Graph 2: Mean of distances in teeth with 4 orifices

Law of orifice location 3: The orifices of the root canals are located at the terminus of the root developmental fusion lines (Figure 8).

CONCLUSION

Similar to the permanent molars the law of symmetry is not applicable to maxillary deciduous molars.

In 1st deciduous molars laws of centrality and concentricity were followed but laws of symmetry were not applicable.

It was also observed that the laws were more applicable to 2nd deciduous molars than 1st, as the opposite is true for permanent molars.

These laws may be used to accurately determine the exact location and position of root canal orifices during access cavity preparation after substantial increase in the sample size.

ACKNOWLEDGEMENT

The authors declare that they have no conflict of interests.

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Current Concept of Relapse in Orthodontic Treatment - A Literature Review

Abstract

Retention is the final phase of active orthodontic treatment where teeth are maintained in a healthy, functional, and esthetic position. The quest to obtain a long term stable result of the achieved orthodontic corrections against relapse factors is brought about by the retention phase of treatment. Numerous factors have been reported to play a role in post treatment stability with no definite conclusions regarding the relative contribution of each of these factors towards stability and relapse. The review numerates those factors and current concept on the relapsing tendency of the orthodontically corrected teeth. The concept of all the studies and tendencies of reverting of the treatment results is been discussed briefly in this article. Retention has been advocated on the basis of reorganisation of the periodontal tissues and late growth changes and that after a specified period of time, stability of tooth position would be achieved. This idea is now being challenged and only way to ensure long-term alignment of the teeth is by the use of fixed or removable retention.

Key words: Fixed retention, Relapse, Removable retainer, Retention

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INTRODUCTION

In orthodontics, although the patient may feel that treatment is complete, it's like in sporting events, "no matter how good things look for one team late in the game, it's not over till it's over". Hence, treatment is over only when the retention phase of treatment is completed. Orthodontic treatment results are potentially unstable and hence retention is necessary.

There are primarily four reasons:

- 1) The gingival and periodontal tissues are affected by orthodontic tooth movement and require time for reorganization when the appliance is removed.
- 2) The teeth may be in an inherently unstable position after the treatment, so that the soft tissue pressures constantly produce a relapse tendency.
- 3) Changes produced by growth may alter the orthodontic treatment result.
- 4) To permit neuromuscular adaptation to the corrected tooth position.

Teeth that have been moved into occlusion has tendency to revert back to their formal malpositions.¹ The quest to obtain a long term stable result of the achieved orthodontic corrections against the above mentioned factors is brought about by this retention phase of treatment. Due to the slow rate of reorganization of the gingival and periodontal structures, retention is advocated of the corrected tooth positions though placed in a stable position with essential completion of growth. The principle of antagonizing this tendency of teeth/structures to move back to their original malpositions is the basis of retention.

DISCUSSION

Relapse is the term applied to the loss of any correction achieved by orthodontic treatment. It's a histogenic and morphogenic response to some anatomical and functional violation of an existing state of anatomic and functional balance.² It is usually thought of as a 'rebound' movement in which teeth recoil back somewhere close to their original positions once retentive forces are removed.^{3,4}

Numerous factors have been reported to play a role in post treatment stability with no definite conclusions regarding the relative contribution of each of these factors towards stability and relapse.

Some of the factors suggested are as follows:

Alteration of Arch Form

McCauley (1944)⁵ and Reidel (1960)⁶ have agreed that the arch form and width should be maintained during orthodontic treatment.

Artun (1990)⁷ stated that proclination may be stable provided lower incisors are initially retroclined, a reason for the retroclination determined, and the cause eliminated during treatment.

Maintenance of arch width has been found in cases of mandibular expansion concurrent with rapid palatal expansion.

Moussa et al (1995)⁸ carried out the study in 55 patients who had undergone rapid palatal expansion in conjunction with edgewise mechanotherapy with a minimum of 8 years post retention. Their results showed good stability for upper intercanine and upper and lower intermolar widths.

Stability of the mandibular intercanine width was poor with the post treatment position closely approximating the pretreatment dimension.

De La Cruz *et al* (1995)⁹ carried out a 10 year post retention study on 87 patients to determine the long-term stability of orthodontically induced changes in maxillary and mandibular arch form. They found that the arch form tended to return toward the pretreatment shape.

Periodontal and Gingival Tissues

Orthodontic tooth movement especially tooth rotations is proposed to result in stretching of the collagen fibers.

Reitan (1959)¹⁰ has attributed these stretched fibers in bringing about rotational relapse by pulling the teeth back toward their pretreatment position.

After the placement of a tattoo marker on the attached gingiva in dogs, Edwards (1968)¹¹ also demonstrated incomplete reorganization of gingival tissues over a 5 month post retention period. With this in mind, various experimental approaches have been investigated, ranging from immediate torsion with surgical forceps, removal of cortical bone, and removal of attached gingiva.

Therefore, circumferential supracrestal fiberotomy was advocated to allow for the release of soft tissue tension and reattachment of the fibers in a passive orientation after orthodontic tooth rotation.^{12,13}

Mandibular Incisor Dimensions

Peck and Peck (1972)¹⁴ after a study of 45 untreated normal occlusions advocated reduction of mandibular incisors to a given faciolingual/mesiodistal ratio to increase stability.

Gilmore and Little (1984)¹⁵ studied 134 treated and 30 control cases a minimum of 10 years post retention and showed a weak association between long term irregularity and either incisor width or FL/MD ratio. Less than 6% of crowding could be explained by this ratio. The tooth structure plays only a minor role in the etiology of late mandibular incisor crowding.¹⁵

Boese (1980)¹⁶ carried out reproximation in conjunction with circumferential supracrestal fiberotomy in relation to the mandibular incisors and evaluated 9 years post-retention mandibular incisor irregularity. He found good stability with post retention irregularity index of only 0.62 mm.

Bolton (1958)¹⁷ using 55 cases of excellent occlusion determined that a certain percentage relationship must exist between the maxillary and mandibular teeth if normal occlusion is to be established.

Neff (1949)¹⁸ gave the 'anterior coefficient' by dividing mandibular into maxillary anterior tooth size as determinants of stability.

Influence of Environmental Factors and Neuromusculature

Strang (1949)¹⁹ theorized that the mandibular intercanine and intermolar widths are accurate indicators of the individuals muscle balance and dictate the limits of expansion during treatment.

Weinstein *et al* (1963)²⁰ and Mills (1966)²¹ stated that the lower incisors lie in a narrow zone of stability in equilibrium between opposing muscular pressure and that the labiolingual position

of the incisors should be accepted and not altered by orthodontic treatment. The orthodontist should aim at harmonizing the muscles at the conclusion of the orthodontic treatment so as to increase the stability of the treatment results achieved.

Shields *et al* (1985)²² found that over 50% of the cases the lower incisors stabilized at a point between the pretreatment and posttreatment positions. Hence permanent retention is essential for maintenance of the mandibular incisor advancement.

Growth²³

Not only growth is an aid in the correction of various types of malocclusion but also is a primary factor in causing relapse. Orthopedic appliances and functional appliances bring about corrections by enhancing, restricting and redirecting growth depending on the malocclusion. The implications of sustained mandibular growth in Class III malocclusions leads to queries as to when this malocclusion should be treated and for how long. To continue the treatment till complete growth subsides will increase the treatment time. The rate of maturation in relation to sex must be considered which suggests that girls mature faster than the boys by about 2 years. The continued posterior traction in the maxillary arch is essential in corrected Class II malocclusions, in patients whose mandibular growth is primarily in a downward and backward direction. In boys greater retention time is recommended of the maxillary and mandibular incisor areas until growth changes are completed. Functional appliances act as useful retainers to assist in maintaining corrections of skeletal components. These prevent changes in maxillo-mandibular position which may take place through continuous harmonious growth.

Nanda and Nanda (1992)²³ maintain that skeletal changes continue to occur posttreatment which are grossly overlooked.

- These skeletal changes that occur during retention could attenuate, exaggerate or maintain the dentoskeletal relationship.
- The pubertal growth spurt for patients with skeletal deep bite was found to occur on an average of 1.5 to 2 years later than seen in open bite cases.
- They advised prolonged retention to counteract the continuing effect of dentofacial growth after the completion of orthodontic treatment.²⁴

Role of Developing Third Molars

The role of third molars in lower incisor crowding has been debated for more than a century. The literature is almost equally divided with arguments for both sides.

Richardson (1982)²⁵ demonstrated a significant forward movement of the first molars between the ages of 13 and 17 years which was the time that an increase in lower incisor crowding was evitable. There was no difference in the forward movement of first molar in cases with or without impacted third molar.

Ades *et al* (1990)²⁶ compared the presence or absence, impacted or fully erupted third molars with its effect on lower incisor crowding 10 years out of retention. They found no differences in mandibular incisor crowding, arch length, intercanine width and eruption pattern of mandibular incisors and molars between the groups.

Hence third molars have a minimum contributing factor in the development of late lower incisor crowding.

Post Treatment Tooth Positioning and Establishment of Functional Occlusion

The importance of a functional and stable occlusion post treatment is repeatedly stressed in the literature. An adequate interincisal contact angle may prevent overbite relapse and good posterior intercuspation prevents relapse of both crossbite and anteroposterior correction.

Kahl Nieke et al (1995)²⁷ attributed a perfect molar relationship as a significant factor in maxillary incisor alignment in a study of 226 post retention cases.

Weiland (1994)²⁸ found a statistically significant value for RCP (retruded cuspal position)-Intercuspal position (ICP) slide though clinically moderate influence on mandibular incisor irregularity post retention.

The axial inclination of the maxillary and mandibular incisor teeth also has a role in determining posttreatment stability.

Bolton (1958)²⁹ found that in excellent occlusion the angles of the labial surfaces of the maxillary and mandibular central incisors to their occlusal plane total approximately 1770 (are in straight line).

Tipping maxillary and mandibular incisors into a too upright relation usually results in a deep anterior overbite.

Influence of the Elements of Original Malocclusion:

Various studies have shown that a tendency towards expression of the original malocclusion during the post treatment period is a common occurrence.

The success of the orthodontic treatment is determined by the net corrections achieved keeping in mind for this loss of corrections.

Overbite increase post retention is related to the amount reduced during treatment although generally 30-50% of the correction is retained.

Shields et al (1985)³⁰ suggested that overbite relapse tends to occur in the first 2 years post treatment and maintenance of the intercanine width increases stability, as suggested by Hernandez (1969).³¹

Lopez Gavito et al (1985)³² found that open bite malocclusions showed 60% stability of the result where as the relapse subgroup showed an increase in lower anterior facial height but no pretreatment variables could be used to predict post treatment relapse.

Elms et al (1996)³³ found Class II Division 1 cases showed a lesser tendency to relapse as compared with other malocclusion groups however a slight change in the overjet towards pretreatment values was observed.

Labially inclined incisors pretreatment was found to be associated with less long term crowding as found by Gilmore (1984).¹⁵ It was postulated that the weaker labial muscular forces do not induced lingual movement of the dentition and subsequent arch length shortening.

Overcorrection is advisable for rotation and arch expansion in the transverse dimension.

CONCLUSION

Over the years retention as a separate phase of orthodontic treatment was largely neglected and therefore clinicians had to face the wrath of relapse of their corrections.

A steady evolution in the importance of retention and retention appliances has been observed over the last 100 years.

Retention appliances have transformed from the bulky, acrylic removable appliances towards the more aesthetic and comfortable Invisible retainers, Essix retainers and the flexible spiral wire retainers.

A multitude of factors has been recognized as the causes of relapse and therefore our aim should be to remove the primary burden of preventing relapse in patients.

This can be achieved by including in the treatment goals the basic principles:

- 1) Patient's pretreatment lower arch form should be maintained during orthodontic treatment as much as possible.
- 2) Original lower intercanine width should be maintained as much as possible.
- 3) Mandibular arch length decreases with time.
- 4) The most stable position of the lower incisor is its pretreatment position. Advancing the lower incisors is unstable and should be considered as a serious compromise of lower anterior post-treatment stability.
- 5) Fiberotomy is an effective means of reducing rotational relapse.
- 6) Lower incisor reproximation shows long-term improvements in post-treatment stability.
- 7) Growth status of the patient must be taken into account in treatment planning.

The success of our treatment should be measured on basis upon the ratio between the magnitude of patient improvement and relapse.

$$\left(\text{Success Index} = \frac{\text{Magnitude of improvement}}{\text{Magnitude of relapse}} \right)$$

Though permanent retention is advised by most clinicians as the only way to ensure long-term post-treatment stability but as trained orthodontists it is incumbent on us to take a proactive approach in dealing with factors associated with relapse.

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“Role of Minerals and Trace Elements in Oral Health- A Review”

Abstract

The six class of nutrients commonly found in food are water, carbohydrate, fats, protein, vitamins and minerals. Nutrition is an integral component of oral health. Nutrition affects oral health, and oral health affects nutrition. Minerals and trace elements along with other nutrients are needed for the body to build and maintain body tissues and to regulate essential body processes. Teeth are composed of three calcified tissues: enamel, dentin and cementum. Enamel and dentin are principally composed of hydroxyapatite crystals similar to those in bone. Approximately 20% of dentin, cementum and bone is organic material, principally collagen; only 1% of the enamel is organic material.

Key words: Minerals, Trace elements, Oral health, Diet, Nutrition

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INTRODUCTION

Many ultra-trace elements have been studied for their potential influence on dental caries. Results of research investigations are complicated by many factors. Some studies suggest relationship between some of these trace elements and development of caries in humans or animals; further research is warranted to determine the mechanism of their effects.¹ Development of normal, healthy teeth is affected by metabolic factors such as parathyroid hormone secretion and availability of calcium, phosphate, vitamin D, protein and many other nutrients. If these factors are deficient, calcification of teeth may be defective and abnormal throughout life.¹

COPPER

Copper functions as a catalyst in formation of collagen from a pre-collagenous stage. Copper is readily incorporated into tooth enamel. Epidemiological data suggest copper is cariogenic but in bacteriologic studies, it is cariostatic by reducing the acidogenicity of plaque. The human body contains copper at a level of about 1.4 to 2.1 mg per kg of body mass. the RDA for copper in normal healthy adults is quoted as 0.97 mg/day and as 3.0 mg/day.¹

SELENIUM

Selenium functions mainly as a cofactor for an antioxidant enzyme that protects membrane lipids, proteins and nucleic acids from oxidative damage. Selenium is present in tooth enamel and dentin. It is probably incorporated into the enamel during amelogenesis. Large amounts during tooth formation may be detrimental to the mineralization process.

Animal studies indicate that excessive selenium may promote dental caries when given pre-eruptive, whereas moderately high levels

appear to have some cariostatic effects. Increased dental caries rate have been observed in areas where the food and water contain higher levels of selenium. This may be due to topical effect on dental plaque or structural alteration in tooth composition. In china, keshan disease (due to severe selenium deficiency) is effectively reduced by oral selenium prophylaxis.²

MANGANESE

Manganese is essential in several enzyme systems and is important for optimal bone matrix development. The human body contains about 12 mg of manganese, which is stored mainly in the bones; in the tissue, it is mostly concentrated in the liver and kidneys.

Elevated concentration of manganese in salivary plaque and enamel are associated with increased caries. Studies have not clarified whether this association is due to incorporation of manganese in enamel or its effect on oral health.³

MOLYBDENUM

Molybdenum functions as a enzyme cofactor, is a trace element present in teeth, may inhibit caries formation. However studies with people and animals have been inconsistent and molybdenum is not clinically recommended for prevention of dental caries. No mechanism has been proposed for how molybdenum could inhibit caries formation, but rodent studies suggest that molybdenum affects crown morphology.¹

The human body contains about 0.07 mg of molybdenum per kilogram of weight. It occurs in higher concentrations in the liver and kidneys and in lower concentrations in the vertebrae. Molybdenum is also present within human tooth enamel.⁴

TRACE ELEMENTS

I. Silicon – silicon contributes to the structure and resilience of collagen, elastin and polysaccharides. Silicon is present in tooth enamel in larger amounts than any other trace elements, but its function if any is unknown.¹ Although results of studies have not been consistent, several investigators believe that stannous(tin) fluoride exhibits more cariostatic activity than other fluoride compounds by reducing plaque accumulation and gingivitis. Stannous fluoride is the active ingredient in some self applieddentrifice and mouth rinses.⁵

II. Aluminium- aluminum presence is harmful in body. Under normal conditions, kidney excrete about the same amount as is absorbed. Aluminium accumulates in bone and has been observed to cause osteodystrophy who receive aluminium from routes other than through the gastrointestinal tract.¹ Aluminium is present in all dental tissues. Dental caries may be reduced because aluminium enhances the uptake and retention of fluoride and enhances cariostatic activity of fluoride. Solubility of enamel is decreased and dental plaque formation and 5emineralizat are inhibited by aluminium.⁵

III. Lead- much information is available about the harmful effects of lead in the body, but little is known about its beneficial role or its essentiality. A large proportion of lead is incorporated into the skeleton and teeth. Lead deposited in the enamel matrix has been associated with pitting hypoplasia. The amount of lead in shed deciduous teeth can be used as an index of lead exposure. The effects of lead on teeth and bones are unknown.⁵

IV. Vanadium- studies on essentiality of vanadium have been inconsistent in their findings. Vanadium is readily incorporated into areas of rapid mineralization of bones and tooth dentin but its role in bones and teeth are unknown. The cariostatic effect of vanadium has been studied. Although an inverse correlation between vanadium content in drinking water and caries incidence was observed in one study, animal experiments were inconclusive in their results. It has been hypothesized that vanadium may exchange for phosphorous in the apatite tooth substance.^{1,5,6}

Minerals Essential for –Tooth Structure

Role of calcium in oral health

About 99% of calcium is found in the skeleton and teeth. Calcium deposited in teeth remains permanently. Diet can influence teeth after they have erupted through local effects. For example, calcium helps to maintain the mineral composition of teeth, which are subject to both 6emineralization and 6emineralization dependent on a number of dietary factors and the Ph of the oral environment. Plaque bacteria ferment sugars, producing acids that decrease the Ph (*i.e.* more acidic) at the tooth surface, which in turn promotes demineralization by the dissolution of calcium (and phosphate) from hydroxyapatite in enamel. Ph). The balance between 6emineralization and demineralization (and high and low Ph) is favoured by reduced frequency of fermentable sugar consumption along with twice daily brushing with fluoridated toothpaste. The presence of calcium in foods can help protect against dental caries as this increases the concentration of calcium in plaque. Certain other foods, for example acidic foods and drinks, can reduce the concentration of calcium in plaque.⁷

Role of phosphorous in oral health

Phosphorous is the second most abundant mineral in body with about 85% in the skeleton and teeth. Hypophosphatemia may occur with long term ingestion of aluminum hydroxide antacids, which binds phosphorous and thereby interfering with absorption. Even relatively small phosphorous depletions may cause increased calcium excretion resulting in a negative calcium balance and bone loss. During tooth development, a phosphorous deficiency can result in incomplete calcification of teeth, failure of dentin formation and increased susceptibility to caries. The resultant wide dentinal tubules allow bacteria to enter the damaged enamel.⁷

Role of magnesium in oral health

Bones contain almost two-third of the body's magnesium. It is the third most prevalent mineral in teeth, with dentin containing about two times the amount present in enamel. Magnesium has an important function in maintaining calcium homeostasis and preventing skeletal abnormalities. Symptoms of magnesium deficiency are neuromuscular dysfunction, personality changes, muscle spasms, convulsions, tremors, hyperexcitability etc. Dietary deficiencies may affect the teeth and supporting structures. Changes in ameloblasts and odontoblasts result in hypoplasia of the enamel and dentin. Alveolar bone formation may be reduced, along with a widening of the periodontal ligament space and gingival hyperplasia.⁷

CONCLUSION

Nutrition is an integral component of oral health. There is a continuous synergy between nutrition and the integrity of the oral cavity in health and disease. Nutrition affects oral health, and oral health affects nutrition. This interdependent relationship sees good nutritional health, promoting good oral health and vice versa. It is the adequate provision of minerals and trace elements which is required to maintain the interdependent relationship.

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Periodontally Accelerated Osteogenic Orthodontics: A Review

Abstract

Orthodontists are considering surgically facilitated orthodontic techniques as they not only enhance orthodontic movements but also enable orthodontists to correct complex dentofacial problems in relatively shorter period of time. Orthodontic tooth movement (OTM), is influenced by increased alveolar bone metabolism and decreased bone density, is said to be in correlation with bone turnover rate as high bone turnover significantly increased the rate of OTM. This review describes a procedure called Periodontally accelerated osteogenic orthodontics found to be effective in accelerating orthodontic treatment (PAOO). This technique combines selective alveolar corticotomy, particulate bone grafting and the application of orthodontic forces. Proper case selection and careful surgical and orthodontic treatment is very important. Each stage is explained in detail and discussed using recent literature.

Key words: Accelerated orthodontics, Bone grafting, Corticotomy, Regional acceleratory phenomenon

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INTRODUCTION

Recently more and more adults are consulting their dentist for orthodontic problems¹ but most of them do not turn up due to the limitations of traditional orthodontic techniques and duration of the treatment.² Nowadays, many orthodontists are considering surgically facilitated orthodontic techniques as they not only enhance orthodontic movements but also enable orthodontists to correct complex dentofacial problems in relatively shorter period of time. These techniques have significantly reduced side effects like root resorption and relapse, therefore resulting in more stable outcomes. Periodontal accelerated osteogenic orthodontics (PAOO) is a clinical procedure that combines selective alveolar corticotomy, particulate bone grafting, and the application of orthodontic forces.³ This is theoretically based on the bone healing pattern known as the regional acceleratory phenomenon (RAP).⁴

BRIEF HISTORY

Corticotomy facilitated tooth movement was first described by L.C.Bryan in 1893⁵ published in a textbook called 'Orthodontia: Or Malposition of the Human Teeth, Its Prevention and Remedy' by S.H.Guilford.

It was Heinrich Köle's publication in 1959,⁶ that set the stage for the subsequent evolution of refined decortication-facilitated orthodontics. He believed that it was the continuity and thickness of the denser layer of cortical bone that offered the most resistance to tooth movement and by disrupting the continuity of this cortical layer of bone that he was actually creating and moving segments of bone in which the teeth were embedded. The blocks of bone could be moved rapidly and somewhat independently of each other because they were connected by only less dense medullary bone, which would act as the nutritive pedicle and maintain the vitality of the periodontium.

Köle reported that the major active tooth movements were accomplished in 6 to 12 weeks. It is important to note that most of the movements described by Köle were relatively gross movements accomplished with borderline orthopedic forces delivered through removable appliances fitted with adjustable screws.⁶

An experimental study of alveolar corticotomy in 49 monkeys published by Bell and Levy in 1972. They demonstrated that vascularity of dental pulp and surrounding medullary bone with distinct avascular zones were progressively recovered after 3 weeks postoperatively, except for the central incisors. Thus, Corticotomy has been developed that prevents injury of the periodontium and pocket formation and also prevents devitalization of a single tooth or a group of teeth and enhanced orthodontic tooth movement.⁷

In 1990, Gantes and co-workers compared space closure by traditional orthodontic technique and corticotomy-facilitated orthodontics. They performed corticotomy in five adult patients in whom space closing was attempted with orthodontic forces.⁸ The mean treatment time for these patients was 14.8 months, with the distalization of the canines being mostly completed in 7 months. The mean treatment time for the traditional orthodontic control group was 28.3 months. The surgery included circumscribing corticotomy cuts both facially and lingually around the six upper anterior teeth.

In 2001, Wilcko and co-workers⁹ reported that in a surface computed tomographic (CT) scan evaluation of selectively decorticated patient, it was discovered that the rapid tooth movement was not the result of bony block movement but rather to a transient localized demineralization and remineralization phenomenon in the bony alveolar housing consistent with the wound healing pattern of the regional acceleratory phenomenon (RAP), developed by Frost⁴ and described in the periodontal literature by Yaffe and co-workers.¹⁰ The demineralization of the alveolar housing over the root surfaces

apparently leaves the collagenous soft tissue matrix of the bone which can be carried with the root surface and then remineralizes following the completion of the orthodontic treatment. Ferguson and co-workers have further defined this to be an osteopenic process.¹¹ Wilcko and co-workers have also demonstrated that it is not the design of the selective alveolar decortication that is responsible for the rapid tooth movement but rather the degree of tissue metabolic perturbation per se.¹²

BIOLOGICAL BASIS

Orthodontic tooth movement (OTM), is influenced by increased alveolar bone metabolism and decreased bone density, is said to be in correlation with bone turnover rate as high bone turnover significantly increased the rate of OTM.^{13,14}

A recent experimental research suggested that maintaining transgenic overexpression of receptor activator of the nuclear factor- κ B ligand (RANKL) would accelerate OTM and selective gene therapy with RANKL could be an alternative to corticotomy surgery.¹⁵

An experimental research revealed that corticotomy-assisted OTM produced transient bone resorption around the dental roots under tension that was replaced by bone after 60 days. On the other hand, osteotomy-assisted OTM resembled distraction osteogenesis and did not exhibit a regional bone resorption phase.¹⁶

The regional acceleratory phenomenon (RAP), recognized by Frost,^{17,18} defines a complex physiologic healing process involving accelerated bone turnover and decreased regional bone density in response to surgical wounding of osseous tissue.

As a local response to noxious stimuli in sites of decortication extending to the marrow, RAP is an intensified bone response and rapid remodelling process featuring increase in osteoclastic-osteoblastic activity and in levels of local and systemic inflammation markers. RAP varies in duration, size and intensity in regard to the magnitude of the stimulus and type of the tissue. In human bone, RAP usually lasts about 4 months and causes bone healing to occur 10-50 faster compared to normal bone turnover and is considered as a physiological emergency mechanism due to potentiating tissue reorganization by a transient burst of localized remodelling.¹⁹

A sum of experimental and clinical data demonstrated RAP in different bone types including alveolar bone and reported strong indirect evidence associated with RAP following surgical trauma which, in turn, results in rapid tooth movement due to calcium depletion and diminished bone density.^{18,20,21}

As surgical injury causes transient local osteopenia in alveolar bone, biomechanical resistance of the bony structure decreases and enables rapid tooth movement through trabecular bone. Utilising orthodontic force may prolong the transient osteopenia and perpetuates a therapeutic osteopenic state, considering having a limited window to limit the RAP to the teeth surrounded by corticotomy for an estimated time of 3-4 months. During this process, continuous tensional stress altered in frequency and magnitude via the roots every 1 to 2 weeks is clinically imperative to maintain the osteopenic state, accelerated tooth movement and post-treatment phenotype stability where the alveolar bone adapts to an inactive 'steady state' equilibrium under constant force.^{19,22}

CASE SELECTION

According to Wilcko, PAOO can be done on people of any age, as long they have a healthy periodontal situation. PAOO cannot be done in patients with dental bone loss, periodontal disease, root damage or poor roots.⁹

PAOO can be used to accelerate tooth movement in most of the cases requiring orthodontic treatment. It has been shown to be particularly effective in treating moderate to severe crowding, in class II malocclusions requiring expansions or extractions and mild class III malocclusions.^{23,24}

PROCEDURE²⁵

The surgical technique for PAOO consists of:

Flap design: A full thickness periodontal flap is raised on both sides. The flap should be extended beyond the corticotomy sites mesially and distally so that vertical releasing incisions are not required. Papillae should be preserved for esthetic purpose. Access to the labial alveolar bone in this area is achieved by "tunnelling" from the distal aspect.

Decortication: After flap elevation, decortications of bone adjacent to the malpositioned teeth is performed by using low-speed round burs or peizo electric-knife under local anaesthesia. The corticotomies are placed on both the labial and lingual (palatal) aspects of the alveolar bone. Typically a vertical groove is placed in the inter-radicular space, midway between the root prominences in the alveolar bone. The groove extends from a point 2 to 3 mm below the crest of bone to a point 2 mm beyond the apices of the root. These vertical corticotomies are then connected with a circular shaped corticotomy. Care is taken not to extend the cuts near any neuro-vascular structures. If the alveolar bone is of sufficient thickness, solitary perforations may be placed in the alveolar bone over the radicular surface. However, if the bone is estimated to be less than 1 to 2 mm in thickness, these perforations are omitted to ensure damage to the radicular surface.

Grafting: Particulate grafting is done in most areas that have undergone corticotomies. The materials most commonly used for grafting after decortication are deproteinized bovine bone, autogenous bone, decalcified freeze-dried bone allograft or a combination thereof. Grafting is done in most areas that have undergone corticotomies. The volume of the graft material used is dictated by the direction and amount of tooth movement predicted, the pre-treatment thickness of the alveolar bone and the need for labial support by the alveolar bone. A typical volume used is 0.25 to 0.5 ml of graft material per tooth. The decorticated bone acts to retain the graft material.²¹

Flap Closure: Primary closure of the gingival flaps without excessive tension and graft containment are the therapeutic endpoints of suturing. The flap should be closed using non resorbable interrupted sutures without creating excessive tension. The sutures are usually left in place for 1 to 2 weeks. The specific suture used is determined by the thickness of the tissue.

Orthodontic Force Application: Orthodontic brackets and arch wire placement are typically done a week before the surgical aspect of PAOO is performed. However, if complex muco-gingival procedures are combined with the PAOO surgery, the lack of fixed orthodontic appliances may enable easier flap manipulation and suturing. After

flap repositioning, immediate orthodontic force can be applied to the teeth and in all cases, initiation of orthodontic force should not be delayed more than 2 weeks after surgery. A longer delay will fail to take full advantage of the limited time period that the RAP is occurring. The orthodontist has a limited amount of time to accomplish accelerated tooth movement. This period is usually 4 to 6 months after which finishing movements occur with a normal speed.

DISCUSSION

Taking an account of basic science perspective, what is most impressive is the ability of OTM with PAOO to increase alveolar volume for ample alveolar support for the roots of the teeth even in the resolution of severely crowded situations. This increase in the limits of orthodontic tooth movement can also be seen in other movements such as extrusion and intrusion.^{11,12}

This ability to move teeth a much greater distance and yet provide for an expanded alveolar base and increased alveolar volume to support the straightened teeth makes it possible to treat certain selected cases that could have previously only been adequately addressed with orthognathic surgery. Concerning the mode of movement, this is a technique that requires the demineralization of a relatively thin layer of bone on the surface of the root of the tooth in the direction of the intended movement. This transient, reversible demineralization (osteopenia) of the thin layer of bone permits the root of the tooth to carry the demineralized collagenous matrix of the bone with it. At the completion of the tooth movement the remaining demineralized collagenous bony matrix will remineralize.

The increase in the rate of bone turnover of the osteopenic process likely assists in the settling process after de-bracketing and in doing so contributes to improved stability during retention. The significance of the increase of the rate of tooth movement, however, pales in comparison to the fact that the teeth can be moved two to three times faster than would be possible with traditional orthodontics alone and that the cases can be completed with an increased alveolar bone volume. This increased alveolar volume can provide for a more intact periodontium, a decreased need for extractions, a degree of facial reshaping and an increase in the bony support for both the teeth and overlying and soft tissues. Ferguson and co-workers have suggested that the increased stability provided by PAOO may be due to "loss of tissue memory from high tissue turn over of the periodontium, as well as increased thickness of the alveolar cortices from the augmentation grafting".¹⁰

CONCLUSION

The PAOO technique requires the utilization of numerous modified diagnostic and treatment parameters but once these are mastered the orthodontist has a powerful new treatment option to offer their patients. With the increasing number of adults considering orthodontic treatment, the propensity for adults and even some non-growing adolescents for periodontal problems, the PAOO technique can be a good treatment option and be a "plus-plus" situation for both the orthodontist and the patient.

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Customized Temporary Bonded Bite-raising Occlusal Blocks: A Boon for Clinicians

Abstract

In the field of Orthodontics; where there are variety of malocclusion for vertical dental discrepancy to be treat on daily practice viz. deep bite, cross bite, scissors bite, canted occlusion and so. We as a clinician always have to focus on bite raising part during treatment. Simultaneously also observe its effect over teeth and compliance with patient, feasibility and ease in fabrication of bite blocks for operator. This article is focussing on new and highly effective and patient friendly appliance; customized temporary bonded bite block for the correction of cross bite scissors bite cases. It will enhances treatment result and reduces the duration.

Key words: Bite block, Cross bite, Scissors bite

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INTRODUCTION

Orthodontists often need to open the bite in the beginning stages of treatment of crossbites, to avoid traumatic occlusion caused by bracket interferences, or other impediments to tooth movement. Many devices have been utilized for this purpose, including removable posterior bite planes, bonded lingual biteplanes, bonded occlusal composite resin build-ups.¹ Guray Bite Raiser and temporary bite raising crown.^{1,2}

Removable posterior biteplanes are often used in cases of anterior crossbite, but these must be worn nearly full-time, and patients do not always cooperate fully. Such devices are subject to breakage while out of the mouth, and an ill-fitting removable appliance can produce mucosal trauma. Bonded lingual bite-planes are not adjustable and can be difficult to remove. Lingual brackets can be bonded to the maxillary central incisors to act as bite-planes, but Fine recommended limiting this technique to Class I and Class II, division 2 cases with minimal overjet.³ Furthermore, the lingual brackets can be as fragile as the labial mandibular brackets.^{4,5} Composite resin build-ups may cause undesired occlusal enamel wear if filled resins are used. Guray Bite Raiser is that it may not allow headgear or auxiliary wires to be placed simultaneously. It also should not be used in cases where anterior biteplanes are required. Temporary bite rising crown⁶ requiring more chair-side time and after correction of cross-bite need to shift on banded or bonded buccal tube. This article presents a new method of temporary bite raiser that can be easily fabricated, more precise, less bulky, easy to remove and more economical.

FABRICATION

The appliance is fabricated indirectly as described below.

1. Take good, well-extended impressions of both arches, and pour working casts in dental stone.



Figure 1: Bite raising blocks with clear, self-curing acrylic resin

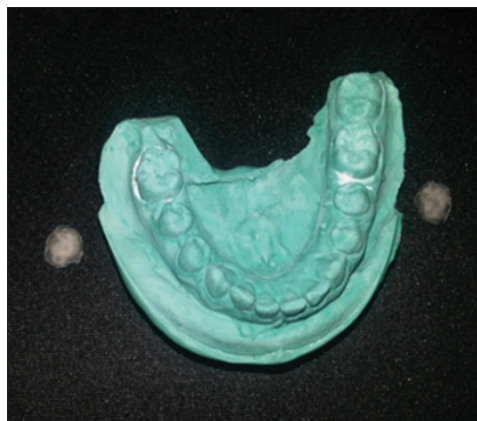


Figure 2: Bite raising blocks removed from cast

2. Apply cold-mold sealant to the cast over the teeth to be bonded with bite raising block
3. Prepare bite raising blocks with clear, self-curing acrylic resin of the proper consistency over occlusal surface of the teeth to be bonded with block. (Figure 1)
4. Check vertical height of bite raising blocks, i.e. should be of same and balancing height and teeth in cross-bite should be free of bite.
5. Remove bite raising blocks from cast. (Figure 2)
6. Remove sharp edges of acrylic and polished the bite raising blocks
7. Clean the teeth of patient to be bonded with block with pumice to remove plaque and the organic pellicle.
8. isolate the operating field and apply etchant gel (phosphoric acid) and frosty appearance of etched tooth (Figure 3(a)(b))
9. at the end of the etching period, the etchant is rinsed off the teeth with abundant water spray
10. Next, the teeth are dried thoroughly with a moisture- and-oil-free air source to obtain the well-known dull, frosty appearance. (Figure 4)
11. After that, a thin layer of bonding agent (primer) paint over the etched enamel surface. The coating may be thinned by gentle air burst for 1 to 2 seconds.
12. Lastly, bond the bite raising block with adhesive and cure with light. The easiest method of bonding of the bite raising block

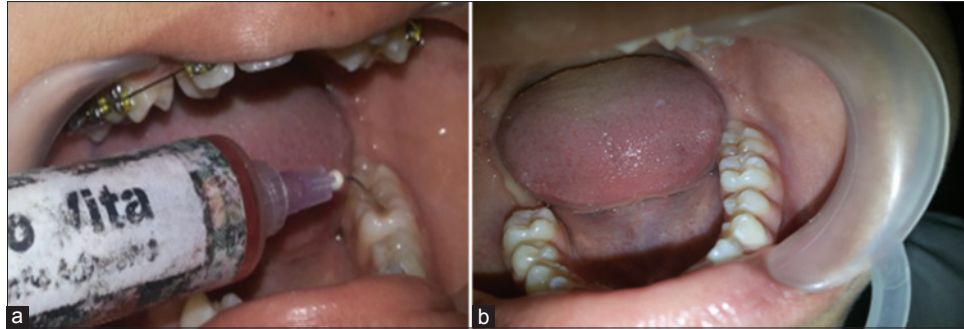


Figure 3: (a) Application of etchant gel for isolation and etching, (b) Frosty appearance of occlusal surface

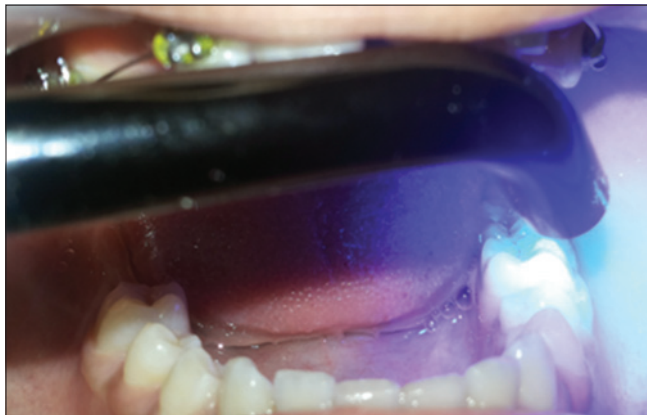


Figure 4: Thin layer of bonding agent (primer) paint over the etched enamel surface and cure



Figure 6: Bite opening after bonding bite raising block



Figure 5: (a,b,c) Bonding the bite raising block



Figure 7: De-bonding of bite raising blocks

is to add a slight excess of adhesive to the backing (replica of occlusal surface) (Figure 5(a),(b),(c),(d)) and then place the block on occlusal surface in its correct position. Totally undisturbed setting is essential for achieving adequate bond strength.

13. Bite raising blocks can be bonded on occlusal area of molars with banded or bonded buccal tubes. (Figure 6).
14. After cross-bite correction, bite raising blocks are very easy to remove like bracket de-bonding.(Figure 7) So after removal of bite raising blocks there is no need of any alteration of further mechano-therapy.

CONCLUSION

These temporary bite-raising blocks have the following merits:

- Are worn full-time.
 - Provide adequate bite opening in the anterior region without discomfort.
 - Promote patient compliance with fixed mechanotherapy.
 - No need to change position of molar tubes and bands after cross-bite correction for further mechanotherapy.
- No additional wire-bending is required.(like offset bend)
 - Less chair-side time.
 - Very easy removal.(like bracket debonding)
 - Are less bulky
 - More economical than removable appliances.

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Peripheral Ossifying Fibroma: A Local Reactive Focal Overgrowth

Abstract

Peripheral Ossifying Fibroma is a reactive gingival overgrowth occurring frequently in anterior maxilla. Localised gingival overgrowths frequently encountered lesions in the oral cavity, which are considered to be reactive rather than neoplastic. Different lesions with similar clinical presentation make it difficult to arrive at a definite diagnosis. Peripheral ossifying fibroma is one such reactive lesion. The present gingival overgrowth is due to poor oral hygiene along with traumatic occlusion. A 25-year-old female patient with gingival overgrowth in relation to mandibular left central incisor to right lateral incisor region. Clinically, the lesion was asymptomatic, firm, pale pinkish and sessile. Surgical excision of the lesion was done followed by histopathological examination.

Key words: Gingival enlargement, Reactive lesion, Peripheral ossifying fibroma

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INTRODUCTION

Local reactive focal overgrowths are frequently found in the oral cavities. Different types of localized reactive lesions may occur on the gingiva, including focal fibrous hyperplasia, pyogenic granuloma, peripheral giant cell granuloma and peripheral ossifying fibroma (POF).¹ The causative etiology for this lesion can be attributed to the local irritants like plaque, calculus, overhanging margins, trauma and dental appliances.^{2,3} POF is considered to be a non-neoplastic enlargement of the gingiva. There are two types of ossifying fibromas, the central type and peripheral type. The central type arises from the endosteum or the periodontal ligament adjacent to the root apex and causes expansion of the medullary cavity. The peripheral type occurs solely on the soft tissues covering the tooth bearing areas of the jaws i.e. it occurs solely on the gingiva.⁴ It may be pedunculated or broad based, usually smooth surfaced and varies from pale pink to cherry red in color.⁵ This paper reports a case of peripheral ossifying fibroma in a 25 year old female in relation to the mandibular anterior teeth.

CASE REPORT

A 25-year-old female reported to the outpatient department with a slow-growing gingival growth which caused esthetic deformity in the mandibular anterior tooth region that had been present for 7 months. The patient's history revealed that a local dentist had excised the lesion and completed oral prophylaxis 4 months previously. The growth reoccurred in the same area following the excision.

On clinical examination a localized gingival swelling of 2 cm X 1.5 cm with irregular surface present in relation to facial aspect of mandibular anterior region of jaw (Figure 1). The lesion was not fluctuant and had a rubbery consistency. No evidence of ulceration or spontaneous bleeding was seen. The lesion was painless and occasionally bleeding occurred when she brushed her teeth.

On the basis of history and clinical findings a provisional diagnosis of peripheral ossifying fibroma was given. The list of differential diagnosis included chronic fibrous epulis, peripheral giant cell granuloma, and pyogenic granuloma. In this case medical history was not contributory. Routine haematological investigation values were also found to be within normal limits. No radiographical changes related to the bone were seen.

In Treatment approach, an oral prophylaxis was done. Thereafter, it was decided to further treat the lesion with a surgical approach (Figure 2). After local anesthesia, the enlarged localized lesion was excised up to the base of the lesion and it was ensured that lesion was completely excised by trimming up the remnants of the soft tissue adjacent to the tooth to prevent recurrence of the lesion (Figure 3). Periodontal dressing was placed (Figure 4). The excised tissue (Figure 5) was



Figure 1: Preoperative facial view



Figure 2: Perioperative view



Figure 5: Excised tissue



Figure 3: Degranulation done

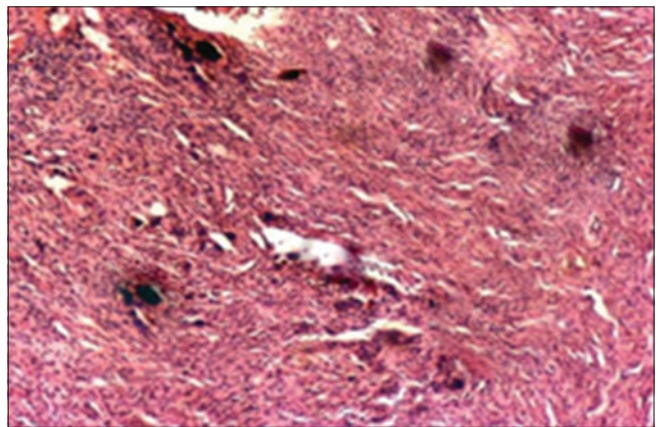


Figure 6: Histopathological examination which revealed parakeratinized stratified squamous epithelium with elongated rete ridges, highly cellular collagenous fiber and proliferating fibroblast



Figure 4: Periodontal dressing placed



Figure 7: Six month postoperative follow-up

sent for histopathological examination which revealed evidence of calcifications in the hypercellular fibroblastic stroma (Figure 6). The histopathological examination confirmed diagnosis of the lesion as peripheral ossifying fibroma. In present case post operative 6 month recurrence was not found (Figure 7).

DISCUSSION

Gingiva is often the site of localized growths that are considered to be reactive rather than neoplastic in nature.⁶ POF has been described by various synonyms such as peripheral cemento ossifying fibroma, peripheral fibroma with osteogenesis, fibrous epulis, calcifying fibroblastic granuloma, etc.⁷

Approximately 60% of POF occur in the maxilla and they are found more often in the anterior region, with 55-60% presenting in the incisor-cuspid region.⁸ In our case, lesion was present in mandibular anterior region. It usually measures less than 1.5 cm and rarely reaches more than 3 cm in diameter, but lesions of 6 cm and 9 cm have also been reported.⁹ POF has higher female predilection, rare occurrence in the first decade, and decline in incidence after age 30 suggest that hormonal influence is responsible for localized growth.¹⁰ In the present case, the clinical findings correlate with these characteristics.

A radiographic feature of POF usually varies. Underlying bone involvement is usually not visible on radiograph. In the present case, no radiographic findings were found.

Treatment of these lesions is complete surgical excision with removal of local irritating factors as done in the present case. Proper excision and curettage of the adjacent tissues is required for prevention of recurrence. In present case post operative 6 month recurrence was not found.

CONCLUSION

Different lesions with similar clinical presentation make it difficult to arrive at a definite diagnosis. Peripheral ossifying fibroma is one such reactive lesion. Hence it should be diagnosed correctly and proper mode of treatment should be suggested.

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Hibernating within, Odontome- A Case Report

Abstract

Odontomas are considered as the hamartomous developmental anomalies resulting from the growth of completely differentiated epithelial and mesenchymal cells that give rise to ameloblast and odontoblast. These tumors are formed of enamel and dentin, but they can also have variable amount of cementum and pulp tissue. Odontomes by definition alone refers to any tumour of odontogenic origin. They are considered as developmental anomalies rather than true neoplasm. A 11-year-old girl patient reported to the regular OPD in our Department of Pedodontics and preventive dentistry, with a complaint of unerupted teeth in the right upper front region. Intra-oral examination revealed bony prominence extending from mid-line to right canine region. On radiographic examination revealed an aggregate of radiopaque mass with well defined radiolucent outline, above retained deciduous anterior teeth in the upper right region. Site and other differentiating features of radiograph of the anomalies confirmed it as odontome. For this surgery was planned under GA and the anomaly structure was removed in collaboration with oral surgeon and pedodontist, later it was sent for biopsy. Proper post-operative care was taken and the condition was periodically evaluated.

Key words: Odontomas, Developmental anomalies, Bony prominence

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INTRODUCTION

Odontomas are mixed odontogenic tumors in which both the epithelial and mesenchymal components undergo functional differentiation and form enamel and dentin.¹ WHO classifies odontomas into: compound and complex odontomas. These are composed of more than one type of tissue and hence termed as composite odontoma. The compound odontoma is a malformation in which all the dental tissues are in a more orderly pattern so that the lesion consists of many tooth-like structures.^{2,3} Odontomas are hamartomas combining mesenchymal and epithelial dental elements. Histologically they are composed of various dental tissues, including enamel, dentin and cementum and in some cases pulpal tissue. They are slow growing, benign, showing nonaggressive behaviour.^{4,5} The cells of the tissues in odontomas are normal but lack organisation due to disordered expression and localisation of the extra-cellular matrix molecules in the dental mesenchyme.⁶ The etiology of odontomas is unknown, although local trauma, infection, and genetic factors have been suggested. One aspect of the etiology of odontomas is most result from extraneous buds of odontogenic epithelial cells. Most of the odontomes are asymptomatic, although occasional signs and symptoms related to their presence do occur. They generally are unerupted or impacted teeth, retained deciduous teeth, swelling and evidence of infection.⁷ Radiographically, odontomas appear as dense radio-opaque lesions with prominent external margins surrounded by a thin radiolucent zone.⁸

CASE REPORT

A 11-year-old girl patient reported to the regular OPD in The Department of Pedodontics and preventive dentistry, with a complaint of unerupted permanent teeth in the right upper front region. Family and past medical history were non-contributory.

Clinical examination revealed retained deciduous maxillary right incisors. A swelling was noticed over the buccal gingiva extending from the mesial margin of the canine to the labial frenum. The swelling had no associated symptoms. Radiographic examination revealed an aggregate of radio-opaque mass with well defined radiolucent outline, above retained deciduous anterior teeth in the upper right region. Site and other differentiating features of radiograph of the anomalies given a provisional diagnosis of odontome. Routine blood investigations were carried out. Surgery was planned under GA and the anomalous structure was removed in collaboration with oral surgeon and pedodontist. Crevicular incision made from left central incisor to right canine region with releasing incision was given. Full thickness mucoperiosteal flap was reflected. A window was prepared over the buccal cortical bone in region of the swelling. The denticles contained in a capsule was removed using a curette. After hemostasis, the area was irrigated with saline and the mucoperiosteal flap was sutured back 3-0 silk sutures. Healing was uneventful and sutures were removed on the tenth post-operative day. Prosthetic replacement of missing teeth will be done after complete healing. Histopathological diagnosis was compatible with compound odontoma. The soft tissue lining was suggestive of the dental follicle (Figures 1-6) .

DISCUSSION

The term "odontoma" was coined by Paul Broca in 1867. Odontomas are relatively common, asymptomatic odontogenic lesions, rarely diagnosed before the second decade of life. The most frequent clinical signs are delayed eruption, persistence of the primary tooth and the presence of a tumor.⁹ This case described was initially diagnosed as compound odontomas since the radiographic examination of the lesions showed calcified interior structures anatomically similar to teeth. This diagnosis was later confirmed by histological examination



Figure 1: Swelling over the right maxillary anterior region. Retained 51, 52 can be seen



Figure 4: A window was prepared over the buccal cortical bone in region of the swelling

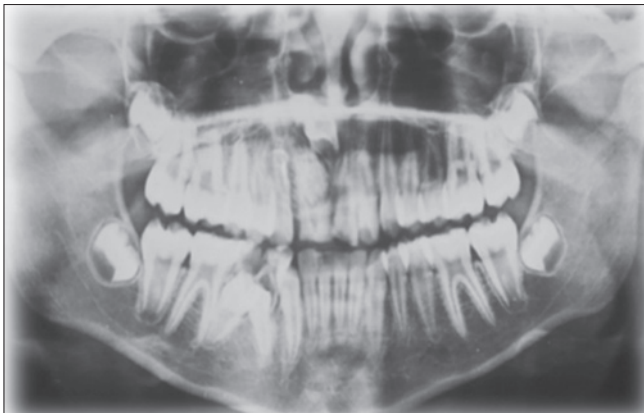


Figure 2: OPG showing dense radiopaque structures in relation to 51 and 52

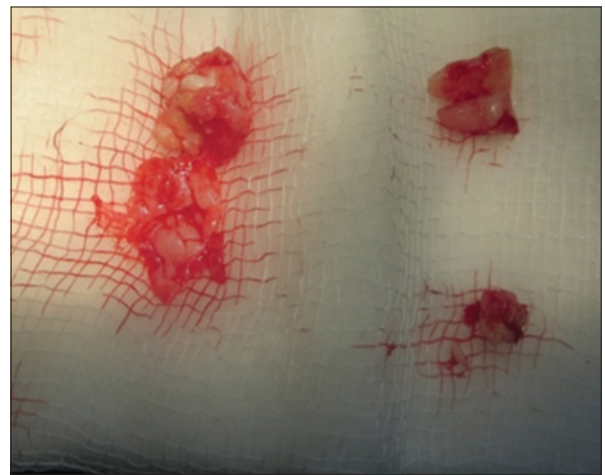


Figure 5: The denticles contained in a capsule with retained primary teeth was removed using a curette



Figure 3: Full thickness muco-periosteal flap was reflected



Figure 6: Post-operative photograph after 1 month

of the lesions after their surgical removal. There is general agreement that most cases of complex odontomas are found in the posterior mandible and that the second most common site is the anterior maxilla. Compound odontomas are twice as commonly observed as the complex odontomas. There have been reports of odontomas erupting into the oral cavity. Almost all odontomas are located intraosseously, but they have occasionally been reported in extrasseous

locations like the gingiva. A rare case of an odontome occurring in the cranium near the pituitary gland, demonstrating that an odontogenic lesion may arise in brain tissues due to the embryological relationship between primordial stomodeum and Rathke's pouch.¹⁰⁻¹³ Differential diagnosis must be established with ameloblastic fibroma, ameloblastic

fibroodontoma, and odonto ameloblastoma. Odontomas can also manifest as part of syndromes, like basal cell nevus syndrome, Gardner syndrome, familial colonic adenomatosis, Tangier disease, or Hermann syndrome.¹⁴ In this case, the lesion produced a unerupted permanent teeth and slight swelling of the cortical bone and this contributed to the discovery of the lesion. In 70% of odontomas, the neighboring teeth undergo pathologic alterations such as devitalization, malformation, aplasia, malposition, and delayed eruption. They may also undergo cystic transformation. In this case report permanent right central and lateral incisor was not erupted and retained primary right central and lateral incisor was present. After extraction of these primary teeth, surgical removal of dentricles was done, which was transformed from permanent central and lateral incisor.

CONCLUSION

In the foregoing case it is concluded that presence of any structure beyond a time frame can become a clear cut indication of certain underlying pathology. This needs a careful investigation with various diagnostic tools and all the informations so found should be integrated to reach a final diagnosis. As was demonstrated by this report, early diagnosis of odontomas allows adoption of a less complex and less expensive treatment and ensures better prognosis.

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Finger Prosthesis – A Divine Creation

Abstract

Maxillofacial prostheses replace lost body parts using artificial substitutes like silicones. These prostheses support the patients psychologically and enhance their social acceptance. Complete or partial finger amputations are some of the most frequently encountered forms of partial hand loss. The most common causes of these amputations are trauma, congenital defects and malformations. Congenital absence, malformation or surgical amputation of the finger, more often cannot be treated by surgical reconstruction. In such cases prosthetic reconstruction of finger helps in restoring the natural appearance of the hand which enhance the confidence of the patient. Ideally the finger prosthesis must duplicate the missing parts so that, it cannot be noticed on casual observation but is often non-functional. This article describes rehabilitation of the patient with finger prostheses using mechanical modes of retention.

Key words: RTV silicone, Finger prosthesis, Mechanical retention

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INTRODUCTION

“It is the God given right of every human being to appear human”.

Prosthesis refers to artificial replacement of an absent part of the human body.¹ Artificial substitutes serve primarily to improve the patient's appearance, function and to support them psychologically. They play an immense role in making the patient more socially acceptable.² The major role in rehabilitating the patient is thus played by the maxillofacial prosthodontist and the anaplastologist. Most of the prostheses are made from medical grade silicones.³ These silicone can be rendered to match to the skin color of the patient and give a more life-like appearance. Most of the silicones used for this purpose are room temperature vulcanizing silicones (RTV silicones). The advantages of RTV silicones include chemical inertness, flexibility and elasticity.⁴ They can also be easily molded and colored. The prostheses can be retained either by mechanical means or by the use of adhesives. Use of magnets for retaining prostheses has also been in use.⁵ Implant retained prostheses have proven to be satisfactory, provided they are economically feasible.^{6,7} Retaining finger and hand prosthesis by using rings, bracelets, etc. are some methods of mechanical retention. Glove type prostheses are designed to snugly fit over the remaining stumps to provide retention.

Any kind of deformity, facial or elsewhere may cause psychological disturbance to the patient as well as social annihilation. Both function and form are important attributes of the hand. The active function of the hand is represented by its prehensile activities in grip, grasp, transferring and absorbing forces.¹

Amputation of one or more fingers of the hand, as the consequence of trauma or congenital absence carries a serious reduction of hand function and unable to cope up with social activity.² Traumatic amputations of fingers can be rescued by microsurgery through re-implantation. In certain cases, reconstruction is neither advisable or nor successful.³ In such patient, prosthesis can be provided as one of the significant treatment modality and may offer great psychological help.⁴

But retention is one of the most important factors for any prosthesis. So, in this case report I tried to highlight rubber washer as retainer which is incorporated into the silicone finger prosthesis to give rise to snugly fit retention and also it is very economical.

CASE REPORT

A 19-years old male patient reported to the Department of Prosthodontics for fabrication of index finger, middle finger and ring finger of the right hand, which he lost in an accident with mini wheat harvester 7 years back.

On clinical examination amputated fingers showed thickened ends with normal surrounding areas and no signs of any infection (Figure 1).

Patient was given different prosthetic options such as glove like finger prosthesis, finger ring or implant retained finger prosthesis. The gloves type prosthesis often gives unsatisfactory retention unlike ring type and implant supported one. But implant supported prosthesis require surgical intervention and it is expensive for which most of the patients disagree. In this case report, rubber washer with silicone prosthesis was planned keeping in mind the cost effectiveness, retentive nature and esthetic outcome.

Steps involved in the fabrication of the prosthesis include:

1. Impression making & working model
2. Wax pattern
3. Investing of the pattern
4. Incorporation of rubber washer “o ring”
5. Shade matching
6. Processing of the silicone material

Impression Making & Working Model

A box was selected and cut from front side. The size of box was according to the patient's hand, so that it could be boxed during impression making. Patient's hand was lubricated with petroleum jelly to prevent adherence of impression material to the skin and hair. First a layer of alginate was spread on the palmer side of the hand and hand seated with gentle pressure with mild rotational movement to eliminate air entrapment. Alginate in small increments is poured on dorsal surface of the hand and spreaded uniformly to remove the air and to prevents formation of voids and nodules. Patient was asked to keep his hand in the unstressed position while recording the impression. After complete pouring of the alginate over dorsal surface, small pieces of gauge was placed and gypsum product (Type II) mixed with anti expansion solution spreaded over the alginate so that it can support the alginate and cast could be poured without distortion (Figure 2).



Figure 1: Dorsal view showing amputated index, middle and ring finger

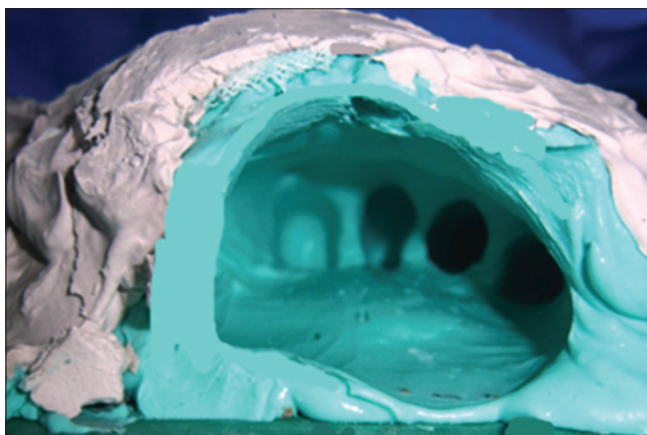


Figure 2: Impression made in irreversible hydrocolloid

The impression was poured in dental stone and a positive replica of the hand was achieved.

Wax Pattern

It was decided to use ‘donor technique’ to replicate the finger shape and size of the patient. A relative of the patient is selected who had approximately same size and shape of the fingers and putty indices of index, middle, ring fingers was made. In indices, wax was poured and fitted to the patient's cast. After cooling of wax the putty indices were removed. The wax pattern so obtained was sculptured according to the patient features and tried on patient's finger (Figure 3). The length, orientation and shape are critically assessed. Size shape and shade of artificial prefabricated nail was selected from artificial nails available in the market.

Investment of the Pattern

Flasking was done in four piece flask. The stump was cut from the model and length and width was checked in flask so that it can be easily invested. The wax pattern was invested in dental stone (Type III) up to the junction of dorsal and ventral surface of the hand. After complete setting of the investment, tin foil substitute was applied and counter flasking was done by using two pour techniques. First pour was done to stabilize the stump with die stone (Type IV) and second pour was done with dental stone. Flask was closed and left for one hour and then dewaxed (Figure 4)



Figure 3: Final waxup and tryin of the prosthesis



Figure 4: Flasking and dewaxing of index, middle and ring finger

Incorporation of Rubber Washer “O” Ring

A different sizes of rubber washer were tried in the amputated fingers out of which snugly fitted one was incorporated in the silicone prosthesis. A precise circumferential groove of 0.5 mm in depth and 1mm in width was done on the stump's finger model to achieve extra retention (Figure 5).

Shade Matching

Before packing the silicone, liquid petroleum jelly is applied with brush on the mould and stumps of the finger. The silicone base paste and accelerator paste were mixed. Pigments were mixed till match the exact shade of the skin of the patient's hand. Color matching of the dorsal and ventral surface was done separately in natural light (Figure 6).

Processing of the Silicone Material

The silicon was packed in the mould layer wise and closed with light pressure so that even distribution of the material occurred and excess removed. Next day deflasking was done and final prosthesis was removed from the mould. The silicon finger prosthesis was checked for any porosity and finishing was done with silicone finishing kit. The nail bed of the silicone finger prosthesis was prepared for nail fixation. Cyanoacrylate adhesive was applied on the undersurface of the nail for bonding with the silicone surface and placed back on the silicon finger prosthesis to achieve a stronger bond to the nail bed. The final prosthesis was inserted on the residual stump and the fit and color matching were evaluated (Figure 7). The patient was demonstrated about the use and instructions were given about maintenance of the prosthesis.

DISCUSSION

Restoration of the natural form and function of an amputated part, either by autologous or by prosthesis, eliminates the trauma caused by constant reminder of the handicap and thus, offers true palliative therapy.⁵ Although autologous reconstruction is the first order of choice, there may be circumstances of inconvenience such as previously attempted surgery, radiotherapy, systemic conditions, or patient's wish where patient opt for prosthesis.^{8,9}

Implant supported restorations provides several advantages, such as stable fixation of the prosthesis to the Skelton and restoration of some sensory feedback (osseoperception).¹⁰ The term osseoperception was suggested by Lundborg et al (1997)¹¹ to describe the vibration and position sensation acquired with osseointegration of the implant. But most of the patients refuse the implant supported prosthesis due to time and money factors and also phobia of multiple surgical interventions.

Silicones are soft, flexible, and in copy nature. The material is freely available & is not subjected to ordinary thermal damage or stains. Prosthetic rehabilitation is quick, reversible and medically uncompromised. As the prosthesis thus fabricated is thin, it allows good thermal and pressure sensitivity through it.

Precise circumference reduction of finger models aimed at achieving good prosthetic fit constituted an integral procedure in the custom-fabrication of thimble-type prosthesis for distal finger amputations. To achieve a good suction fit, the inner circumference of the prosthesis was made smaller than that of the residuum. The colour

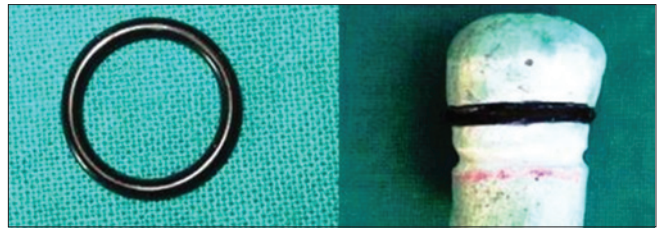


Figure 5: Incorporation of snugly fit 'O' ring



Figure 6: Incorporation of intrinsic stain



Figure 7: Delivery of final silicone finger prosthesis

matching can be done either by intrinsic or extrinsic staining. In this case report, intrinsic staining was used as it prolongs durability of the colour of the prosthesis.

CONCLUSION

The custom made finger prosthesis not only gives esthetic but also restore functions to some extent. It is acceptable and comfortable, resulting in psychological improvement & personality. Such a prosthesis also aids in social rehabilitation and improves the confidence level of the patient.

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Endodontic Treatment of Three Rooted Maxillary First and Second Premolar- A Case Report

Abstract

Aberrations in the root canal anatomy are a commonly occurring phenomenon. A thorough knowledge of the basic root canal anatomy and its variations is necessary for successful completion of the endodontic treatment. Maxillary premolars show a considerable variation in root canal morphology but the presence of three roots is rare. This article describes the diagnosis and endodontic management of maxillary first and second premolar with three separate roots and three root canals.

Key words: Maxillary premolars, Root canal variations, Treatment

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INTRODUCTION

Cleaning, shaping and filling the root canal system effectively is the basis of successful root canal therapy. To achieve this, thorough knowledge of the morphology of the root canal system is essential. Therefore the first step in achieving a successful endodontic outcome is an exact diagnosis of the root canal system and its anatomical variations. Maxillary premolars show a considerable variation in root canal morphology but the presence of three roots is rare.

The incidence of three-canal maxillary premolars has been observed as 5 to 6% for first premolars^{1,2} and 1% for second premolars.³ Vertucci and Gegauff¹ found 5% of 400 maxillary first premolars to have three canals: 0.5% existed as three canals in a single root, 0.5% existed as two canals in one root and one canal in a second root, and 4% existed as one canal in each of three separate roots. Carns and Skidmore² found 6 of 100 maxillary first premolars to have three canals, all of which existed as one canal in each of three roots. Vertucci et al³ found 2 of 200 maxillary second premolars to contain three canals.

Maxillary premolars with three root canals were sometimes called small molars or 'radiculous' because of their similar anatomy to that of adjacent maxillary molars.^{4,5} In straight-on radiographs of maxillary premolars, Sieraski et al⁶ found that whenever the mesio-distal width of the mid-root image was equal to or greater than the mesio-distal width of the crown, the tooth most likely had three roots. Based on this information we diagnosed and proceeded with root canal treatment of a patient with three-canal and three-rooted maxillary first and second premolars.

CASE REPORT

A 26-year-old male patient reported to the post-graduate clinic, Department of conservative dentistry and endodontics, Sri Sukhmani Dental College and Hospital, DeraBassi, Dist. Mohali (India) with a

chief complaint of pain in the upper left posterior region. Patient gave a history of dental treatment in the same region from some private dentist one week before. On clinical examination tooth #24 and #25 had a carious lesion. Both teeth had an access opened and patient had a radiograph for same teeth which showed files in canals of teeth (Figure 1). The periapical region appeared radiographically normal. The teeth were isolated and access cavity was modified with a cut at the bucco-proximo angle from the entrance of the buccal canals to the cavo-surface angle resulting in a cavity with a T-shaped outline. Mesiobuccal and distobuccal canals were explored with size 10 K file and the palatal with a size 15 K file. The working length was established with apex locator (Root ZX, Morita, USA) and confirmed radiographically for both teeth (Figure 2). The root canals were shaped with Hyflex CM rotary instruments (Coltene Endo). During canal preparation Glyde (DentsplyMalliefer) was used as a lubricant and the root canals were disinfected with 5.25% sodium hypochlorite (Prime Dental Product, Mumbai, India). The root canals were properly dried with absorbent paper points and obturated with gutta-percha and calcium hydroxide based sealer (Apexit plus, Ivoclar Vivadent) (Figure 3).

DISCUSSION

High quality preoperative radiographs and their careful examination are essential for the detection of additional root canals.⁷⁻⁹ Walton¹⁰ recommendations:

- If a radiograph shows a sudden narrowing or even a disappearing pulp space, the canal diverges at that point into two parts that may either remain separate or merge before reaching the apex.¹¹
- If an eccentric orifice found, at least one more canal is present and should be searched for on the opposite side.
- A third canal should be suspected clinically when the pulp chamber does not appear to be aligned in its expected buccopalatal relationship.

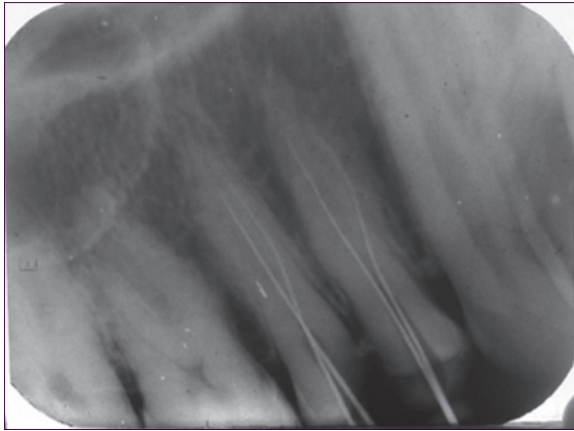


Figure 1: Access opened radiograph which shows files in canals

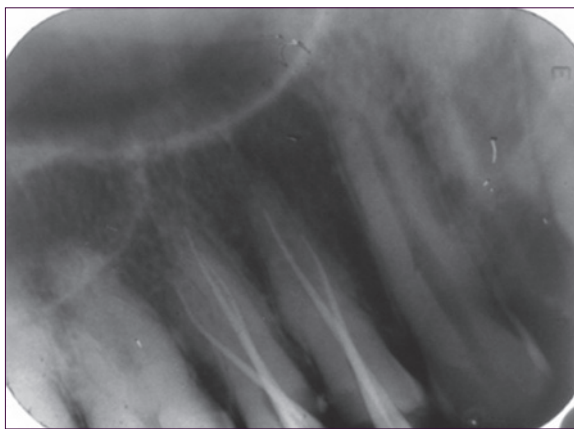


Figure 2: Working Length was established with apex locator

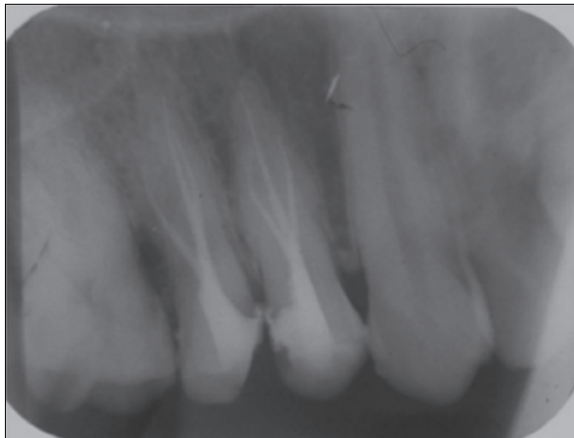


Figure 3: Obturation with gutta-percha and calcium hydroxide based sealer

- Additionally, if the pulp chamber appears to deviate from normal configuration and seems to be either triangular in shape or too large in a mesiodistal plane, more than one root canal should be suspected.¹²

Pulp cavity of each tooth shows high variability that makes the endodontic treatment unique. In three rooted maxillary premolars, the buccal orifices are close to each other that are hard to locate. According to Balleri et al the outline of the access cavity was shaped by a cut at the bucco-proximal angle from the entrance of the buccal canals to the cavo-surface angle.¹³ This T-shaped access outline is helpful for correctly reaching all of the root canals. An apex locator was used to estimate the working lengths prior to establishing a working length estimation radiograph. The use of an apex locator improves the chances of estimating the correct length first time, especially when canals are likely to be superimposed on a radiograph.

CONCLUSION

Morphological variations in pulpal anatomy must be always considered before beginning treatment. A thorough knowledge of variations will assist the dentist in reaching conclusions when diagnosing and treating endodontic cases. The possibility of presence of multiple canals and additional roots in different cases should be carefully explored and treated.

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