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Unusual Foreign Objects in Immature Permanent Teeth and Its Management- A Case Report

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Abstract

During dental treatment, foreign objects are commonly detected without warning. Children and teenagers are more likely than adults to have foreign bodies in their teeth because they have a propensity to put things in their mouth, especially when there are open carious lesions. Due to patients' propensity to clean their teeth with sharp things, food lodgement in cariously affected teeth might also result in object lodgement. Foreign objects serve as infection foci, which causes pulpal pathosis. Numerous reports have described various foreign things getting stuck in the root canal, which is a persistent source of discomfort and illness in the oral cavity. The management of the affected teeth as well as the retrieval of the foreign objects in a tooth are covered in this case report.

Keywords: Case Report, MTA, Apexification, Foreign Object, Permanent Teeth, Open Apex, Blunderbuss Canal

INTRODUCTION

The habit of inserting foreign objects into the mouth is common among children, with some continuing the habit persistently. In some cases, children may not report the trauma to their parents for fear of punishment. [1] The incidence of foreign objects in the pulp chamber and root canals of teeth is high in children due to this habit.[2] These objects can also act as a focus of infection and lead to complications.[3] Examples of foreign objects that have been reported in the pulp chamber and root canals include pencil leads and staple pins.[4] The risk of foreign objects getting embedded in teeth is higher when the pulp chamber is open due to traumatic injury, large cavities, or incomplete root canal procedures.[2,5]. The diagnosis of foreign objects in teeth is often made accidentally, as the tooth may not show any symptoms.[2] The tooth may be associated with infection, pain, swelling, and recurrent abscesses as a result of pulp exposure and lodgment of the foreign body.[6] The foreign object may impede complete debridement of the root canal and can also act as a potential source of infection.[5] Therefore, removal is necessary to successfully complete root canal treatment. If the object has been pushed apically, retrieval becomes complicated, and surgery may be necessary.[2]

This article discusses a case of foreign objects embedded in teeth, the potential causes, and treatment options.

CASE DESCRIPTION

CARE guidelines 2013 were used for this case report.

A 16 year old boy reported to the Department Of Conservative Dentistry And Endodontics, Government College Of Dentistry, Indore with pain in the upper front tooth region for 2-3 days. The patient had dull aching pain. There was no associated swelling. The patient gave a history of trauma to the upper anterior teeth region 5 years back. The medical history was noncontributory.

On clinical examination the tooth 11 was discolored with Ellis Class III fracture and was tender to vertical percussion. On further Sensibility testing with heat and cold tests the tooth gave no response. On further examination there was a shiny metal object lodged inside the pulp chamber.

Intraoral periapical (IOPA) radiograph revealed a radio-opaque paper clip-like object in the pulp chamber, blunderbuss apex with peri-apical radiolucency. The parents were unaware of the child inserting any foreign object inside the tooth.

FIG.1: PRE-OP PICTURE SHOWING 11 WITH DISCOLOURATION AND ELLIS CLASS III FRACTURE

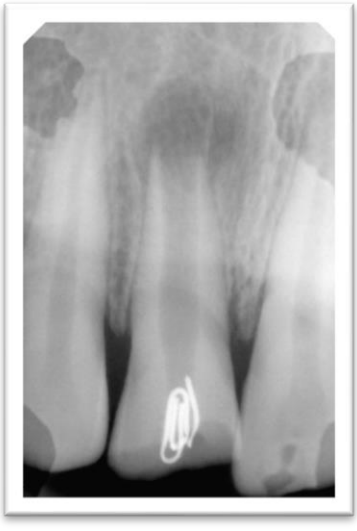

FIG.2: PRE-OP IOPA SHOWING PAPERCLIP-LIKE OBJECT LODGED INSIDE THE PULP CHAMBER

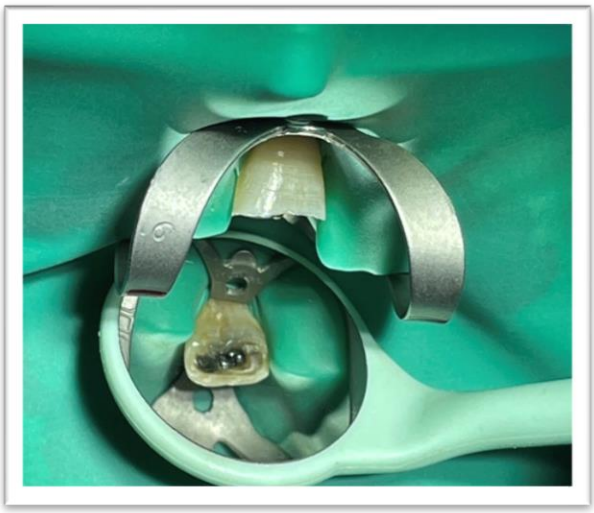

FIG.3: SHINY METALLIC OBJECT VISIBLE IN THE EXPOSED PULP CHAMBER

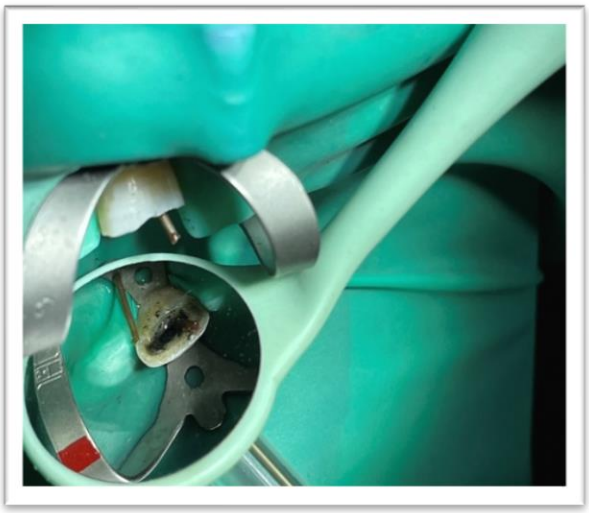

FIG.4: WOODEN PARTS OF THE INCENSE STICKS COMING OUT FROM THE INSIDE OF THE ROOT CANAL

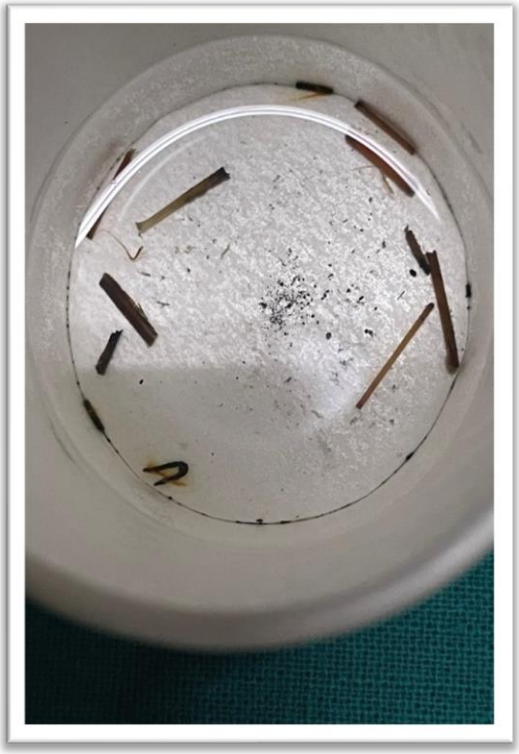

FIG.5: FOREIGN OBJECTS RECOVERED FROM THE ROOT CANAL

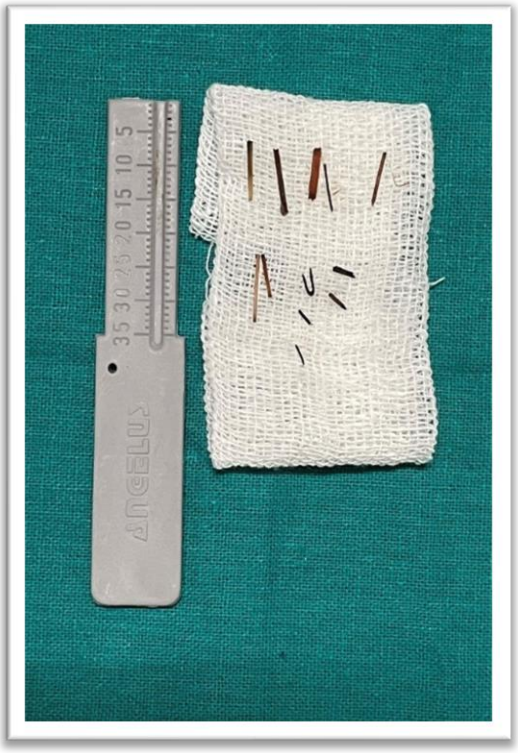

FIG.6: FOREIGN OBJECTS RECOVERED FROM THE ROOT CANAL

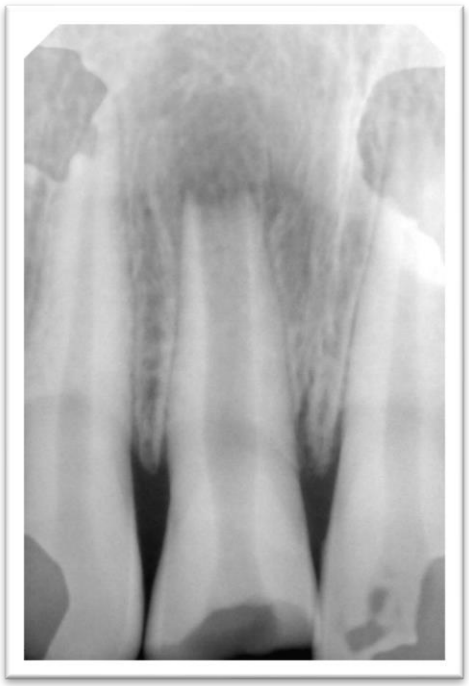

FIG.7: IOPA AFTER RETRIEVAL OF FOREIGN OBJECTS

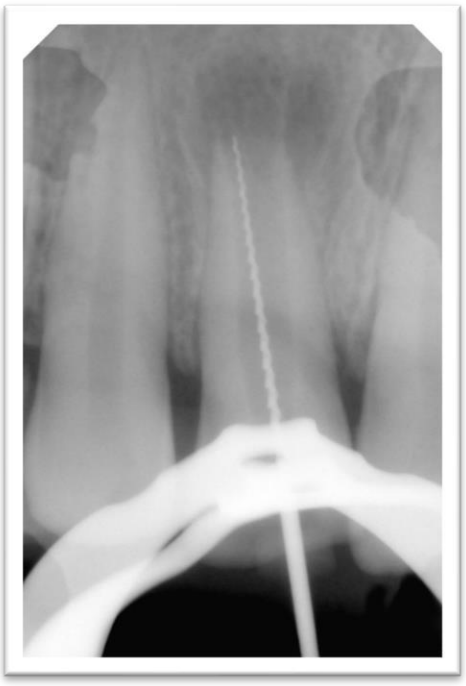

FIG.8: WORKING LENGTH DETERMINATION

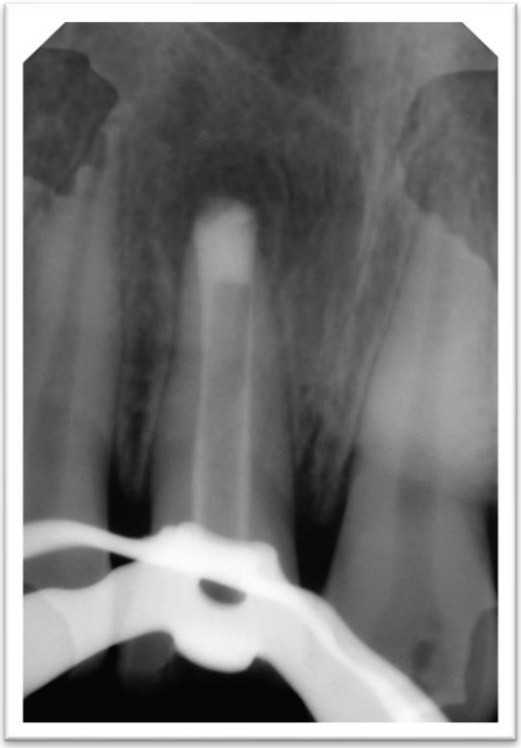

FIG.9: MTA PLUG

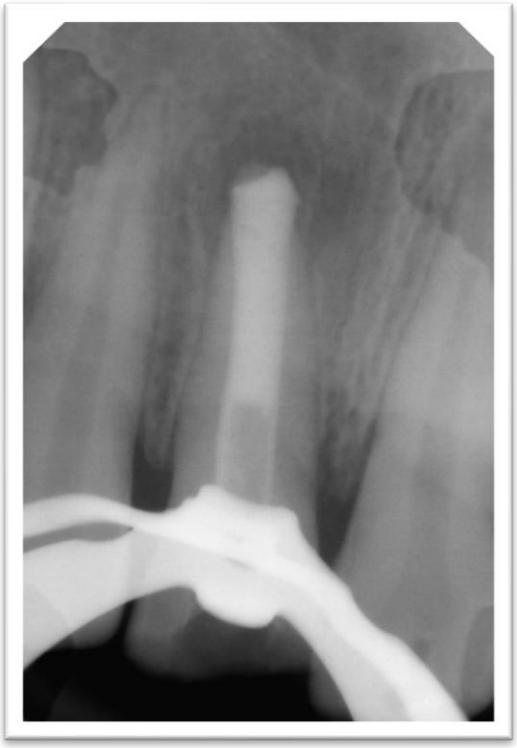

FIG.10: CANAL FILLED WITH MTA TILL MID ROOT LEVEL TO REINFORCE THE WEAK CANAL WALLS

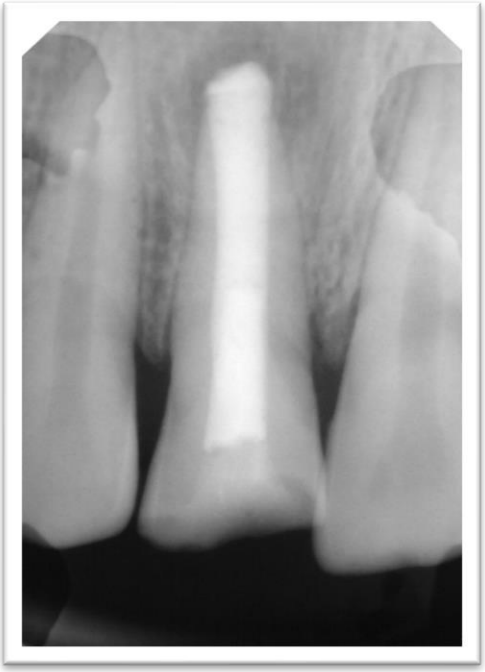

FIG.11: IMMEDIATE POST-OP

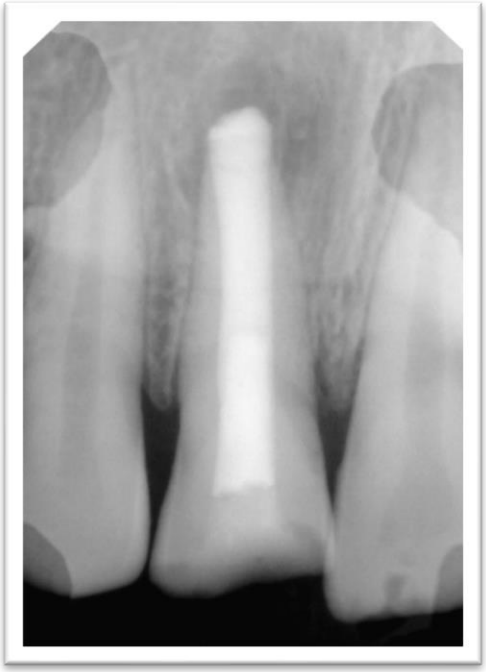

FIG.12: FOLLOW UP 3 MONTHS

The exposed pulp chamber was enlarged with the help of a round bur and the lodged foreign object loosened with the help of ultrasonics, the chamber was irrigated with the help of normal saline to remove the debris. The lodged foreign object was removed in pieces with the help of Shepherd's Hook and Steiglitz Forceps.

After successfully retrieving the lodged foreign object when the attempt to negotiate the canal was made some resistance was felt, with the help of H files and extreme care the other lodged radiolucent objects were retrieved which were identified to be the wooden parts of the incense sticks.

After determining the working length (19mm), the canal was debrided using circumferential filling and copious irrigation using normal saline and 2 percent chlorhexidine (Zodenta, Neelkanth Health Care Pvt Ltd) after which intracanal dressing of calcium hydroxide (Neocal, Orikam Healthcare India Pvt Ltd) was given and the canal sealed with temporary restoration (MD Temp. Meta Biomed™, Korea)

In the next appointment the apexification procedure was performed and the artificial apical plug was made using MTA (Prevest Denpro MTA Plus, Prevest DenPro Limited) and the canal was sealed with a moist cotton pellet to allow proper setting of the mta plug.

After 48 hours the root canal was obturated using Thermoplasticized gutta percha technique (Denjoy Ifill Cordless Gutta Percha Obturator, Denjoy Dental Co., Ltd., China) and the access cavity sealed using resin-modified GIC (Fusion i-Seal, Prevest DenPro Limited, India)

DISCUSSION

Children frequently experience problems from accidentally ingesting foreign objects. As a result, foreign objects may be discovered in their teeth. 6 The majority of these troubling incidents involve kids, especially when a pulp chamber is left open due to caries exposure, traumatic injury, or dislodged restorations. According to a review of the literature, these incidents are more common in children, who have a greater propensity to keep foreign objects in their mouths, especially while studying or watching television. Foreign objects are frequently diagnosed only during routine radiographic examinations due to children's fear of punishment and ignorance.4 Children may put objects into their teeth because of food impaction, which over time develops into a habit. These foreign objects have the potential to be a significant source of infection.6

Several foreign objects have been found lodged in the pulp chambers and root canals of both deciduous and permanent teeth. Root canals have yielded metallic paper clips, metal screws, pencil leads,

stapler pins, darning needles, beads, plastic chopsticks, toothpicks, indelible ink pencil, ink pen tips, brads, tomato seed, crayons, dressmaker pins, two straws, conical metal objects, hat pins, aluminum foil, and other items.7 In the case we reported It was a metallic paper pin and wooden part of multiple incense sticks.

McAuliffe et al. summarized various radiographic methods for localizing a radiopaque foreign object, including parallax views, vertex occlusal views, triangulation techniques, stereo radiography, and tomography.8 The presence of radiolucent foreign objects becomes especially challenging as in our case due to them not being detected on radiograph as in our reported case where along with radio-opaque metallic paper pin there were multiple pieces of radio-lucent wooden incense sticks pieces, so immense care should be taken to prevent accidental dislodgement of these radiolucent objects periapically.

Silver points in the root canal are removed with Steiglitz forceps. A disposable injection needle and a thin steel wire loop formed by passing the wire through the needle being used are described. To tighten the loop around the object, this assembly was used in conjunction with a mosquito hemostat.9

The Masserann kit and modified Castroveijo needle holders have been reported for retrieving foreign objects lying in the pulp chamber or canal using an ultrasonic instrument.8 McCullock proposed that removing a small amount of tooth structure improves access to a foreign object.10 If a foreign object is tightly bound in the canal, it may need to be loosened first and then removed with minimal damage to the internal tooth, according to Walvekar et al. 11

Hedstroem files make it much easier and more convenient to engage any foreign objects in the root canal.4

In our case, we used Ultrasonic scaler, Shepherd's Hook, Steiglitz Forceps and H files. Foreign object removal and calcium hydroxide dressing can both aid in the elimination of chronic peri-apical infection.8

If these infection foci are not removed at the appropriate time, complications may occur. Costa et al. reported chronic maxillary sinusitis of dental origin caused by the insertion of foreign bodies into the maxillary sinus via the root canals.12 To avoid further complications, prompt diagnosis and treatment are required.6

CONCLUSION

Due to self-inflicted harm or iatrogenically, foreign bodies may become trapped or entrenched within the root canal system of a tooth. This is frequently observed in teeth with untreated caries, teeth with restorations that have come loose, and teeth with long-term damage that has not been addressed. As long as the tooth is asymptomatic, many individuals choose not to get treatment. To ensure that dental treatment is given as soon as possible to prevent further issues, proper counselling is necessary.

DECLARATION OF PATIENT CONSENT

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published, and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

CONFLICTS OF INTEREST

There are no conflicts of interest.

BIBLIOGRAPHY

1. Rangeeth BN, Moses J, Reddy NV. Self-injurious behavior and foreign body entrapment in the root canal of a mandibular lateral incisor. J Indian Soc Pedod Prev Dent 2011;29:S95-8.
2. Yadav RK, Tikku AP, Chandra A, Rathinavel C, Shakya V, Bharti R. Endodontic management of foreign body in the root canal-case series. Int J Sci Res Publ 2015;5:1-3.
3. Roig-Greene JL. The retrieval of foreign objects from root canals: A simple aid. J Endod 1983;9:3947.
4. Ramugade MM, Sapkale KD, Metkari SS. Patient induced unusual metallic obturation of the root canal of permanent maxillary central incisor with an immature apex – A rare case report. Singapore Dent J 2014;35:77-82.

5. Mahesh R, Waseem H, Siva Kumar M. Unusual behavior in children – Foreign object in tooth: A report of two cases. Ethiop J Health Sci 2014;24:369-73.
6. Pereira T, Pereira S. An unusual object in the root canal of a primary tooth – A case report. Int J Paediatr Dent 2013;23:470-2.
7. Kariya PB, Singh S, Mallikarjuna RM, Govil S. Dental neglect leading to foreign body lodgement in pulp chamber. Adv Hum Biol 2016;6:145-8.
8. McAuliffe N, Drage NA, Hunter B. Staple diet: A foreign body in a tooth. Int J Paediatr Dent 2005;15:468-71.
9. Pereira T, Shetty S. An unusual foreign object in a tooth. Niger J Gen Pract 2018;16:30-1.
10. McCullock AJ. The removal of restorations and foreign objects from root canals. Quintessence Int 1993;24:245-9.
11. Walvekar SV, Al-Duwairi Y, Al-Kandari AM, Al-Quoud OA. Unusual foreign objects in the root canal. J Endod 1995;21:526-7.
12. Costa F, Robiony M, Toro C, Sembronio S, Politi M. Endoscopically assisted procedure for removal of a foreign body from the maxillary sinus and contemporary endodontic surgical treatment of the tooth. Head Face Med 2006;2:37.

Comparative Evaluation of Bleeding and Pain After Orthodontic Extraction with Hemocoagulase V/S 1% Feracrylum Solution – A Prospective Split Mouth Study

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Abstract

Background: A comparative split mouth study of topical feracrylum citrate versus hemocoagulase to minimize post operative bleeding, amount of blood lost and post extraction pain patients. Patients and Methods: A total of 30 patients undergoing biateral orthodontic extraction of first or second premoar were selected for the study. (30 patients, 60 sites, Right-Hemocoagulase Left-Feracrylum). In the study group I Hemocoagulase was used on the right side , 1% feracrylum citrate solution was used on the left side. Results: Among the study group I , average post extraction bleeding time was 94.8 mins, amount of blood lost was 4.8mg, post operative pain on day 1 was 3.4, on day 2 was 1.4. In group II , average post extraction bleeding time was 42.8 mins, amount of blood lost was 3.2 mg, post operative pain on day 1 was 0.9, on day 2 was 0.7. None of the patients had any pain on the 7 th day. Conclusions: Feracrylum is more effi cient and safer topical haemostatic agent than Hemocoagulase. It reduced the post operative bleeding, amount of blood lost and post extraction pain.

Keywords - Feracrylum, Hemocoagulase, Extraction, Bleeding, Hemostasis

INTRODUCTION

Bleeding is a troublesome, outcome encountered during or after surgical procedure and can cause distress, agony, and discomfort to the patient and the surgeon.

Prolonged bleeding after dental extractions is a complication commonly encountered by oral and maxillofacial surgeons. Postoperative bleeding from an extraction wound may be expected to last for a period of five to fifteen minutes. Hemorrhage exceeding this time will generally require special attention.

Capillary bleeding can occur during minor surgical procedures. Capillary bleeding implies breakdown in supply chain of nutrients and oxygen in the area, leading to impaired wound healing. Restoring the capillary flow ensures faster wound healing and hence, reduced inflammation and infection.[i] Hence blood coagulation, inflammation and tissue repair are closely linked.[ii] Early control of capillary bleeding leads to reduced morbidity of the patient as it enhances healing which leads to faster recovery.

This study was undertaken taking in consideration this phenomenon to study the efficacy of local application of hemocoagulase solution as compared to Feracrylum in post extraction bleeding and pain following orthodontic dental extraction of premolars and to clinically evaluate their usefulness in the practice of oral and maxillofacial surgery.

METHODS

The present study was conducted on 30 patients who reported to the OPD for orthodontic extraction of maxillary or mandibular premolars. All the patients included in the study fulfilled the eligibility criterias. Patients between the age of 17-25 years were selected for the study. To prevent compromise with the bleeding and coagulation time any patient with known inherited or acquired coagulopathy were excluded from the study. Any patient with history of tobacco use were also excluded from the study because of the same reason. A split mouth design was used to eliminate the bias that could arise by comparing bleeding time of two different individuals. Medically, psychiatrically and physically compromised patients as well as pregnant subjects were excluded. The Institute's ethics committee approved the study, and a written informed consent was obtained from each patient. Patient who did not give consent for the study were also excluded. 30 patients for a total of 60 bilateral orthodontic extractions were selected for the study. Each patient was divided into two groups (Group A and Group B) according to left and right side. Hemocoagulase was used on the right side (Group A) of every patient and Feracrylum was used on the left side (Group B). Patient was assessed post-operatively at the intervals of 1st day, 3rd day, and 7th day. Criteria assessed were bleeding stoppage time, Amount of blood lost, Post-operative pain by visual analogue scale.

PROCEDURE

- Extraction was carried out in a normal way under local anesthesia.
- As soon as the tooth was extracted pre-weighed gauze ball impregnated with 1ml hemocoagulase (botropase) was placed inside the socket and bleeding stoppage time was noted. The socket was analyzed visually every 20 seconds until no bleeding is seen and the time at which complete hemostasis is achieved was noted, same procedure is repeated with a gauze ball impregnated with 1 ml of feracrylum and bleeding stoppage time was noted.
- After the hemostasis was achieved the gauze balls were removed and weighed on the weighing machine.
- The weight of the gauze ball was subtracted from the total weight of the gauze to yield the amount of blood that was lost and was noted.
- Post extraction pain was evaluated using the visual analogue scale on the 1st, 3rd and 7th day.

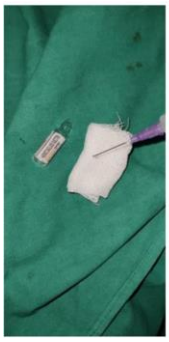

Fig 1: Gauze piece being impregnated with 1ml of hemocoagulase

Fig 2: Hemostasis with hemocoagulase

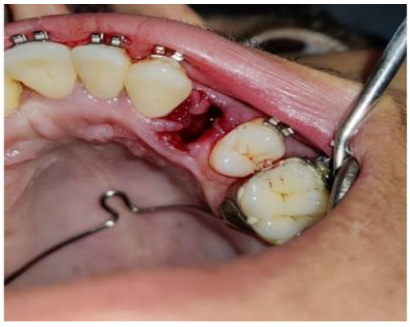

Fig 4: Gauze **piece** being impregnated with 1ml of feracrylum

Fig 5: Hemostasis with feracrylum

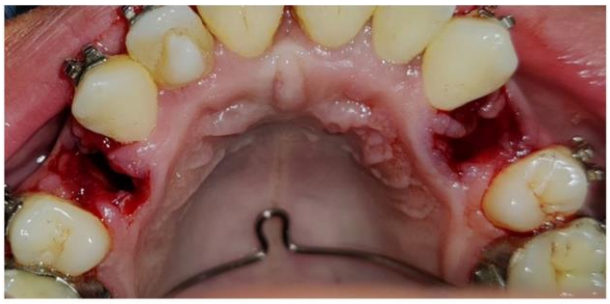

Fig 6: Post operative picture showing hemostasis with hemocoagulase (right) and feracrylum (left)

Note: (Green Arrow showing) the formation of a gel like barrier with feracrylum on the left side

RESULTS

Statistical Analysis

Data were entered in Microsoft Excel, and statistical analysis was performed using SPSS version 18.0 (Chicago Inc.). Categorical values were expressed in the form of frequencies and percentages, whereas continuous variables were expressed as Mean ± SD. Association between different study groups at different time interval was assessed using independent student t test and chi square test. p value was kept at < 0.05 to establish statistical significance.

Results

7 (23.33%) males and 23 (76.67%) females with a mean age of 20.3 ± 2.5 years (Ref. Range: 17-25) were included in the study (Table 1). Patients with any systemic conditions or history of smoking and alcohol use were excluded from the study. All the patients were referred from the department of Orthodontics for extraction. 30 patients were included in the study. Gauze impregnated with 1ml hemocoagulase was placed on the right side and gauze impregnated with feracrylum was placed on the left side of every patient.

GENDER DISTRIBUTION	No	%
Female	23	23
Male	7	7
	30	**30**

Table 1 Showing gender distribution

Bleeding Stoppage Time

In this study, bleeding stoppage time in group I was 94.8 ± 19.7 min and in group II 42.8 ± 7.4 min (P\0.00001). The results showed a lesser bleeding stoppage time when Feracrylum was used for hemostasis. (Table 2)

Amount of Blood Lost

The intra-operative blood loss in group I was 4.8 ± 1.3 mg and in group II 3.2 ± 0.9 mg (P\0.0002). The results showed less blood loss in group II (Table 2)

Post Extraction Pain

Assessment of severity of pain was done by using Visual Analogue Scale. It was an objective scoring given by patients and categorized into mild (0–4), moderate (5–8) and severe pain (9–10) (Table 2). All the patients complained of mild pain (0-4), except 1 patient in group I who gave a score of 5.

Comparison of post extraction pain (vas) between the two groups shows that the post extraction pain on day 1 is less with feracrylum, 2.5 ± 0.9 than hemocoagulase, 3.4 ± 0.8 with p value of 0.0001 which is statistically significant.

Comparison of post extraction pain (vas) between the two groups shows that the post operative pain on day 3 with feracrylum was 0.9 ± 0.7 and hemocoagulase was 1.4 ± 0.8 which shows no statistical significance with p value of 0.0345.

On post operative day 7 all the patients in both the groups did not complain of any pain.

	Hemocoagulase		Feracrylum		P Value
	Mean	SD	Mean	SD	
Age	20.3	2.5	20.3	2.5	No Change
Bleeding stoppage time (min)	94.8	19.7	42.8	7.4	0.0000
Amount of blood lost (mg)	4.8	1.3	3.2	0.9	0.0000
Post extraction pain (VAS)					
1st Day	3.4	0.8	2.5	0.9	0.0001
3rd Day	1.4	0.8	0.9	0.7	0.0345
7th Day	0	0.0	0.0	0.0	No Change

Table 2 - Independent Student t test comparison of the bleeding stoppage time, amount of blood lost, and post extraction pain.

DISCUSSION

Tooth removal, or extraction, is one of the routinely carried invasive oral surgical procedures in dental practice, Post-extraction bleeding (PEB) is one of the complications of dental extraction that might make a patient panic and seek immediate consultation. As the number of patients on anticoagulant therapy like aspirin, warfarin, and clopidogrel, are rising due to increase in cardiovascular disorders the chance of encountering PEB is also increasing. Post-extraction bleeding can also result from local or systemic causes that are not expected in routine dental extractions. Other factors that make an individual susceptible includes, negligence in following post extraction instructions. In the past, various local hemostatic measures have been employed to combat problems with hemostasis. Pressure packing, suturing the socket, adrenaline pack or acrylic splint of various constructions have

been used. However, at times bleeding is largely from capillaries which cannot be controlled by mechanical means, wherein drugs would be of a greater value. Biological agents like thrombin, fibrin glue are technically difficult to apply, especially in wet regions such as bleeding extraction sites. They are also expensive and may carry the risk of viral transmission. In some cases, simple compression at the site of bleeding will suffice in obtaining hemostasis, whereas in other times call for more time-consuming procedures. Various local hemostatic agents have been proposed to be applied locally, on extraction sites, which includes hemocoagulase, tranexamic acid mouthwash, fibrin glue, cyanoacrylate, thrombin, microfibrillar collagen, oxidized Cellulose and Feracrylum.

The snake venoms that have shown to induce defibrinogenation include: Ancrod from the venom of *Calloselasma rhodostoma* (formerly known as *Agkistrodon rhodostoma*), batroxobin from the venom of *Bothrops atrox* and *B. moojeni*, and crotalase from the venom of *Crotalus adamanteus*. The purified fractions of ancrod, batroxobin, and crotalase possess coagulant, proteolytic and esterolytic properties, although their primary mechanism of action is a proteolytic effect on circulating fibrinogen. Ancrod cleaves only the A-fibrinopeptides, but not the B-fibrinopeptides, from fibrinogen; this contrasts with thrombin, batroxobin, and crotalase, which cleave both fibrinopeptides A and B.[iii] The hemocoagulase topical solutions are compounds that are applied locally to control surface bleeding and capillary oozing.

The hemocoagulase topical solution is an enzyme complex based fundamentally on coagulative and antihemorrhagic properties of those fractions isolated from the poison of '*Bothrops jararaca* or *Bothrops atrox* Botropase is a hemocoagulase preparation used to arrest bleeding of different etiology. It is an enzyme preparation with hemocoagulase activity which is attributable to the protein batroxobin. The enzyme clots pure fibrinogen like thrombin, releasing fibrinopeptide A from fibrinogen. The enzyme possesses all the typical characteristics of serine proteases and has a molecular weight of 27,000 Da and its isoelectric point is around 7.5. Botropase is said to have actions like thrombin.[iv] However, there are many differences between the two agents. Botropase is both systemic and local hemocoagulant unlike thrombin. Botropase induced clot is not structurally similar to thrombin clot. Botropase is not absorbed by clot like thrombin. It appears that even in the absence of calcium, botropase can cleave the fibrinogen into fibrin. Antithrombin III does not interfere with botropase hemocoagulant action.

The fibrin clot formed is highly resistant to plasmin and encourages the growth of collagen fibers beneath it. Thus, it reduces the bleeding time,[v] enhances cell division and capillary network formation in wound space and hastens wound healing concomitantly arresting capillary bleeding. Being a topical form it also acts fast and is atoxic.

Hemocoagulase also holds good prospect in managing post-extraction bleeding in cardiac patients on aspirin without stopping aspirin before extraction. Its topical use provides faster hemostasis in patients undergoing dental extraction without any systemic or local adverse effects.

1% Feracrylum citrate, a novel hemostatic agent, It is an effective, safe, reliable topical agent which is used in various surgeries for control of diffuse oozing from the surgical site. It is a water-soluble mixture of incomplete ferrous salt II and III of polyacrylic acid containing 0.05–0.5% of iron. It is biodegradable and hygroscopic. The molecular weight is about 5,00,000–8,00,000 Daltons, due to which there is no systemic absorption. No noted side effects on major organs like liver, kidney, adrenal gland, cardiovascular system and hemopoietic system. It is a chemical haemostatic agent with no local side-effects, less cost, and good haemostatic property. Its use has been documented in many surgical fields.

The effectiveness of feracrylum in reducing the post operative bleeding has been studied in only one study done by **Sachin Rai** *et al* in which they compared the efficacy of Feracrylum as Topical Hemostatic Agent against Tranexamic acid in Therapeutically Anticoagulated Patients Undergoing Dental Extraction. However, it has never been compared with hemocoagulase . This is the first study to compare the haemostatic effect of feracrylum after dental extraction with an

established agent i.e., hemocoagulase. The present prospective study was aimed to assess and compare the effects of hemocoagulase and feracrylum in reducing the post operative bleeding, amount of blood lost and post extraction pain.

In this study the post extraction bleeding was less in both the groups when compared with average bleeding time of 5-15 mins given in literature (Wagner). The mean post operative bleeding in hemocoagulase group was 94.8 secs whereas in the feracrylum group was 42.8 secs. The mean amount of blood lost in hemocoagulase group was 4.8mg and in feracrylum group was 3.2 mg. The differenece in pain in both the groups. It is thought that the superior results with feracrylum can be attributed to its property of formation of a mechanical barrier by combining with blood proteins like albumin and form a gel like substance which acts as a barrier on the raw surface which halts the capillary ooze and bleeding and prevents dislodgement of the fragile clot. [vi]

CONCLUSION

The present study, results may conclude that both hemocoagulase and feracrylum can lesser the post extraction bleeding time, amount of blood lost and pain when compared to the regular dressing of a sterile gauze. There was lesser bleeding stoppage time and also lesser blood loss when Feracrylum was used. Patients recovered from pain and started normal food intake within 2–3 days in both the groups. In this study, majority of the patients experienced lesser pain on the first day in Group II when Feracrylum was used during hemostasis. Feracrylum and hemocoagulase application as a hemostatic agent after extraction is effective in reducing post operative blood loss although the results of using feracrylum are superior. Post op recovery was quick with no side effects or complications. Further studies are recommended with large sample size to confirm these findings.

BIBLIOGRAPHY

1. Joshi, S. A., Gadre, K. S., Halli, R., & Shandilya, R. (2014). Topical use of Hemocoagulase (Reptilase): A simple and effective way of managing post-extraction bleeding. Annals of maxillofacial surgery, 4(1), 119. https://doi.org/10.4103/2231-0746.133082
2. William A. Wagner, Adrian O. Hubbell, Viper venom for control of postextraction hemorrhage, Oral Surgery, Oral Medicine, Oral Pathology, Volume 11, Issue 10, 1958, Pages 1118-1119, ISSN 0030-4220, https://doi.org/10.1016/0030-4220(58)90293-7.
3. Aslam S, Francis PG, Rao BHS, Ummar M, Issac JK, Nair RB. A Double Blind Study on the Efficacy of Local Application of Hemocoagulase Solution in Wound Healing. J Contemp Dent Pract 2013;14(3):394-400.
4. Ramesh KV, Rao MC, Bairy KL, Ramanarayan K, Kulkarni DR. Effects of procoagulants on wound healing. Indian J Exp Biol 1990;28(1):43-45.
5. Van Galen KPM, Engelen ET, Mauser-Bunschoten EP, Van Es RJJ, Schutgens REG. Antifibrinolytic therapy for preventing oral bleeding in patients with a hemophilia or Von Willebrand disease undergoing oral or dental procedures. Cochrane Database of Systematic Reviews 2014, Issue 12. [DOI: 10.1002/14651858.CD011385.
6. Kumbargere Nagraj S, Prashanti E, Aggarwal H, Lingappa A, Muthu MS, Kiran Kumar Krishanappa S, Hassan H. Interventions for treating post-extraction bleeding. Cochrane Database Syst Rev. 2018 Mar 4;3(3):CD011930. doi: 10.1002/14651858.CD011930.pub3. PMID: 29502332; PMCID: PMC6494262.
7. Gornitskaia OV, Platonova TN, Volkov GL. Enzymes of snake venoms. Ukr Biokhim Zh 2003;75:22-32.
8. Nahas L, Kamigutti AS, Barros AR. Thrombin-like and factor X-activator components of Bothrops snake Venoms. Thrombos Haemostas 1979;41:314-327.
9. Borio PG. Coagulation processes and ophidic venoms. Toxicon 1955;6:30-35.
10. Shenoy AK, Ramesh K V, Chowta MN, Adhikari PM, Rathnakar U P. Effects of botropase on clotting factors in healthy human volunteers. Perspect Clin Res 2014;5:71-4
11. Ramesh KV, Kulkarni DR, Bairy KL, Ramanarayan K. Effects of Botropase on wound healing. Ind J Surg 1990 May;52(5):218- 221.

12. Ricci A. Trial of some hemostatic drugs in tonsillectomy under general anesthesia with intubation. Minerva Med 1968; 59(93):5011-5014
13. Lahoti BK, Aggarwal G, Diwaker A, Sharma SS, Laddha A (2010) Hemostasis during hypospadias surgery via topical application of feracrylum citrate: a randomized prospective study. J Indian Assoc Pediatr Surg 15(3):87. https://doi.org/ 10.4103/0971-9261.71746
14. Laddha AK, Mulla M, Sharma SS, Lahoti BK, Mathur R. A prospective comparison of topical feracrylum citrate versus adrenaline as haemostatic agent in hypospadias surgery in children. Afr J Paediatr Surg. 2014 Jul-Sep;11(3):215-8. doi: 10.4103/0189-6725.137328. PMID: 25047311.
15. Rai S, Rattan V. Efficacy of Feracrylum as Topical Hemostatic Agent in Therapeutically Anticoagulated Patients Undergoing Dental Extraction: A Comparative Study. J Maxillofac Oral Surg. 2019 Dec;18(4):579-583. doi: 10.1007/s12663-018-1156-6. Epub 2018 Sep 27. PMID: 31624440; PMCID: PMC6795659.

Assessment and Comparison of Nutritional Status and Improvement in Health Status Among Complete Denture Wearers in Rajasthan Population Using Questionnaire and Customised Diet Plan: A Randomised Clinical Trial

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Abstract

Purpose: In this trial, we aimed to clarify the combined effect, on the nutritional statuses of edentulous elderly patients, of dentists providing complete dentures with dietary advice.

Method: A randomized-clinical trial was performed on a healthy edentulous population. All participants had new complete dentures fabricated and were randomly divided into test group 1 and test group 2. The test group 1 received customised dietary advice through standardized pamphlets and the control group received advice on denture care only. Nutritional status was assessed using the Mini Nutritional Assessment (MNA) and oral health status was assessed using GOHAI before and at 1 and 3 months after treatment. Intragroup and Intergroup comparison between individual groups in relation to different quantitative parameters will be done using Paired 't' test and Independent 't' test respectively.

Results: In total, 92 participants completed all trial steps. At 3 months after treatment, the MNA and GOHAI score in the test group 1 was significantly higher than that in the test group 2($p< 0.05$).

Conclusions: Nutritional statuses of edentulous population can be improved by fabricating new complete dentures and providing customised dietary advice.
Keywords: Nutrition, Geriatrics, Customised Diet, Complete denture, Edentulous

INTRODUCTION

Perfect health is a prize that has been the goal of mankind through all the ages. Oral health is not separate from general health, but maintaining oral health is definitely difficult and different in old age.[1] A variety of changes occur with aging which involves physiological, psychosocial, functional, pharmacological and oral factors,[1,2,3] that can impact and be impacted by nutrition.[2] These changes vary tremendously from person to person.

Diet and nutrition plays an important role in maintaining health and comfort of oral tissues. Elderly individuals with extensive tooth loss preferentially consume soft, easier to chew foods which have a low nutrient density.[4] The lack of all teeth contributes to disability, impairment and handicap, and for most of edentulous patients the rehabilitation with conventional complete dentures is the accessible treatment option.[3] In this context, it is possible that the edentulousness and the wearing of conventional complete dentures can affect the quality of life and patient's health status. [3] Recent studies have indicated that prosthetic treatment with complete dentures combined with customised dietary counselling could be effective at improving food and nutrient intake of edentulous elderly patients. [4,5,6]

Specific tools are available for assessment of nutritional status and oral health related quality of life. In literature, investigations have been done to assess the same by formulating the question. Various studies [10-14] have addressed the assessment of nutritional status using different instruments such as Mini-Nutritional Assessment (MNA) and the General Oral Health Assessment Index (GOHAI) questionnaire. However, limited studies have combined them together. Therefore, in this study we aim to assess the health status of edentulous adults, before and after denture treatment and with or without customised diet, to assess whether this type of intervention can improve nutritional and oral health statuses using MNA and GOHAI questionnaire.

MATERIALS AND METHODOLOGY

A. Study Design

A randomized clinical trial was conducted on 50 males and 50 female edentulous subjects reporting to the OPD of department of prosthodontics crown & bridge and implantology, Pacific Dental College and hospital, Udaipur with the research design consisting of subjective assessment of Nutritional status and dietary intake in complete denture wearers and comparison of health status among patients taking regular diet and customized diet assessed by using Mini-Nutritional Assessment (MNA) and the General Oral Health Assessment Index (GOHAI) assessment tools. Subjective assessment was done thrice;

i. on the day of denture insertion,
ii. after one month of denture placement and
iii. after three months of follow-up

Ethical clearance from the Institutional Research Review Board (IRRB) was obtained.

Following were the inclusion and exclusion criteria:

Inclusion Criteria:

1. Completely edentulous patients opting conventional complete denture therapy
2. New denture wearers and old denture patients opting for new dentures due to worn out or ill-fitting old dentures
3. Age ranging from 45 to 80 years including male and female
4. Patients without any systemic diseases
5. Patient willing to participate and sign consent form

Exclusion Criteria:

1. Patients with single maxillary or mandibular complete denture
2. Patients desiring for implant therapy
3. Patients suffering from psychological and neurological problems.
4. Patients with systemic diseases

5. Patients not willing to sign the consent form

- **Customized Diet plan: (Table 1,2,3)**
- Diet plan was formulated by maintaining the dietary guidelines for Indians[9] and Balanced diet food pyramid as given in Dietary guidelines for Indians- A Manual, by National institute of Nutrition, Hyderabad, India and customized based on the local population of Rajasthan by consulting a registered dietician.
- Different diet plans are formulated depending on their, **gender (Male, Female), dietary restrictions (Veg/Non-Veg), age (45-60 and 60-80 years of age) and caloric requirement**.
- **Patient Sampling**

  A total of 100 sample size was determined, of which 25 males and 25 females were selected by lottery method in Test group 1: who were provided with customized diet plan along with denture treatment and 25 males and 25 females were included in test group 2: who were provided with only denture treatment with regular post denture instructions and no diet plan.

B. Methodology / Data sources or Measurement

A study was explained to patients and informed consent was taken before proceeding to procedure. To eliminate operator or investigator's influence, patient and examiner were blinded. The dentures were fabricated by the post graduate scholar under the supervision of senior prosthodontist following standard clinical and laboratory protocol. Patients were recalled after 1 week for follow up to address complaints and do denture adjustment if needed to ensure that there are no ill-fitting dentures. The questionnaires forms were presented on the day of denture insertion in the local language by Post graduate student (Figure 1). Samples in test group 1 were provided with formulated customized diet plan along with post denture insertion instruction and was explained to the patients as well as to their family member who took care of their meals and pamphlets were given to the patient. They were instructed and motivated to maintain the record of daily dietry intake in a diary.

Samples in test group 2 were just given post denture insertion instructions with no dietary advice, but were asked to maintain the daily dietary record. The health and nutritional status was again assessed after one month and after three month of denture placement using:

i. Mini nutritional Assessment (MNA)
ii. Geriatric Oral Health Assessment Index (GOHAI)

iii. Assessment using MNA (Figure 2):[15]

1. Name , Gender, Age, Weight (kg) and Height (cm) was recorded.
2. MNA questionnaire form combines Screening and assessment features, which include total of 18 items. These items are divided into 4 Domains and considered for evaluation of health status. The 4 Domains include:
   i. Anthropometric Measurement
   ii. Global Evaluation
   iii. Dietic Assessment
   iv. Subjective Assessment
   v. **Assessment Using GOHAI (Figure 2): [12,16]**

   The participants were interviewed and asked to estimate the frequency of problems in GOHAI questionnaire using a five point Likert scale rating (always [5], often [4], sometimes [3], seldom [2] or never [1]). The 12-item questionnaire was classified into four major domains which were the functional limitation, pain or discomfort, psychological and behavioral impact. The GOHAI score was determined by summing the final score of each of the 12 items ranges from 0 to 60. The score for GOHAI item number 3, 5 and 7 were reversed in order to attain a positive oral health GOHAI score. The higher GOHAI score denotes better oral health status perceived by the participants themselves.

It comprises 12 items grouped into three fields:

1) The **functional** field →Limit eating, biting or chewing, speaking and swallowing.
2) The **psychosocial** field → concerns, relational discomfort and appearance.
3) The **pain or discomfort** field → drugs, gum sensitivity and discomfort when chewing certain foods.

Maximum score is 60, minimum score is 17. Score between 57 to 60 indicate good oral quality of life while <50 indicate poor oral quality of life.

CUSTOMISED DIET PLANS

SCHEDULE	DIET FOR 3 DAYS POST DENTURE INSERTION
Morning	Milk with oats mix grain /biscuit
Breakfast	Semi liquid upma / sattu flour lapsi
Mid-morning	Fruit juice orange/ sweet lime / pineapple/ mashed apple /Coconut water
Lunch	Soft moong dal lapsi with Gram flour curry and Buttermilk Daliya add veg (potato+ capsicum+ cauliflower all veg mashed) + dal
Evening	Fruit Juice and carrot / mushroom / tomato soup
Dinner	Mashed potato + mashed roti with spinach stew OR Brown rice with palak stew

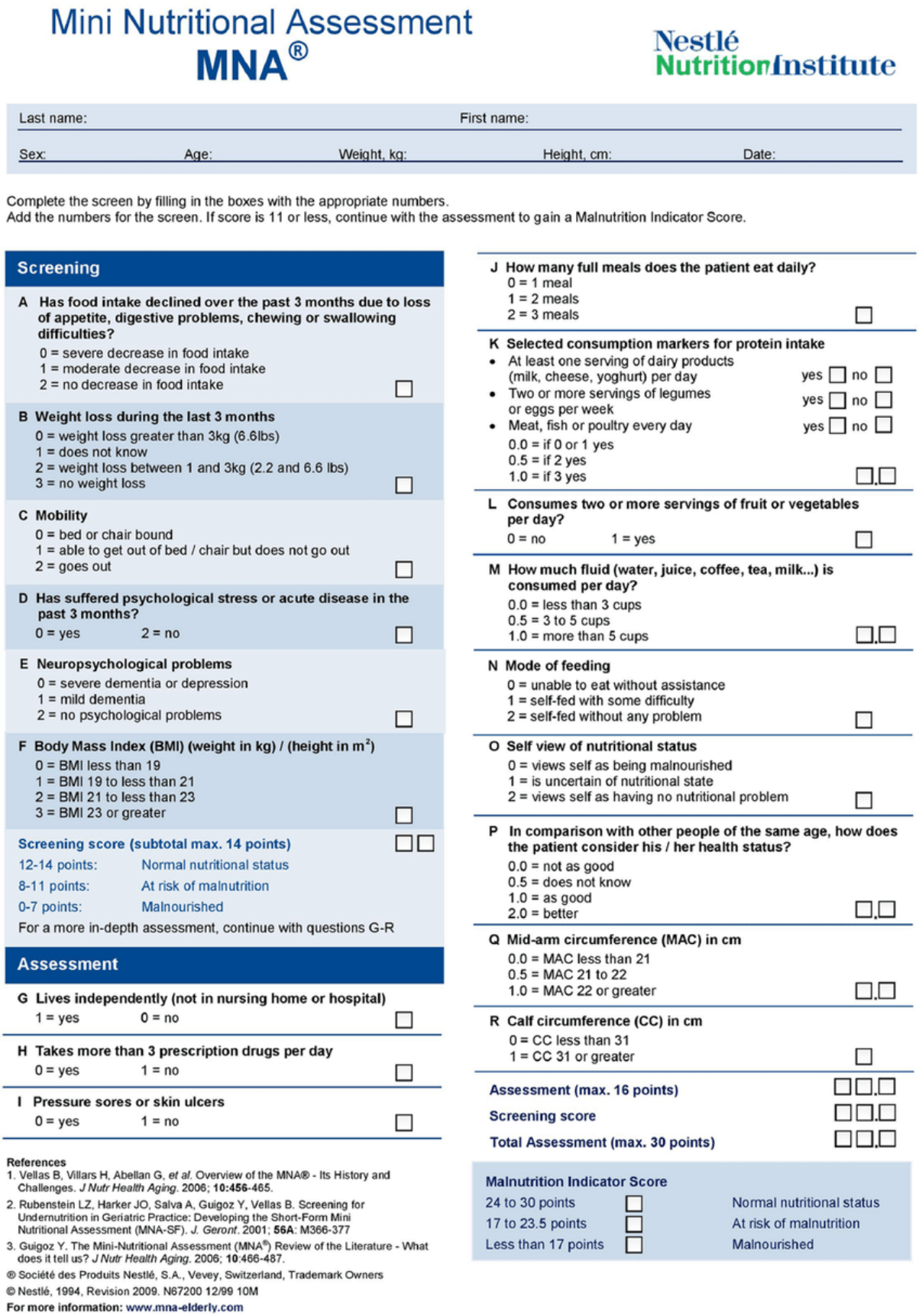
Table 1: Diet for 3 days post denture insertion: Generalized for all

Schedule	Non-Vegetarian Male	Non-Vegetarian Female
Early morning	Luke warm water with lemon juice OR Cumin seeds OR Honey+ Turmeric OR Basil seeds OR Cinnamon	Luke warm water with lemon juice OR Cumin seeds OR Honey+ Turmeric OR Basil seeds OR Cinnamon
Breakfast	Bread 2 + omelette 2/ Boiled eggs 2 +Milk 250 ml(1 glass)	Bajara roti + Garlic chutney (16 cal)/ Stuffed moong dal and potato roll +Milk 250 ml(1 glass)
Mid-Morning	Orange juice 1 glass OR Carrot juice	Coconut water OR Amla juice
Lunch	Chicken OR Laal maas + dal 1 bowl + roti 1 and 1/2 + rice 1 bowl + salad OR Boiled Chicken	Mutton + rice 1and 1/2 bowl + salad OR Gatta+rice 1 bowl
Evening	Dhokala 3 + red chutney OR Sprout paneer chat	Sprout paneer chat
Dinner	Dal khichadi OR Chicken biryani	Fish curry OR Kolambi Roti 1and 1/2+ dal 1 bowl OR Boiled chicken

Table 2: Vegetarian Diet for Males and Females, Age 45-60 and 60-80 years

Schedule	Non-Vegetarian Male	Non-Vegetarian Female
Early morning	Luke warm water with lemon juice OR Cumin seeds OR Honey+ Turmeric OR Basil seeds OR Cinnamon	Luke warm water with lemon juice OR Cumin seeds OR Honey+ Turmeric OR Basil seeds OR Cinnamon
Breakfast	Bread 2 + omelette 2/ Boiled eggs 2 +Milk 250 ml(1 glass)	Bajara roti + Garlic chutney (16 cal)/ Stuffed moong dal and potato roll +Milk 250 ml(1 glass)
Mid-Morning	Orange juice 1 glass OR Carrot juice	Coconut water OR Amla juice
Lunch	Chicken OR Laal maas + dal 1 bowl + roti 1 and 1/2 + rice 1 bowl + salad OR Boiled Chicken	Mutton + rice 1and 1/2 bowl + salad OR Gatta+rice 1 bowl
Evening	Dhokala 3 + red chutney OR Sprout paneer chat	Sprout paneer chat
Dinner	Dal khichadi OR Chicken biryani	Fish curry OR Kolambi Roti 1and 1/2+ dal 1 bowl OR Boiled chicken

Table 3: Non-vegetarian diet for males and females



Mini Nutritional Assessment
MNA®

Nestlé Nutrition Institute

Last name: First name:

Sex: Age: Weight, kg: Height, cm: Date:

Complete the screen by filling in the boxes with the appropriate numbers.
Add the numbers for the screen. If score is 11 or less, continue with the assessment to gain a Malnutrition Indicator Score.

Screening

A Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties?
0 = severe decrease in food intake
1 = moderate decrease in food intake
2 = no decrease in food intake

B Weight loss during the last 3 months
0 = weight loss greater than 3kg (6.6lbs)
1 = does not know
2 = weight loss between 1 and 3kg (2.2 and 6.6 lbs)
3 = no weight loss

C Mobility
0 = bed or chair bound
1 = able to get out of bed / chair but does not go out
2 = goes out

D Has suffered psychological stress or acute disease in the past 3 months?
0 = yes 2 = no

E Neuropsychological problems
0 = severe dementia or depression
1 = mild dementia
2 = no psychological problems

F Body Mass Index (BMI) (weight in kg) / (height in m²)
0 = BMI less than 19
1 = BMI 19 to less than 21
2 = BMI 21 to less than 23
3 = BMI 23 or greater

Screening score (subtotal max. 14 points)
12-14 points: Normal nutritional status
8-11 points: At risk of malnutrition
0-7 points: Malnourished

For a more in-depth assessment, continue with questions G-R

Assessment

G Lives independently (not in nursing home or hospital)
1 = yes 0 = no

H Takes more than 3 prescription drugs per day
0 = yes 1 = no

I Pressure sores or skin ulcers
0 = yes 1 = no

J How many full meals does the patient eat daily?
0 = 1 meal
1 = 2 meals
2 = 3 meals

K Selected consumption markers for protein intake
- At least one serving of dairy products (milk, cheese, yoghurt) per day yes no
- Two or more servings of legumes or eggs per week yes no
- Meat, fish or poultry every day yes no

0.0 = if 0 or 1 yes
0.5 = if 2 yes
1.0 = if 3 yes

L Consumes two or more servings of fruit or vegetables per day?
0 = no 1 = yes

M How much fluid (water, juice, coffee, tea, milk...) is consumed per day?
0.0 = less than 3 cups
0.5 = 3 to 5 cups
1.0 = more than 5 cups

N Mode of feeding
0 = unable to eat without assistance
1 = self-fed with some difficulty
2 = self-fed without any problem

O Self view of nutritional status
0 = views self as being malnourished
1 = is uncertain of nutritional state
2 = views self as having no nutritional problem

P In comparison with other people of the same age, how does the patient consider his / her health status?
0.0 = not as good
0.5 = does not know
1.0 = as good
2.0 = better

Q Mid-arm circumference (MAC) in cm
0.0 = MAC less than 21
0.5 = MAC 21 to 22
1.0 = MAC 22 or greater

R Calf circumference (CC) in cm
0 = CC less than 31
1 = CC 31 or greater

Assessment (max. 16 points)
Screening score
Total Assessment (max. 30 points)

Malnutrition Indicator Score
24 to 30 points Normal nutritional status
17 to 23.5 points At risk of malnutrition
Less than 17 points Malnourished

References
1. Vellas B, Villars H, Abellan G, *et al.* Overview of the MNA® - Its History and Challenges. *J Nutr Health Aging.* 2006; **10**:456-465.
2. Rubenstein LZ, Harker JO, Salva A, Guigoz Y, Vellas B. Screening for Undernutrition in Geriatric Practice: Developing the Short-Form Mini Nutritional Assessment (MNA-SF). *J. Geront.* 2001; **56A**: M366-377
3. Guigoz Y. The Mini-Nutritional Assessment (MNA®) Review of the Literature - What does it tell us? *J Nutr Health Aging.* 2006; **10**:466-487.

For more information: www.mna-elderly.com

Figure 1: Mini Nutritional Assessment Questionnaire[17]

	GOHAI			Scores		
Sr. No	Questions	Always 1	Often 2	Sometimes 3	Seldom 4	Never 5
1	How often did you limit the kinds or amounts of food you eat because of the problems with your teeth or dentures?					
2	How often did you have trouble biting or chewing any kinds or food such as firm meat or apples?					
3	How often were you able to swallow comfortably?					
4	How often have your teeth or dentures prevented you from speaking the way you wanted?					
5	How often were you able to eat anything feeling discomfort?					
6	How often did you limit contacts with people because Of the condition of your teeth or denture?					
7.	How often were you pleased or happy with the looks of your teeth and gums, or dentures?					
8.	How often did you use medication to relive pain or discomfort from around your mouth?					
9.	How often were you worried or concerned about the problems with your teeth, gums or dentures?					
10.	How often did you feel nervous or self-conscious because of problems with your teeth, gums or dentures?					
11.	How often did you feel uncomfortable eating in front of people because problems with your teeth or dentures?					
12.	How often were your teeth or gums sensitive to hot, cold or sweets?					

Figure 2: Geriatric Oral Health Assessment Index (GOHAI)[16]

Statistical Analysis

- Statistical analysis was performed using Statistical Product and Service Solution (SPSS) version 16 for Windows (SPSSInc, Chicago, IL).
- Descriptive quantitative data is expressed in mean and standard deviation.
- Confidence interval is set at 95% and probability of alpha error (level of significance) set at 5%.
- Power of the study set at 80%.
- Intragroup comparison between individual groups in relation to different quantitative parameters will be done using Paired 't' test
- Intergroup comparison between both groups in relation to different quantitative parameters using Unpaired/ independent 't' test.

RESULTS

The total of 100 subjects including 50 males and 50 females treated with conventional complete denture treatment were selected for this study. Among them, 6 subjects did not report for 1 month follow up hence, were eliminated from the study. Among remaining 94, 2 patients did not report for 3 month follow up period. Hence, a total of 92 patients were included and their data were statistically analysed; and a total attrition of 8 patients was observed.

There was significant improvement in nutritional status and health status in subjects of test group 1 i.e. samples on customised diet plan and test group 2 i.e. samples on Regular diet as assessed by MNA and GOHAI before and post 1 month and post 3 month of denture treatment with p value <0.05.

Nutritional status analysed by MNA revealed that there was significant difference between Pre-treatment and post 1-month dental treatment, Pre-treatment and post 3 month and post 1 month and post 3 month of complete denture treatment among subjects of Test group 1 and subjects of Test group 2 with p value < 0.05.

However, the difference in values between post 1 month and post 3 month revealed insignificant improvement with p value 0.946.

The nutritional status or improvement in health status as assessed by GOHAI revealed that there was no significant difference among both the test group p>0.05, except for pain parameter which revealed significant difference in 3rd month follow up p=0.01 and between 1 month and 3 month follow up with p=0.025.

Also, on comparison of GOHAI between 1 month and 3 month follow up revealed significant difference with p=0.05; as assessed by Independent t test.

DISCUSSION

In the current study two different nutrition and health assessment tools were used, MNA and GOHAI to evaluate improvement in nutrition and health status of 92 edentulous patients between subjects on customised diet plan prescribed by us and those on regular diet before and after one month and three months of denture insertion.

The null hypothesis was there will be no difference in the health status of complete denture wearers before and after denture treatment with or without customized diet This hypothesis was rejected as there was significant improvement and the effect of prescribing customized diet proved to be more efficient as compared to the samples on regular diet as assessed by MNA and GOHAI tools.

As per the assessment score for MNA, <17 indicates undernutrition, 17-23.5 indicated at risk of undernutrition and >24 indicated well nourished. The mean of pre-treatment total assessment score indicated that majority of patients were at the risk of malnutrition prior to the treatment. However, test group 1 samples showed significant improvement in nutritional status and majority were scored as well-nourished at 1 month follow up, which showed further improvement by the 3rd month with mean of 26.01. this is in accordance with the study by Prakash et. al.[15] in the year 2012, who also reported higher MNA scores on follow up compared to pre-treatment in complete denture wearers who were explained about importance of well-balanced diet.

The samples in test group 2 also showed significant improvement in nutritional status from pre-treatment to1 month follow up, which showed further improvement by the 3rd month with mean of 24.57 were majority scored as well-nourished. This is in accordance with the study done by Prasad et al.[17] who reported that prosthetic rehabilitation of edentulous patients improves nutritional status of edentulous patients. As compared to test group 2, more significant improvements were seen in test group 1 in total assessment score of MNA and GOHAI. This is in accordance with the study of Suzuki et al.[6] which stated that dentures alone are insufficient to improve nutritional statuses in healthy elderly population, and that the treatment should be combined with the simple dietary advice.

Thus, both the groups showed significant improvement in nutritional and health status compared to pre-treatment assessment; where the patients who received customized diet plan showed better improvement as compared to the patients with only denture care and no dietary advice.

CONCLUSION

The aim of this study was to assess nutritional status and dietary intake in patients before and after complete denture insertion and to compare improvement in health status among patients taking regular diet and customized diet using Mini-Nutritional Assessment (MNA) and the General Oral Health Assessment Index (GOHAI) questionnaire.

Based on the results it is concluded that:

1. 1.There is significant improvement in health status of individuals before and after treatment with conventional complete denture in patients on regular or no diet plan.
2. 2.There is significant improvement in health status of individuals before and after treatment with conventional complete denture in patients on customized diet plan.
3. On comparison between Regular and customized diet plan, the patients on customized diet plan showed more improvement compared to the ones with no diet

plan. Thus, within the limited conditions of this trial, we suggest that dentists might be able to improve the nutritional statuses of edentulous patients by fabricating new complete dentures and providing simple dietary advice.

BIBLIOGRAPHY

1. Krishnan Y, Jain L, Seth J, Kumar V, Nutritional and prosthodontic care for geriatric patients. Int J Oral Health Dent 2017;3(3):127-132
2. Palmer CA. Gerodontic nutrition and dietary counseling for prosthodontic patients. Dent Clin North Am. 2003 Apr;47(2):355-71.
3. Deogade SC, Naitam D, Sundarkar P, Aswani K. "Nutrition for Geriatric Complete Denture Wearing Patients". Acta Scientific Nutritional Health 4.3 2020: 01-06
4. Paturu R, Veeravalli PT, Vaidyanathan AK, Grover M. Evaluation of Nutritional Status and Eating Pattern in First and Second-Time Denture Wearers: A Prospective 60 Days (2 Months) Pilot Study. J Indian Prosthodont Soc 2011 11:156–164
5. Shrestha B, Basnet BB, Adhikari G. A questionnaire study on the impact on oral health-related quality of life by conventional rehabilitation of edentulous patient BDJ Open 2020; 6:3
6. Suzuki H, Kanazawa M, Komagamine Y, Iwaki M, Amagai N, Minakuchi S. Changes in the nutritional statuses of edentulous elderly patients after new denture fabrication with and without providing simple dietary advice. J Prosthodont Res. 2019 Jul;63(3): 288-292
7. Bradbury J, Thomason JM, Jepson NJ, Walls WG, Allen PF, Moynihan PJ. Nutrition counseling increases fruit and vegetable intake in the edentulous. J Dent Res 2006;85: 463–8.
8. Moynihan PJ, Elfeky A, Ellis JS, Seal CJ, Hyland RM, Thomason JM. Do implant supported dentures facilitate efficacy of eating more healthily? J Dent 2012;40: 843–50.
9. Dietary guidelines for Indians -a manual; national institute of nutrition Hyderabad – 500 007, India.
10. Suzuki H, Kanazawa M, Komagamine Y, Iwaki M, Jo A, Amagai N, Minakuchi S. The effect of new complete denture fabrication and simplified dietary advice on nutrient intake and masticatory function of edentulous elderly: A randomized-controlled trial. Clin Nutr. 2018 Oct;37(5):1441-1447
11. Reber E, Gomes F, Vasiloglou MF, et al. Nutritional risk screening and assessment. J Clin Med 2019;8(7):1065.
12. Kundapur V, Hegde R, Shetty M, Mankar S, Hilal M, Prasad A H. Effect of Loss of Teeth and its Association with General Quality of Life using Geriatric Oral Health Assessment Index (Gohai) among Older Individuals Residing in Rural Areas. Int J Biomed Sci. 2017 Mar;13(1): 6-12
13. Bettie N, Rai R, Narayan K, Priyadarshani V, Gethsie R, Vathana S. Role of nutrition in the health of complete denture. NOVYI MIR Reasearch Journal. 2020; 5(11): 29-35
14. Viola AP, Takamiya AS, Monteiro DR, Barbosa DB. Oral health-related quality of life and satisfaction before and after treatment with complete dentures in a Dental School in Brazil. Journal of Prosthodontic Research 2013; 57:36–41
15. Prakash, Nagaranjani & Kalavathy, Natarajan & Sridevi, Jami & Premnath, Kumareshan. Nutritional status assessment in complete denture wearers. Gerodontology 2012; 29. 224-30.
16. Atchison K, Dolan T. Development of the geriatric oral health assessment Index. J Dent Educ 1990; 54: 680-687
17. Prasad DK, Demeri F, Hegde C, et al. Nutritional Assessment in Completely Edentulous Geriatric Patients. World J Dent 2020;11(4):284–286

Comparison of Analgesic Efficacy of Etoricoxib and Aceclofenac in Post Operative Pain Management after Periodontal Flap Surgery

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Abstract

Background: The purpose of the study was to compare the analgesic efficacy of Etoricoxib (90 mg once a day) and Aceclofenac (100 mg twice a day) in post-operative pain management after periodontal flap surgery for three days.

Material & Methods: 15 subjects underwent, periodontal flap surgical procedures in at least two quadrants were randomly divided for administration of 90 mg tablet Etoricoxib orally once daily after surgery in one quadrant & administration of 100 mg tablet Aceclofenac orally twice daily for 3 days postoperatively after surgery in another quadrant. The postoperative pain was evaluated using Visual analogue scale.

Results: Study demonstrated that both Etoricoxib and Aceclofenac had significant post-operative pain control within 24 hours. In the present study Aceclofenac showed significant difference in post-operative pain control in first 4 hours than Etoricoxib.

Conclusion: Aceclofenac showed better overall results in controlling post-operative pain compared to Etoricoxib up to 24 hours.

Keywords: Analgesia, Etoricoxib, Aceclofenac, Post-operative pain, Periodontal Flap surgery.

INTRODUCTION

Periodontal disease is a chronic inflammatory infection having a high prevalence worldwide.[1] Periodontal treatment is experienced as painful by a substantial number of patients, during & after which there is an expectation of discomfort, postoperative pain, and dentin hypersensitivity .[2] Scaling and root planning, one of the most common procedures in

periodontal practice, can promote pain of significant duration and magnitude.[3] Periodontal surgical therapies, when necessary, also generates pain and discomfort with greater intensity than that caused only by scaling and root planning.[4-6]

Pain is an unpleasant, sensory and emotional experience associated with tissue injury or infection, resulting in cellular damage.[7] Post-operative pain after periodontal surgical procedures is a matter of considerable consequence to most patients. Many factors contribute towards occurrence of post-operative dental pain like duration, extent & complications which may relate to the inflammatory process that is initiated by surgical trauma.

There is no universally accepted method for measuring pain. Patient-reported outcomes are of most importance in pain measurement, as pain is a subjective phenomenon and varies person to person. Visual analogue scales have proved to be satisfactory in the subjective measurement of pain. It is a 10-point scale where pain experienced is marked as no pain to severe unbearable pain .[8]

Cyclooxygenase (COX) pathways have long been targeted for the treatment of inflammatory pain, through the use of NSAIDs. With the demonstration of two major COX isoforms, COX-1 and COX-2, involved in the production of prostaglandins, but with different distribution and regulation, preferential and selective COX-2 inhibitors have been developed.[9]

Acetaminophen, Nonsteroidal anti-inflammatory drugs (NSAIDs) and opioids analgesics are prescribed to subside pain. NSAIDs are commonly the first options in pain management after surgical procedures, especially due to the less severe side effects compared to others. The role of preoperative and postoperative medications in reducing postoperative complications has been extensively evaluated.[10]

Aceclofenac is a phenyl acetic acid derivative NSAID with preferential COX-2 inhibitory activity.[11] It exhibits anti-inflammatory and analgesic properties and thus used for pain management after many dental procedures.[12] The new class of NSAIDs with selective inhibition of the COX-2 anti-inflammatory activity has been developed, the *-coxibs* NSAIDs. The *-coxibs* exhibit minimal damage to gastric mucosal & peptic ulceration with ulcer bleeds at a lower rate than with traditional NSAIDs. Etoricoxib is a newer COX-2 inhibitor has the highest COX-2 selectivity. As the half-life of Etoricoxib is 24 hours, it is suitable for once-a-day treatment.[13]

Thus this study was undertaken to compare the analgesic efficacy of Etoricoxib & Aceclofenac in reduction of pain after periodontal flap surgical procedures.

MATERIAL AND METHODS

Study Design and Ethical Consideration

The study was single-center, single-blind, split mouth, cross over randomized controlled clinical trial. Ethical approval was obtained at the beginning of the study from the Institutional Ethical Committee. The participants were informed about the study protocol & written informed consent was obtained.

Sample Selection and Inclusion Criteria

The study recruited 15 patients (18-65 years) with generalized chronic periodontitis who were who were scheduled for flap surgery in at least two quadrants. The study took place in Department of Periodontology, RUHS College of Dental Sciences, Jaipur from January 2023 and March 2023.

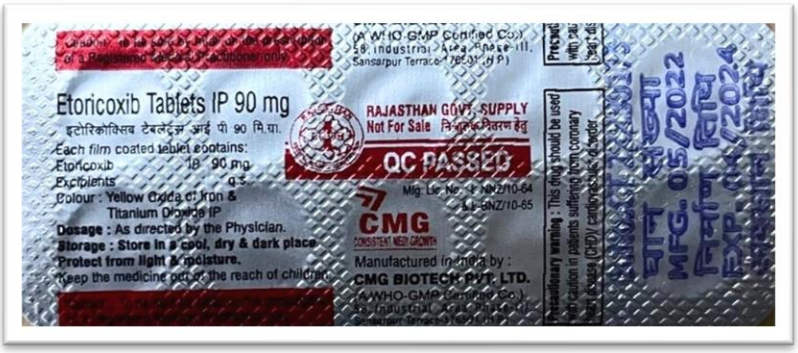
Patients who fulfilled the following criteria were included in the study :1) having generalized chronic periodontitis & planned for Periodontal flap surgery; 2) in good systemic health 3.) Had no history of drug allergy and non-consumption of analgesics two weeks prior to surgery. Patients were excluded if they met any of the following criteria: 1.) Patients who had infectious diseases, history of asthma, peptic ulceration, or other disorders of the upper gastrointestinal tract; 2.) With history of ischemic heart disease / hypertension / cardiac failure / cerebrovascular disease or pre-disposed to cardiovascular events 3.) Consumption of any immunosuppressive or anti-inflammatory drugs 1 month prior to the study; 4.) Pregnant women and lactating mothers. 5.) Smokers, alcohol abusers & tobacco chewers.

After completion of phase I therapy i.e. scaling & root planning, all the patients who were participating in the study were scheduled for periodontal flap surgical procedure, under local Anesthesia (2% lidocaine with 1: 100,000 epinephrine) by an experienced periodontist. Mucoperiosteal flap was

elevated & after completion of open flap debridement sutures were place. In each patient, after completion of periodontal flap procedure of first quadrant, Tab Etoricoxib 90 mg OD[14] & for second quadrant, Tab Aceclofenac 100mg BD[15] was prescribed. At least a 4-week interval between the appointments was set for adequate healing.

Test Drug Protocols

Patients underwent Periodontal flap surgery in which least two quadrants were randomly allocated for administration of either of the test drugs orally within 1 hour after completion of surgery. Tab Etoricoxib 90 mg once a day was administered after surgery in either of the quadrant. After 1 month of healing, Surgical procedure was performed for another quadrant and Tab Aceclofenac 100 mg was administered twice a day for post-operative pain management. The test drug of the respective group was randomly assigned for each surgical intervention (either of the surgical quadrant). The appearance of drug packaging was identical.



Picture 1. Tab Etoricoxib 90 mg

Picture 2. Tab Aceclofenac 100 mg

Data Collection

At the completion of the surgery, the patients were given post-operative instruction and supplied with a printed record forms and were asked to rate their subjective postoperative pain intensity using a visual analog scale (VAS) at 2 hours, 4 hours, 6 hours, 12 hours, 18 hours, 24 hours, 48 hours & 72 hours on a scale of 0 to 10; where 0 is for no pain and 10 is for worst pain. Each patient is provided with an additional rescue analgesic; Tab paracetamol 500mg, every 4 to 6 hours if the pain scale crosses moderate to severe pain.[16,17] The quantity and frequency of use were documented whenever the administration of medications (rescue and other medicines) were necessary.

Statistical Analysis

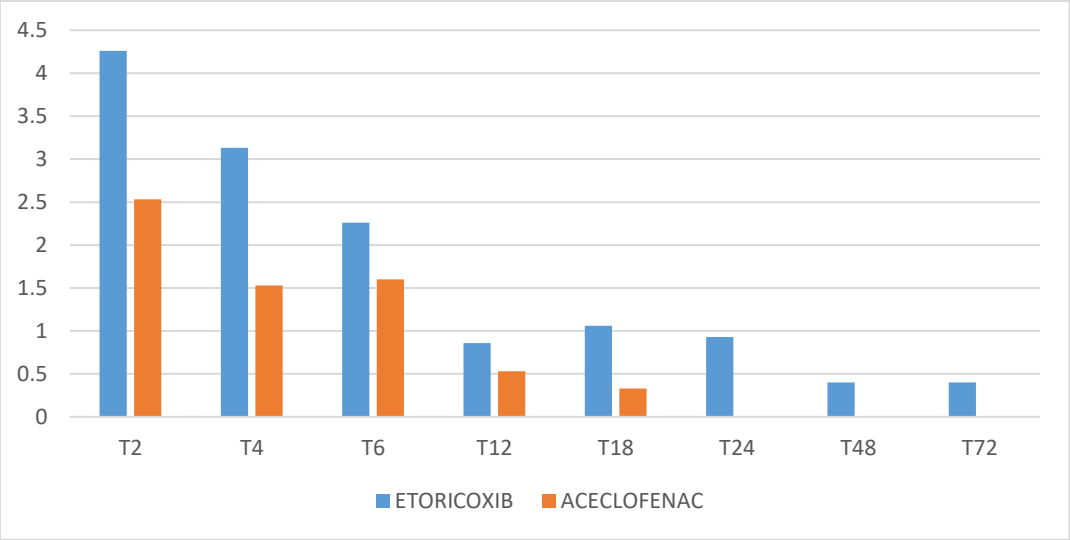
Statistical analysis was performed to characterize both the test drugs using statistical software SPSS version 22 (India).[18] Pain scores after administration of Etoricoxib and Aceclofenac were tabulated for the same individual. Differences between the effects of test drugs at different examination times (intergroup comparisons) were performed using student paired t test. These variations served as response variables for the conclusion of investigation. P value less than 0.05 was taken as significant.

Table 1. Post-operative pain scores of Etoricoxib and Aceclofenac group at various evaluation times and no. of rescue medicine.

Pain Score Study Group	T2	T4	T6	T12	T18	T24	T48	T72	No. of Rescue Analgesics
Etoricoxib	4.26 ± 2.46	3.13 ± 2.44	2.26 ± 3.29	0.86 ± 1.08	1.06 ± 1.98	0.93 ± 1.65	0.4 ± 0.48	0.4 ± 0.48	2
Aceclofenac	2.53 ± 1.54	1.53 ± 1.45	1.6 ± 1.62	0.53 ± 0.71	0.33 ± 0.47	0	0	0	1
P Value	**0.02**	**0.037**	0.49	0.33	0.17	0	0	0	-

Significant p values are shown in bold.

Figure 1. VAS pain score of Etoricoxib group and Aceclofenac group recorded at specific postoperative time intervals. Data are expressed as the mean ± standard deviation.



RESULTS

The study recruited a total of 15 subjects, 6 males (40%) and 9 females (60%) whose ages ranged from 18 to 65 years with a mean ± SD of 39 ± 7.6 years. Pain scores assessed through the VAS scale at different evaluation time are shown in Table 1 & 2 and the dynamic changes between the test drugs in each group is shown in Figure 1. At all the time points, administration of Aceclofenac was having less pain score compared to Etoricoxib. The peak postoperative pain score was seen at 2 hours for both with more pain score reduction observed in Aceclofenac use ($P < 0.001$) compared to the use of Etoricoxib. Further statistically significant reduction in mean VAS score were observed in both Etoricoxib use & Aceclofenac use at 4 hours which was higher for Aceclofenac. On Intragroup comparison, statistically significant reduction in mean VAS score was observed with Etoricoxib use at 12 hours. Intergroup comparison revealed mean pain score values at 2 h ($P = 0.02$), 4 h ($P = 0.038$), 6 h ($P = 0.049$), 12 h ($P = 0.33$), 18 h ($P = 0.17$) and 24 h ($P = 0.0$) after surgery, which were significantly lower for Aceclofenac than Etoricoxib (Figure 1). There was a steady deterioration in pain scores in both during successive evaluation intervals, with differences almost equal to zero after 24 hours.

Surgical characteristics did not differ for either of the quadrant. Local anesthetic was injected at all appropriate sites, not more than recommended quantity before surgery. Postoperative healing was uneventful in all patients, without adverse events being present during the follow-up. One subject after Aceclofenac use & two subjects after Etoricoxib use took the rescue analgesic in first 24 hours.

DISCUSSION

The current study looked at the efficacy of an oral NSAID, which is a type of medication that is routinely administered after oral surgical procedures. It is vital to note that the time and extent of the surgery may have an impact on pain perception.[2] Postoperative pain after periodontal surgeries is predicted to be milder and of shorter duration than other more complex oral surgeries.[5] Postoperative pain has been found to be more in intensity in the first 24 hours following periodontal surgery, then decreases gradually.[19] The mechanism of action of NSAIDs for pain relief is traditionally attributed to decreased prostaglandin synthesis due to cyclooxygenase inhibition, hence avoiding peripheral and central sensitization.[20,21] Other pathways, such as contact with the endocannabinoid system or ionic channels, could be related to their analgesic effects.[22,23] According to the literature, NSAIDs may produce adequate analgesic effect to alleviate most postoperative dental pain.[24]

Aceclofenac, a highly selective cox-2 inhibitor and NSAID of the phenyl acetic acid group, was authorized for medical use in 1992. Aceclofenac is water-insoluble, although it is conjugated in human hepatocytes and metabolized to the main metabolite 4-hydroxy aceclofenac. Aceclofenac has a plasma half-life of 4-4.3 hours. Aceclofenac is a powerful anti-inflammatory agent that works by reducing the expression or production of inflammatory mediators.[25] Etoricoxib is a novel COX-2-selective inhibitor with analgesic efficacy in the treatment of acute pain and primary dysmenorrhea, with rapid onset and long-lasting pain alleviation. Etoricoxib deliver pain alleviation that was both immediate and sustained over a 24-hour period.[26]

Pain is subjective, and its experience varies person to person. As a result, only patients are capable of assessing their own suffering. For this purpose, A Visual Analogue Scale use is recommended by Berge[27], Caporossi & Studzinski[28].

The objective of this study was to evaluate the efficacy of Etoricoxib and Aceclofenac in the postoperative pain management after Periodontal Flap Surgery. The Study demonstrated that both Etoricoxib and Aceclofenac had significant post-operative pain control within 24 hours after surgery. No statistically significant difference was discovered after 24 hours following surgical procedure, validating these findings. Results found with the Visual Analogue Scale showed that the Aceclofenac use had a lower pain score at all time points in the study compared with Etoricoxib use. While **Isola G et al** study compared effectiveness of Etoricoxib and Diclofenac on pain and perioperative sequelae after surgical avulsion of mandibular third molars found that compared to diclofenac and placebo, Etoricoxib had a significant analgesic effect throughout the first postoperative week.[28] While in a study by **Caporossi & Studzinski** found that there were no statistically significant differences in pain alleviation between NSAIDs and dexamethasone, at any post-operative time.[29]

This is the first kind of study comparing analgesic efficacy of Etoricoxib and Aceclofenac for post-operative pain management after Periodontal Flap Surgery. In the present study, both Etoricoxib and Aceclofenac had significant post-operative pain control within 24 hours. Aceclofenac showed significant difference in post-operative pain control in first 4 hours than Etoricoxib. **Lima et al** in a study comparing analgesic efficacy of two tablets of 100 mg Aceclofenac taken orally either 1 h before surgery or in the early postoperative period in controlling pain after surgical extraction of impacted mandibular third molars found that 200 mg Aceclofenac dose was efficient in controlling pain.[30] Etoricoxib took 12 hours to show significant difference in pain reduction. A study by Costa et al demonstrated statistically significant difference in pain reduction following removal of unerupted mandibular third molars over a 48-h period.[31] Both Etoricoxib and Aceclofenac required the use of a rescue analgesic in a few patients.

There were no reported adverse effects with the usage of Etoricoxib in the current investigation. According to the published Cochrane reviews,[32,33] Etoricoxib 120 mg use has been shown to be relatively safe. **Lima et al** in a study recommended maximum daily dose of 200 mg Aceclofenac in a day.[30]

The limitations of the present study are significant heterogeneity of included studies, implying differences between them, such as follow-up length, small sample size, risk of bias, different analgesics,

and pain metrics. Additionally, the findings of this study should be interpreted with caution, as unique characteristics of the sample, the precise evaluation intervals, the pain measurement scale and some potential carryover impact may influence the results. Additionally, Pain threshold levels are very subjective and must be taken into account in the current investigation.

CONCLUSION

Aceclofenac showed better overall results in controlling post-operative pain compared to Etoricoxib in first 24 hours of post-surgery. Nevertheless, there were no significant difference in the use of rescue medications. However, more research is needed to determine the possible benefits of Etoricoxib and Aceclofenac in postoperative therapy following periodontal flap surgery.

BIBLIOGRAPHY

1. Kassebaum NJ, Bernabé E, Dahiya M, Bhandari B, Murray CJL, Marcenes W.Global burden of severe periodontitis in 1990- 2010: A systematic review and meta-regression. J Dent Res 2014; 93: 1045–1053.
2. Canakci CF, Canakci V. Pain experienced by patients undergoing different periodontal therapies. Journal of the American Dental Association. 2007;138:1563-1573.
3. Aslund M, Suvan J, Moles DR, D'Aiuto F, Tonetti MS. Effects of two different methods of non-surgical periodontal therapy on patient perception of pain and quality of life: a randomized controlled clinical trial. Journal of Periodontology.2008;79(6):1031-1040. https://doi.org/10.1902/jop.2008.070394. Jun.
4. Curtis JW Jr, McLain JB, Hutchinson RA. The incidence and severity of complications and pain following periodontal surgery. Journal of Periodontology. 1985;56:597-601.
5. Mei CC, Lee FY, Yeh HC. Assessment of perception following periodontal and implant surgeries. Journal of Clinical Periodontology. 2016;43:1151-1159.
6. Bahammam MA, Kayal RA, Alasmari DS, et al. Comparison between dexamethasone and ibuprofen for postoperative pain prevention and control after surgical implant placement: a double-masked, parallel-group, placebo-controlled randomized clinical trial. Journal of Periodontology. 2017;88:69-77.
7. Melzack R, Wall P, editors. Textbook of pain. 4th ed. New York, NY: Churchill. Livingstone; 1999.
8. Scott J, Huskisson E. Graphic representation of pain. Pain 1976;2(2):175-84
9. González-Barnadas A, Camps-Font O, Martín-Fatás P, Figueiredo R, Gay-Escoda C, Valmaseda-Castellón E. Efficacy and safety of selective COX-2 inhibitors for pain management after third molar removal: a meta-analysis of randomized clinical trials. Clin Oral Investig. 2020 Jan;24(1):79-96. doi: 10.1007/s00784-019-02910-3. Epub 2019 Apr 23. PMID: 31016540.
10. Edmund B. Prevention and Management of Post-Operative Pain in Oral Surgery. Prim Dent J. 2018;7(3):57-63.
11. Brogden RN, Wiseman LR. Aceclofenac. A review of its pharmacodynamic properties and therapeutic potential in the treatment of rheumatic disorders and in pain management. Drugs 1996: 52: 113– 124.
12. Legrand E. Aceclofenac in the management of inflammatory pain. Expert Opin Pharmacother 2004: 5: 1347–1357.
13. Daniels et al. Evaluation of the Dose Range of Etoricoxib in an Acute Pain Setting Using the Postoperative Dental Pain Model. Clin J Pain 2011;27:1–8.
14. Malmstrom K, Sapre A, Couglin H, Agrawal NG, Mazenko RS, Fricke JR Jr. Etoricoxib in acute pain associated with dental surgery: a randomized, double-blind, placebo- and active comparator-controlled dose-ranging study. Clin Ther. 2004;26(5):667-79. doi: 10.1016/s0149-2918(04)90067-7. PMID: 15220011.
15. Asmawi, M.Z., O.M. Arafat, S. Amirin and I.M. Eldeen. In vivo antinociceptive activity of leaf extract of Crinum asiaticum and phytochemical analysis of the bioactive fractions. Int. J. Pharmacol. 2011; 7: 125-129.
16. Cetira Filho EL, Carvalho FSR, de Barros Silva PG, et al. Preemptive use of oral nonsteroidal anti-inflammatory drugs for the relief of inflammatory events after surgical removal of lower third molars: a systematic review with meta-analysis of placebo controlled randomized clinical trials. Journal of Cranio-MaxilloFacial Surgery. 2020;48:293-307.
17. Santos BFE, Costa FO, Pinto-Júnior AAC, Araújo AVA, Cyrino RM, Cota LOM. Postoperative pain and edema control following different protocols of preemptive analgesia in the surgical removal of impacted third molars: a triple-blind parallel randomized placebo-controlled clinical trial. Journal

of CranioMaxillo-Facial Surgery. [published online ahead of print January 11, 2021].
18. Priyanka Gogoi. Application of SPSS Programme in the Field of Social Science Research. International Journal of Recent Technology and Engineering (IJRTE). 2020 ;8(5): 2277-3878.
19. Seymour RA, Blair GS, Wyatt FAR.Post-operative dental pain and analgesic efficacy. Part I. Br J Oral Surg. 1983;21:290–297. https://doi.org/10.1016/0007-117X(83)90017-3
20. Burian M, Geisslinger G.COX-dependent mechanisms involved in the antinociceptive action of NSAIDs at central and peripheral sites. Pharmacol Ther .2005;107:139–154. https://doi.org/10. 1016/j.pharmthera.2005.02.004
21. Cashman JN. The mechanisms of action of NSAIDs in analgesia. Drugs.1996; 52(Suppl):5–23. https://doi.org/10.2165/00003495- 199600525-00004.
22. Guindon J, LoVerme J, De Léan A et al Synergistic antinociceptive effects of anandamide, an endocannabinoid, and nonsteroidal anti-inflammatory drugs in peripheral tissue: a role for endogenous fatty-acid ethanolamides? Eur J Pharmacol .2006;550: 68–77. https://doi.org/10.1016/j.ejphar.2006.08.045.
23. Arslan R, Bektas N.The role of TRP and K+ ion channels in analgesic effect of NSAIDs. Clin Exp Heal Sci.2018; 8:301–307. https:// doi.org/10.5152/clinexphealthsci.2018.832.
24. Wong YJ, Keenan J, Hudson K et al. Opioid, NSAID, and OTC analgesic medications for dental procedures: PEARL network findings. Compend Contin Educ Dent 2016;37:710–718
25. González-Alvaro I, Carmona L, Díaz-González F, et al. Aceclofenac, a new nonsteroidal antiinflammatory drug, decreases the expression and function of some adhesion molecules on human neutrophils. J Rheumatol 1996;23(4):723–729.
26. Malmstrom, K., Sapre, A., Couglin, H., Agrawal, N. G., Mazenko, R. S., & Fricke, J. R. Etoricoxib in acute pain associated with dental surgery: A randomized, double-blind, placebo- and active comparator-controlled dose-ranging study. Clinical Therapeutics.2004; 26(5), 667–679. doi:10.1016/s0149-2918(04)90067-7.
27. Berge TI. The use of a visual analogue scale in observer assessment of postoperative swelling subsequent to thirdmolar surgery. Acta Odontol Scand 1989: 47: 167–174.
28. Isola G, Matarese G, Alibrandi A, Dalessandri D, Migliorati M, Pedullà E, Rapisarda E. Comparison of Effectiveness of Etoricoxib and Diclofenac on Pain and Perioperative Sequelae After Surgical Avulsion of Mandibular Third Molars: A Randomized, Controlled, Clinical Trial. Clin J Pain. 2019;35(11):908-915. doi: 10.1097/AJP.0000000000000748. PMID: 31368908.
29. Caporossi LS, Dos Santos CS, Calcia TBB, Cenci MS, Muniz FWMG, da Silveira Lima G. Pharmacological management of pain after periodontal surgery: a systematic review with meta-analysis. Clin Oral Investig. 2020 ;24(8):2559-2578. doi: 10.1007/s00784-020-03401-6. Epub 2020 Jun 22. PMID: 32572640.
30. Presser Lima PV, Fontanella V. Analgesic efficacy of aceclofenac after surgical extraction of impacted lower third molars. Int J Oral Maxillofac Surg. 2006;35(6):518-21. doi: 10.1016/j.ijom.2005.09.001. Epub 2005; 8. PMID: 16278069.
31. Costa FW, Soares EC, Esses DF, Silva PG, Bezerra TP, Scarparo HC, Ribeiro TR, Fonteles CS. A split-mouth, randomized, triple-blind, placebo-controlled study to analyze the pre-emptive effect of etoricoxib 120 mg on inflammatory events following removal of unerupted mandibular third molars. Int J Oral Maxillofac Surg. 2015;44(9):1166-74. doi: 10.1016/j.ijom.2015.06.012. Epub 2015 Jul 3. PMID: 26144571.
32. Clarke R, Derry S, Moore RA. Single dose oral etoricoxib for acute postoperative pain in adults. Cochrane Database Syst Rev. 2014 8;2014(5):CD004309. doi: 10.1002/14651858.CD004309.

Assessment of the Anterior Loop of Inferior Alveolar Nerve at the Mental Foramen in Jaipur Population – A Comparative Study Using Panoramic Radiograph and Cone Beam Computed Tomography

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Abstract

Introduction: Knowledge of alveolar loop of inferior alveolar canal is important to prevent any post operative complications after mandibular surgery or any prosthesis placement in mandible para symphysis region. The aim of this study was to visualize anterior loop in Jaipur (Rajasthan) population comparing digital orthopantomogram (OPG) radiographs and cone beam computed tomography (CBCT) and the objective was to evaluate the frequency of anterior loop between OPG and CBCT, frequency in different age groups, genders and unilateral and bilateral presence in the mandible.

Material and Methods: The study was done in the Department of Oral and maxillofacial surgery of Jaipur Dental College. A total of 100 panoramic and 100 CBCT radiographs were examined. Anterior loop was examined in all 200 radiographs. The collected data were subsequently processed and analyzed using SPSS statistical package version 20.

Results: CBCT is more reliable as compared to OPG. Anterior loop was most commonly seen in younger age group. As the age advanced visibility of anterior loop was reduced. Bilateral presence was most common.

Conclusion: In the present study, a total of 400 sites were examined on radiographs. Out of 115 male subjects, anterior loop was visible in 64 subjects and out of 85 female subjects, anterior loop was visible in 39 subjects only. A significant value is observed in bilateral presence and decrease in loop frequency with age. With advancement in modern diagnostic tools, it has become an essential part for the clinician to incorporate modern technologies and provide better treatment options to the patient as well as for the clinician to prevent iatrogenic injuries.

Keywords: Anterior loop, Cone Beam Computed Tomography, Inferior Alveolar Canal, Mandible, Panoramic Radiograph.

INTRODUCTION

Oral and maxillofacial region of an individual is one of the most complex anatomical structures of whole body.[1]

Mandible when compared to maxilla is more compact and dense bone. In mandible, mandibular nerve enters through mandibular foramen in mandible. The mandibular foramen is present on the ascending mandibular ramus. As it passes through mandibular canal it is called inferior alveolar nerve (IAN).

It runs downward and forward, generally below the apices of the molar till first and second premolar. Inferior alveolar neurovascular bundle leaves the canal via mental foramen where it splits into two branches, incisive and mental nerve branch. The section of the nerve in front of the mental foramen and just before its ramification to the incisive nerve is called the anterior loop (AL) of IAN.[2]

In Sicher's Oral Anatomy, the anterior loop is described as 'the mental canal which rises from the mandibular canal and runs outward, upward and backward to open at the mental foramen.[3]

The considerable variation in the course, the shape, the curve and the direction of the nerve as well as the terminal segment of IAN complicates the regional anatomy. The anterior loop cannot be seen clinically, but can be detected in radiographs which includes dental panoramic or orthopantomogram (OPG), cone beam computed tomography (CBCT) or magnetic resonance imaging (MRI).[4]

The precise knowledge of mental foramen, mandibular foramen, inferior alveolar canal, mandibular neurovascular bundle is of utmost importance for desired outcome of different types of mandibular surgery, implant or any prosthesis placement in mandible region.[5]

Any surgery in para symphysis region without proper knowledge of anterior loop in that region may cause iatrogenic damage which may result in neurosensory disturbances in the area of lower lip and chin.[6]

Radiographs are the diagnostic tool which provide precise information about the visibility of anterior loop and presence of it as well. Some studies have been done from a few dental institutes in India to evaluate different anatomical variants of anterior loop of inferior alveolar nerve.[6]

However, with the Indian population being heterogenous with a diverse gene pool, different geographic locations may sometimes show slight anatomical variations. Hence, this study is planned and to be conducted with an aim to visualize anterior loop radiographically in Jaipur, Rajasthan which has a population of about 4.2 million people.

AIMS & OBJECTIVES

The aim of this study is to visualize anterior loop in Jaipur (Rajasthan) population on digital panoramic radiographs and cone beam computed tomography and the objective is to evaluate the frequency of anterior loop between CBCT and Panoramic radiograph, in different age groups, genders and unilateral and bilateral presence in the mandible.

MATERIALS AND METHOD

Patients visiting the Outpatient Department of Oral and Maxillofacial Surgery of Jaipur Dental College from 2020 to 2023 will be considered for the study. These individuals were subjected to CBCT and Panoramic radiograph examination for reasons such as presurgical implant planning and third molar impactions.

400 mandibular sites from 200 images (100 Panoramic and 100 CBCT images) of 200 patients were obtained with demographic details.

Panoramic radiographs were obtained from Kodak 8000C (Model OPX105) Digital Panoramic and Cephalometric System using standard exposure parameters (Tube Potential – 73 kV, Tube current – 12 mA, Total filtration-2.5 mm, Time- 13.9 sec) as recommended by the manufacturer.

CBCT radiographs were obtained from Carestream CS8200 3D machine using Field of view (FOV: 12x5cm), Voxel size: 150. Operating parameters were at 4.00 mA, 90 kV and exposure time set at 20.0 seconds.

All radiographs were made and evaluated in the same manner.

Inclusive Criteria –

1. Patients from the age group of 16 and 65 years.
2. No pathology that could affect the position of the mandibular canal and mental foramen.
3. No evidence of any trauma or surgery that could affect the position of the mandibular canal and mental foramen.
4. Adequate quality of images.
5. Patients who are predominant residents of Jaipur.
6. Dentulous patients.

Exclusive Criteria –

1. Presence of systemic diseases.
2. Pregnancy/ Lactating patients.
3. Patients undergoing radiotherapy.
4. Presence of implants or mental artifacts in foramen region.
5. Edentulous patients.

Parameters

1. Frequency of anterior loop in Panoramic and CBCT.
2. Visibility of anterior loop according to age group

   Age Group categories (16-25, 26-35, 36-45, 46-55, 56-65)
   - Present
   - Absent
3. Number of subjects with anterior loops according to sex
   - Male
   - Female
4. Age – Gender Distribution
5. Visualization of anterior loop
   - Only on Right side
   - Only on Left side
   - Present on Both sides
   - Absent

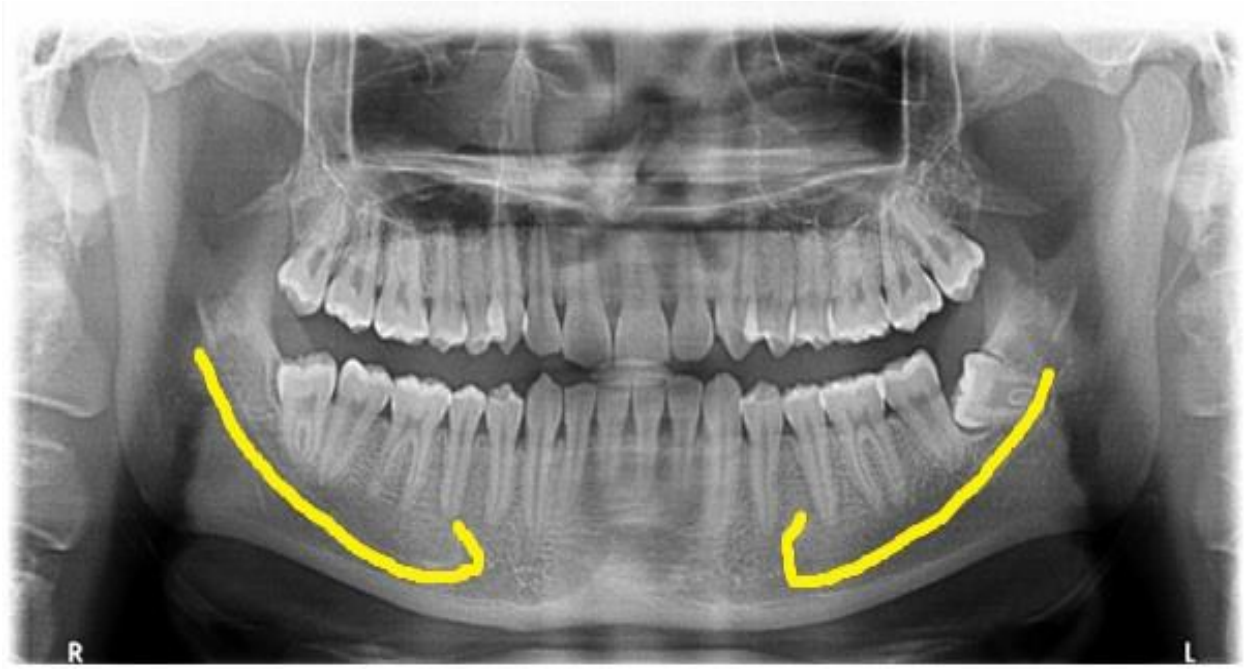


Figure 1: Visibility of anterior loop in Panoramic Radiograph.

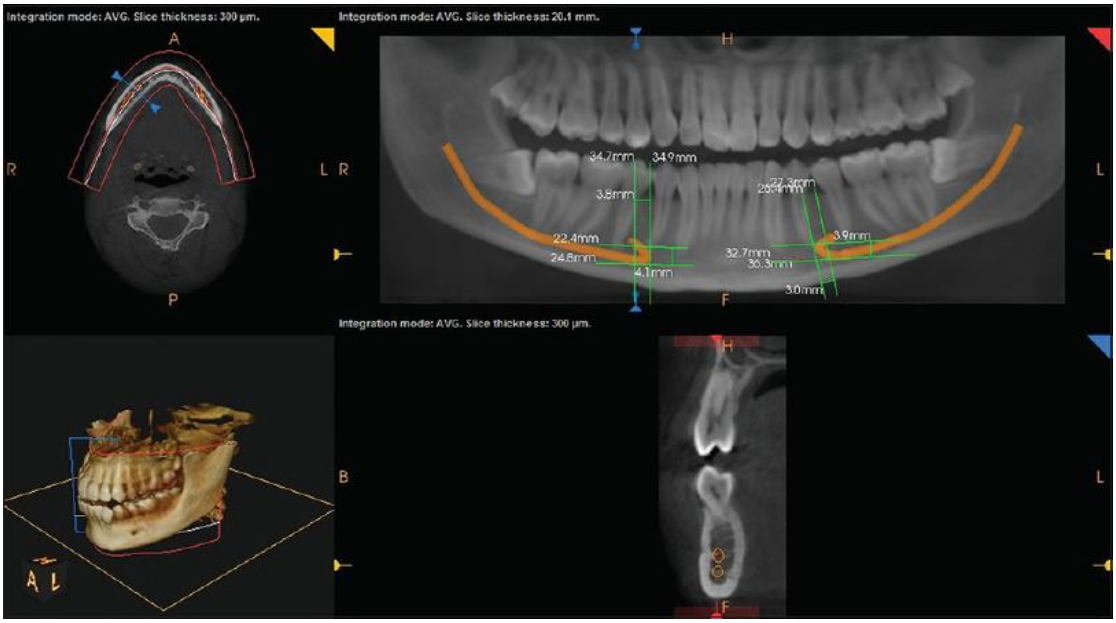


Figure 2: Anterior loop in CBCT showing three linear measurements with 3D reconstruction.

STATISTICAL ANALYSIS (SPSS PACKAGE Version 20.0)

Table 1: Chi-square test for frequency of anterior loop in Panoramic and CBCT

Frequency	Present	Absent	Row total
CBCT	68 (51.50) [5.29]	32 (48.50) [5.61]	100
OPG	35 (51.50) [5.29]	65 (48.50) [5.61]	100
Column Totals	103	97	**200 (Grand Total)**

The chi-square statistic is 21.7996. The p-value is < .00001. The result is significant at p < .05.

Table 2: Chi square test for number of subjects with anterior loops according to sex

Gender	Total	Present	Absent	Row totals
Male	115(115.00) [0.00]	64 (59.22) [0.38]	51 (55.78) [0.14]	230
Female	85 (85.00) [0.00]	39 (43.78) [0.52]	46 (41.22) [0.55]	170
Column Totals	200	103	97	**400 (Grand Total)**

The chi-square statistic is 1.8677. The p-value is .393034. The result is not significant at p < .05.

Table 3: Chi square test on Visibility of anterior loop according to age group

Age Group	Present	Absent	Row Totals
16-25	18(22.14) [0.78]	25 (20.86) [0.82]	43
26-35	40 (32.44) [1.76]	23 (30.56) [1.87]	63
36-45	20 (21.63) [0.12]	22 (20.37) [0.13]	42
46-55	14 (14.94) [0.06]	15 (14.06) [0.06]	29
56-65	11 (11.84) [0.06]	12 (11.16) [0.06]	23
Column Totals	103	97	**200 (Grand Total)**

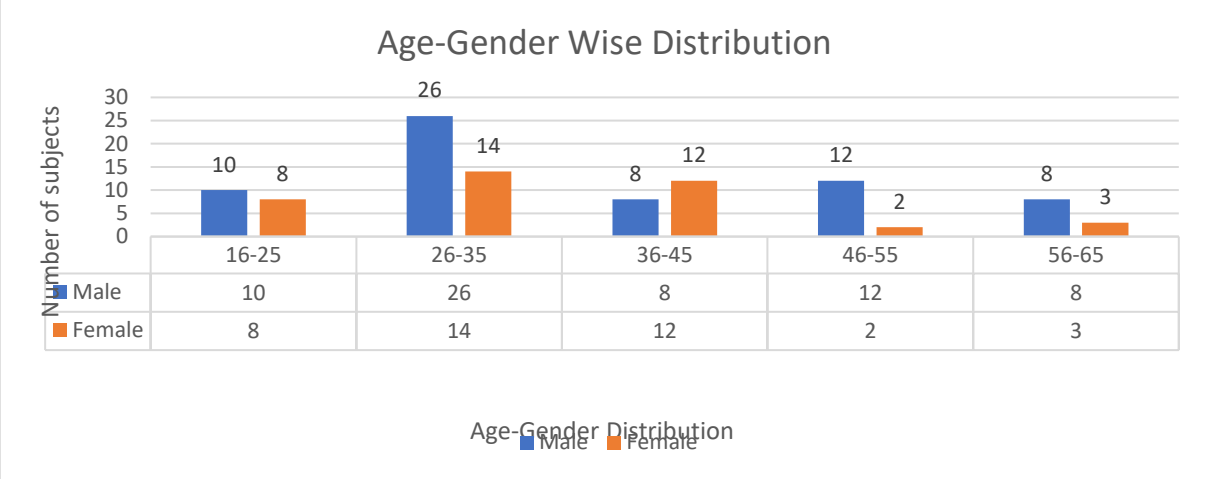
The chi-square statistic is 5.7252. The p-value is .220633. The result is not significant at p < .05.

Table 4: Chi square test for Visualization of anterior loop according to site

Site	Present	Absent	Row Totals
Right Unilateral	7 (49.70) [36.68]	96(53.30) [34.20]	103
Left Unilateral	3 (49.70) [43.88]	100 (53.30) [40.91]	103
Present bilaterally	93 (49.70) [37.73]	10 (53.30) [35.18]	103
Absent bilaterally	90 (43.91) [48.39]	1 (47.09) [45.11]	91
Column Totals	193	207	**400 (Grand Total)**

The chi-square statistic is 322.0844. The p-value is < 0.00001. The result is significant at p < .05.

Chart 1: Age-Gender distribution



RESULTS

200 radiographs were evaluated, out of which 100 were panoramic radiograph and 100 CBCT images. A total of 400 hemimandible sites were examined for the presence of anterior loop of inferior alveolar nerve at the mental foramen. We found that anterior loop was visible in 51.5% of studied population.

Frequency of anterior loop was more significant in CBCT radiograph as compared to Panoramic radiographs (Table 1).

Out of the 115 males and 85 females, Male to Female ratio was not significant (Table 2).

Breakdown of subjects into various age groups shows maximum number of subjects is in age group 26-35 (40 subjects) followed by 36-45 (20 subjects), 16-25 (18 subjects), 46-55 (14 subjects) and minimum number of subjects is in 56-65 group (11 subjects) as presented in (Table 3).

According to site, presence of anterior loop on bilaterally sites were most common (Table 4) and Chart table 1 shows the age gender distribution with higher frequency in age group 26-35 which shows decreasing frequency of anterior loop with increase in age.

DISCUSSION

Anterior loop is an important anatomical landmark in mandible region which is often overlooked because of negligence or due to poor visualization of anterior loop or lack of knowledge about anterior loop among various radiologist and surgeons.

However, of late with the advent and increase in popularity of dental endo-osseous implants, this structure has generated interest among clinicians. To avoid any inadvertent damage to anterior loop which may lead to neurosensory disturbances, a 5 mm distance to most distal fixture from anterior loop has been proposed by Suneetha et al (2021) in the south Indian population of Guntur, Andhra pradesh.[22]

Dentate subjects only were included in this study because it has been observed in studies conducted by Kuzmanovic et al that due to poor bone quality in edentulous patients, visibility of anterior loop is extremely difficult.

Also, as the age advances in edentulous patients, resorption of alveolar ridge in edentulous patients may progress to such an extent that mental canal is also resorbed and mental neurovascular bundle is exposed.[23]

Similar study conducted in 2003 by Kuzmanovic et al. on 22 cadavers, the prevalence in OPG was (27%) and the length was ranged between (0.5-3 mm) while in dissected cadaver was present in (35%) and length measurements was (0.4- 3.31) mm. Jacobs et al. in 2004 used OPG only to evaluate the prevalence of anterior loop and the result was 11%.The prevalence was higher and this is due to high accuracy of CBCT (3D) compared to OPG (2D).[23,24]

Lower percentage of anterior loop was noticed with radiographical studies using OPG such as (Kaya , 2008 and Ngeow, 2009) 28% and 40.2% respectively. This due to small sample size and low accuracy of 2D (OPG) compared to the present methods using CBCT and large sample size.[25,27]

Uchida et al. in 2009 performed another study to compare the accuracy of CBCT with that of direct surgical exposure of cadavers and concluded that CBCT was more reliable, and recorded a mean length of 2.2 mm and diameter was 1.9 ±1.7 mm.[26]

Similar to other studies that has been reported in literature, this study also shows that detection of anterior loop has proven to be more superior in cone beam computed tomography as compared to panoramic radiographs and there is no definite significant values in comparison with gender and sex. However more prevalence of anterior loop in age group of 26-35 has been observed in this study which shows more co-relation with the study done by Alok et al in Darbhanga population study in Bihar with prevalence in 20-29 age group as compared to 41-60 age group observed in Suneetha et al in the south Indian population. [22,28]

CONCLUSION

With drastic progression in dental sciences, it has become paramount for a good clinician to utilize modern technologies to keep ahead in modern times. This study also shows that there can be slight variations in prevalence of AL in different age groups according to geographic regions. However more studies need to be done with larger study groups to make a definitive conclusion.

Hence, in any procedure and more specifically relating to dental implants involving the mental foramen area, an ideal radiographic evaluation with Cone beam computed tomography to identify and assess the nerve should be mandatory to prevent unwanted neurosensory complications.

BIBLIOGRAPHY

1. Siddiqui Z, Rai S, Ranjan V. Efficacy and evaluation of cone beam computed tomography in determining the prevalence and length of anterior loop of inferior alveolar nerve in North Indian population. J Indian Acad Oral Med Radiol 2018;30:32-7.
2. Arzouman MJ, Otis L, Kipnis V, Levidine D. Observations of the anterior loop of the inferior alveolar canal. Int J Oral Maxillofac Implants 1993;8:295-300.
3. Apostolakis D, Brown JE. The anterior loop of the inferior alveolar nerve: Prevalence, measurement of its length and a recommendation for interforaminal implant installation based on cone beam CT imaging. Clin Oral Implants Res 2011;23:1022-30.
4. Arzouman MJ, Otis L, Kipnis V, Levine D. Observation of the anterior loop of the inferior alveolar canal. Int J Oral Maxillofac Implants 1993;8:295-300.
5. Xian Liang , Jacobs R, Hassan B, Li L, Pauwels R, Corpas L, et al. A comparative evaluation of cone beam computed tomography (CBCT) and multi-slice CT (MSCT) Part I. On subjective image quality. Eur J Radiol 2010; 75: 265-9.
6. Xiao Li , Jin ZK, Zhao H, Yang K, Duan JM, Wang WJ. The prevalence, length and position of the anterior loop of the inferior alveolar nerve in Chinese, assessed by spiral computed tomography. Surg Radiol Anat 2013; 35: 823-30.
7. Wismeijer D, Van Waas, Vermeeren, Kalk. Patients' perception of sensory disturbances of the mental nerve before and after implant surgery: a prospective study of 110 patients. Bri of Oral and Maxillofac Surg(1997) 35, 254-259
8. Wei Cheong Ngeow, Dionysius DD, Ishak H, Nambiar P. A radiographic study on the visualization of the anterior loop in dentate subjects of different age groups. J Oral Sci 2009; 51: 231-7.
9. Westermark A, Bystedt H, Von Konow L. Inferior alveolar nerve function after sagittal split osteotomy of the mandible: correlation with degree of intraoperative nerve encounter and other variables in 496 operations. Bri J of oral and Maxillofac surg 1998, 36: 429-433.
10. Sakhdari , Hafezi , Esmaili. Prevalence of the inferior alveolar nerve's anterior loop and mandibular incisive canal by use of Cone Beam Computed

Tomography (CBCT) in an Iranian population. J Res Dentomaxillofac Sci.2016;1(3):14-21.

11. Santini A and Alayan I. A comparative anthropometric study of the position of the mental foramen in three populations. British Dental Journal 2012;212:E.
12. Suomalainen A, Kiljunen T, Käser Y, Peltola J, Kortesniemi M. Dosimetry and image quality of four dental cone beam computed tomography scanners compared with multislice computed tomography scanners. Dentomaxillofac Radiol 2009; 38: 367-78.
13. Sun-Kyoung Yu, Seog Kim, Shin Gu Kang, Jae Hyuk Kim, Kyeong Ok Lim, Seong-Ik Hwang, Heung -Joong Kim. Morphological assessment of the anterior loop of the mandibular canal in Koreans. Anat Cell Biol 2015;48:75-8.
14. Sithiporn Agthong, Thanasilp Huanmanop, and Vilai Chentanez. Anatomical Variations of the Supraorbital, Infraorbital, and Mental Foramina Related to Gender and Side. J Oral Maxillofac Surg 2005,63:800-804.
15. Renton. Prevention of Iatrogenic Inferior Alveolar Nerve Injuries in Relation to Dental Procedures. J of oral and maxillofac Surg.2010;37:350-363.
16. Richard Bartling, Katherine Freeman, and Richard A. Kraut. The Incidence of Altered Sensation of the Mental Nerve After Mandibular Implant Placement. J Oral Maxillofac Surg 1999 57: 1408-1410.
17. Ofer Mardinger , Chaushu G, Arensburg B, Taicher S, Kaffe I. Anterior loop of the mental canal: an anatomical-radiologic study. Implant Dent. 2000;9(2):120-5.
18. Nikos Makris, Harry Stamatakis, Kostas Syriopoulos, Kostas Tsiklakis, Paul F van der Stelt. Evaluation of the visibility and the course of the mandibular incisive canal and the lingual foramen using cone-beam computed tomography. *Clin. Oral Impl. Res. 21, 2010; 766–771.*
19. Mohammed Jasim Al-Juboori1, Chua Miao Hua, Kuo Yuet Yuen. The importance of the mental foramen location detection by using different radiographic technique: Mini review. *International Journal of Medical Imaging. 2014 Vol. 2, No. 3, pp. 63-68.*
20. Munetaka Naitoh M, Hiraiwa Y, Aimiya H, Gotoh K, Ariji E. Accessory mental foramen assessment using cone-beam computed tomography. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2009 Feb;107(2):289-94.*
21. Lipa Bodner, Jacob Bar-Ziv and Jand Eli Reichenthal. Trigeminal Neuropathy: Improved Imaging With a Dental Computed Tomography Software Program. *J Oral Maxillofac Surg. 1998 56:545-548.*
22. Assessment of Anterior Loop of Inferior Alveolar Nerve. A Cone Beam – Computed Tomography Study. J.S Suneetha, Y.Samatha, A.R Kiran, N.P Rao Naik, B.N Kumar, G.Anoop. Department of Oral Medicine and Radiology, SIBAR Institute of Dental Sciences, Guntur, Andhra Pradesh, India.
23. Kuzmanovic DV, Payne AG, Kieser JA, Dias GJ. Anterior loop of the mental nerve: a morpholic and radiographic study. Clin Oral Implants Res 2003;14:464- 471.
24. Jacobs R, Mraiwa N, Van Steenberghe D, Sanderink G, Quirynen M. Appearance of the mandibular incisive canal on panoramic radiographs. Surg Radiol Anat 2004;26:329-333.
25. Ngeow WC, Dionysius DD, Ishak H, Nambiar P. A radiographic study on the visualization of the anterior loop in dentate subjects of different age groups. J Oral Sci 2009;51:231-237.
26. Yuki Uchida , Noguchi N, Goto M, Yamashita Y, Hanihara T, Takamori H, et al. Measurement of anterior loop length for the mandibular canal and diameter of the mandibular incisive canal to avoid nerve damage when installing endosseous implants in the interforaminal region: a second attempt introducing cone beam computed tomography. JOral Maxillofac Surg 2009; 67: 744-50.
27. Kaya Y,Sencimen M, Sahin S, Okcu KM, Dogan N, Bahcecitapar M. Retrospective radiographic evaluation of the anterior loop of the mental nerve: Comparison between panoramic radiography and spiral computerized tomography. Int J Oral Maxillofac Implants 2008; 23:919-25.
28. Abhijeet Alok, Shivani Singh, Preeti Tomar Bhattacharya, Mallika Kishore, Kumar Piyush, Anjani Kumar Shukla. A radiographic study on the visualization of the anterior loop in darbhanga population - an original research. International Journal of Contemporary Medical Research 2019;6(5):E11-E14

Comparative Evaluation of Oxygen Releasing Formula (Blue-M Gel®) and Metronidazole Gel as an Adjunct with Scaling and Root Planning in the Management of Patients with Chronic Periodontitis: A Pilot Study

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Abstract

Introduction: The first stage of treating periodontal disorders is called phase I therapy. Scaling and root planning (SRP) alone was found to be of limited efficacy especially in certain inaccessible areas, hence use of an adjunct to SRP has been advocated. Metronidazole has been effectively utilised in the past as an addition to SRP. In the discipline of periodontology, the use of commercially available BLUE -M® gel (high level oxygen releasing formula) has recently been encouraged.

Objective: The purpose of this study was to compare and assess the effectiveness of Blue-m® gel and Metronidazole gel as an adjuvant to non-surgical periodontal treatment (SRP), in terms of its clinical efficacy, in periodontal pockets ≥ 4 mm.

Materials and Methods: 20 patients with chronic periodontitis were randomly allocated into group A (SRP + blue m® gel) and group B (SRP + Metronidazole gel). Clinical parameters

such as Oral hygiene index simplified (OHI-S), Sulcus bleeding index (SBI), Probing pocket depth (PPD), Clinical attachment level (CAL)were measured at baseline & 6 week respectively.

Result & Conclusion: Both the gels, Metronidazole gel and blue m gel were equally effective and comparable in management of chronic periodontitis.

Keywords: Metronidazole gel, Scaling & root planning, Oxygen releasing gel, Periodontitis.

INTRODUCTION

Periodontitis is a chronic inflammatory disease caused by microorganisms that have colonized the subgingival area. Despite the host's protective mechanisms these microorganisms are responsible for the connective tissue breakdown and alveolar bone loss.[1]

Scaling and root planning (SRP), is commonly used for treating periodontal diseases. Bacterial infection and microbial plaque are the main causes of the inflammatory alterations in periodontal tissue. The bacteria create a highly organised and intricate biofilm in the periodontal pocket. As the process goes on, the biofilm becomes difficult for the patient to access during oral hygiene procedures because it has spread far beneath the gingiva.[2]

Mechanical debridement, which disrupts the biofilm, is a traditional therapeutic option for disorders including chronic periodontitis. The location of the lesion, however, may make therapy more difficult and hinder a meaningful reduction in the bacterial burden due to the complex anatomy of the root. Numerous locally delivered antimicrobial solutions have been evaluated in studies as alternatives to traditional scaling and root planning or as monotherapy for the treatment of chronic periodontitis.[3]

Additionally, comprehensive debridement is not often obtained after SRP, and some deep periodontal pockets are thought to still exist. In these situations, the patient must undergo surgical therapy.[4]

Gram-negative anaerobic bacteria, such as A. actinomycetemcomitans and P. gingivalis, predominate in the flora of chronic periodontal diseases.[5]

Despite various advantages the systemic antibiotic therapy has various disadvantages too such there is the evolution and maturing of resistant bacteria and administration of higher dosages so as to attain required concentration of gingival crevicular fluid at the target sites led to the discovery of local drug delivery system.[6]

Metronidazole gel has selective antimicrobial activity against obligate anaerobes has been used for the treatment of gingivitis and periodontitis. It significantly reduces the total bacterial count in gingival crevicular fluid.[7]

Strong evidence over the past few years has implicated oxidative stress as one of the factors contributing to the development and aetiology of periodontitis. Also, for biological processes to proceed normally, free radicals and reactive oxygen species (ROS) are crucial. At low concentrations, these free radicals can promote the development of fibroblasts and epithelial cells, but greater amounts could cause tissue damage.[8]

Blue m® oral gel is recently developed formula for specific targeted problems in the mouth and it claim's to possess unique properties when compare to convention local drug delivery systems. It improves the healing of the wounds by intensifying the levels of oxygen in periodontal pockets, bleeding gum, wounds which results from traumatic extraction, in implant dentistry, chemotherapy. The use of this unique formula improves oral hygiene of an individual and also, reduces the risk of infections and inflammation.[9]

Aim

To compare the effect of oxygen releasing oral gel (blue-m gel®) and metronidazole gel as an adjunct with scaling and root planning in the management of patients with chronic periodontitis.

Objective

To evaluate Clinical parameters like OHI-S, SBI, PPD, CAL at baseline & at 6 weeks.

Materials and Methods

20 participants were chosen for the study who successfully met the inclusion criteria. The study design was explained to all potential participants with their written informed consent.

Inclusion Criteria

1. Patients with chronic periodontitis with clinical attachment level >3mm and pocket depth ≥4mm (stage 2 and 3 periodontitis)
2. Age range between 20 and 65 years.
3. Systemically healthy subjects.

Exclusion Criteria

1. Patients With Systemic Diseases,
2. Patients under antibiotic and anti-inflammatory medication.
3. Smokers
4. Pregnant and lactating females.

METHODOLOGY

Clinical examination: The patients for the present study was procured from the outpatient Department of Periodontology and oral implantology, RUHS College of Dental sciences, Jaipur. Following the recording of the case history, clinical examinations were carried out. Patients with either localised or generalised chronic periodontitis were recruited for the study after meeting the inclusion and exclusion criteria. Clinical parameters were taken such as OHI-S, SBI, PPD, CAL were analysed at baseline (0 day) and at 6 weeks.

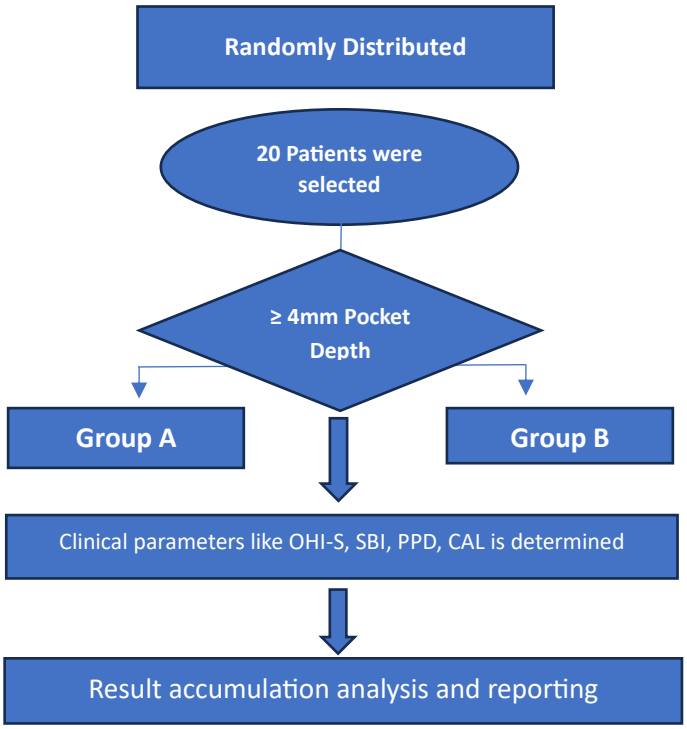
Study Groups

A total of 20 patients who fulfilled the inclusion criteria were enrolled in the study.

The Patient were randomly allotted into two groups by lottery method.

Group A: 10 Patients received SRP followed by local administration of blue m gel in the periodontal pocket with depth ≥ 4mm.

Group B: 10 Patients received SRP followed by local administration of metronidazole gel in the periodontal pocket with depth ≥4mm.



Flowchart 1: Study allocation and procedure

Preparation of Test Materials

Metronidazole gel(20g): Composition: Metronidazole Gel (1.5 %w/w)

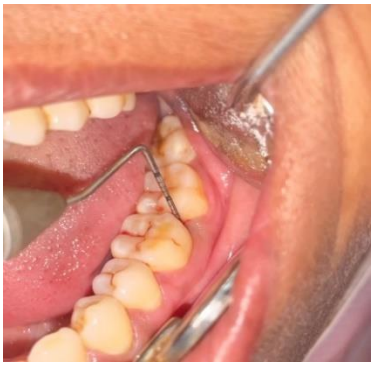
Blue m gel (15 ml): Composition: Aqua, Alcohol, Glycerin, Silica, Sodium Saccharin, Sodium Perborate, Citric Acid, PEG-32, Sodium Gluconate, Lactoferrin, Xanthan Gum, Cellulose Gum

Procedure of Periodontal Therapy

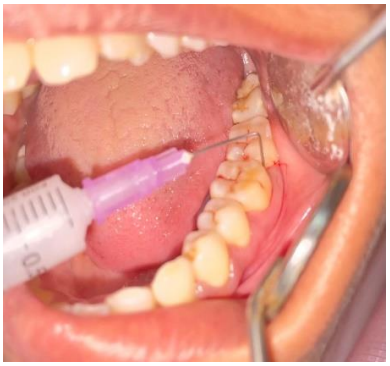
Clinical examinations were carefully performed, values for baseline evaluation were obtained prior to the procedure, and recordings were made by a single calibrated examiner as well. Values were obtained on a standardised form that contained the patient's analytical data, and SRP was carried out using an ultrasonic scaler. Following complete SRP, a probe was used to re-determine the Pocket Probing Depth, which was then followed by the local drug delivery of gels at both the control and experimental sites.

In Group A, the region of interest was thoroughly dried using an air syringe, and then the desired site was isolated using cotton rollers created specifically to guard against saliva contamination. Blue m gel, a local drug delivery, was injected into the periodontal pockets using a disposable syringe with a needle attached to it that had been bent at a 90-degree angle. The local drug delivery system composed of Metronidazole gel was placed in the periodontal pocket at the study site (Group B) using the same method. After 6 weeks, the comparable sites with their respective gels were tested for the probing depth.

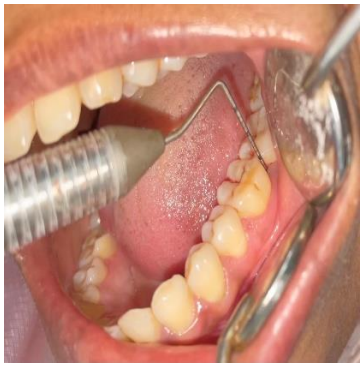
Modified sulcular bleeding index by mombelli with scores 0,1,2,3 using periodontal probe to assess bleeding on probing and clinical attachment levels was assessed using periodontal probe with fixed point on the teeth (CEJ).



INITIAL PROBING DEPTH



INSERTION OF GEL



POCKET DEPTH AT 6 WEEKS

Statistical Analysis

To evaluate the effectiveness of blue m gel (Group A) and Metronidazole gel (Group B) data were organised into a uniform manner. Using the statistical tool, mean standard deviation (SD) was calculated. Clinical parameters like OHI, SBI, PPD, CAL were assessed, respectively, at baseline and at 6 weeks.

Paired t-tests were used for within-group comparison. Test of significance i.e the P Value was set at - $P < 0.05$

RESULTS

INTERGROUP COMPARISON OF OHI-S BETWEEN THE GROUPS

	Pre Treatment	Post Treatment	Mean Change	Percentage change	p value	P value
Group A	4.32±1.20	2.21±1.20	2.11±0.89	50.94±19.77	0.901	Non-Sig
Group B	4.49±1.08	2.20±0.84	2.29±0.63	51.84±10.78		

Independent t test with p value less than 0.05 as the significance level

INTRAGROUP COMPARISON OF OHI-S BETWEEN PRE AND POST TREATMENT LEVELS

	Pre Treatment	Post Treatment	Mean Change	p value
Group A	4.32±1.20	2.21±1.20	2.11±0.89	0.001 (Sig)
Group B	4.49±1.08	2.20±0.84	2.29±0.63	0.001 (Sig)

INTERGROUP COMPARISON OF PROBING DEPTH BETWEEN THE GROUPS

	Pre Treatment	Post Treatment	Mean Change	Percentage change	p value	P value
Group A	6.70±0.48	4.40±0.52	2.30±0.48	34.28±6.26	0.003	Non-Sig
Group B	6.60±0.52	5.10±0.73	1.50±0.53	22.81±8.26		

Independent t test with p value less than 0.05 as the significance level

INTRAGROUP COMPARISON OF PROBING DEPTH BETWEEN THE GROUPS

	Pre Treatment	Post Treatment	Mean Change	P value
Group A	6.70±0.48	4.40±0.52	2.30±0.48	0.001 (Sig)
Group B	6.60±0.52	5.10±0.73	1.50±0.53	0.001 (Sig)

INTERGROUP COMPARISON OF SULCULAR BLEEDING BETWEEN THE GROUPS

	Pre Treatment	Post Treatment	Mean Change	Percentage change	p value	P value
Group A	2.03±0.31	0.52±0.17	1.51±0.26	74.53±7.59	0.803	Non-Sig
Group B	1.81±0.42	0.46±0.16	1.35±0.42	73.90±8.38		

Independent t test with p value less than 0.05 as the significance level

INTRAGROUP COMPARISON OF SULCULAR BLEEDING BETWEEN THE PRE AND POST TREATMENT LEVELS IN BOTH THE GROUPS

	Pre Treatment	Post Treatment	Mean Change	Percentage change
Group A	2.03±0.31	0.52±0.17	1.51±0.26	0.001 (Sig)
Group B	1.81±0.42	0.46±0.16	1.35±0.42	0.001 (Sig)

INTERGROUP COMPARISON OF CAL BETWEEN THE GROUPS

	Pre Treatment	Post Treatment	Mean Change	Percentage change	p value	P value
Group A	5.00±1.05	3.50±0.85	1.50±0.85	28.66±14.90	0.724	Non-Sig
Group B	5.30±0.83	3.90±0.87	1.40±0.52	26.66±9.40		

Independent t test with p value less than 0.05 as the significance level

INTRAGROUP COMPARISON OF CAL FROM PRE TO POST TRATEMNET LEVELS IN BOTH THE GROUPS

	Pre Treatment	Post Treatment	Mean Change	Percentage change
Group A	5.00±1.05	3.50±0.85	1.50±0.85	0.001 (Sig)
Group B	5.30±0.83	3.90±0.87	1.40±0.52	0.001 (Sig)

From the results it is seen that there is a significant difference in reduction in probing pocket depth. The mean difference between the probing depth reduction in group A (Blue M gel) from baseline to 6 week was 2.3 and the mean difference probing depth reduction in group B (metronidazole gel) from baseline to 6 week was 1.5. Group A showed better potential in probing depth reduction.

Blue m gel is found to be helpful and encouraging in the current study. There was a notable decrease in the indices scores and colony forming unit scores compared to baseline values and at 6 weeks.

DISCUSSION

This is the first study according to our knowledge in which blue m gel and metronidazole is compared.

The Intra group comparison of clinical parameters like OHI-S, SBI, PPD, CAL was statistically significant in both the groups.

The mean probing depth at the day of drug delivery was for Blue M gel group was 6.70mm SD±0.48mm and the mean probing depth six week after drug delivery was 4.40 SD± 0.52mm .The mean probing depth at the day of drug delivery was for Metronidazole gel group was 6.60 mm SD±0.52mm and the mean probing depth six week after drug delivery was 5.10 SD± 0.73 mm.

From the results it is seen that there is a significant difference in reduction in probing pocket depth. The mean difference between the probing depth reduction in group A (Blue M) from baseline to 6 week was 2.3 and The mean difference probing depth reduction in group B (Metronidazole gel) from baseline to 6 week was 1.5. Group A showed better potential in probing depth reduction.

The mean clinical attachment levels at the day of drug delivery was for Blue M gel group was 5.0 mm SD±1.05 mm and the mean clinical attachment levels six week after drug delivery was 3.50 SD± 0.85 mm .The mean clinical attachment levels at the day of drug delivery was for Metronidazole gel group was 5.30 mm SD±0.83 mm and the mean clinical attachment levels six week after drug delivery was 3.90mm SD±0.87 mm

The mean bleeding on probing levels at the day of drug delivery was for Blue M gel group was 2.03 mm SD±0.31 mm and the mean bleeding on probing levels six week after drug delivery was 0.57SD± 0.17 mm .The mean bleeding on probing levels at the day of drug delivery was for Metronidazole gel group was 1.81 mm SD±0.42 mm and the mean bleeding on probing levels six week after drug delivery was 0.46 mm SD±0.16 mm

The Intergroup comparison of OHI-S, SBI, CAL between the Group A and Group B was statistically non-significant with almost similar average reduction .

According to the available evidence, the addition of local drug delivery into the periodontal pocket can increase and improve the status, condition, and health of the periodontal tissues.[10]

It has been investigated whether local delivery of antimicrobial drugs could overcome the limitations of conventional or standard SRP therapy. Utilising sustained release formulations of antibiotics like

tetracycline fibres, metronidazole gel, and chlorhexidine chips to deliver antimicrobial agents directly to the site of infections in periodontal pockets has recently proven to be a successful treatment, and many clinicians are now using it.[10]

Due to the release of more active oxygen by Blue M gel, pockets at areas treated with it have significantly less depth. Healing occurs quickly and effectively as a result. Because blue m gel is similar to Metronidazole gel in that it is believed to normalise and control harmful bacteria, the decrease in colony forming units was caused by this. Furthermore, using the Blue m gel to conduct the study had no drawbacks or hazards. The substantivity of Blue m gel is unclear, and the study's sample size and longevity were both smaller than expected.

CONCLUSION

Within the limitation of the study, we can say that SRP with blue m gel is as effective as SRP with metronidazole gel in the management of Chronic periodontitis.

Source of Funding

Nil.

Conflict of Interest

None.

BIBLIOGRAPHY

1. Oosterwaal PJ, Mikx FH, van't Hof MA, Renggli HH. Comparison of the antimicrobial effect of the application of chlorhexidine gel, amine fluoride gel and stannous fluoride gel in debrided periodontal pockets. J Clin Periodontol 1991;18:245-51.
2. Unsal E, Akkaya M, Walsh TF. Influence of a single application of subgingivalchlorhexidine gel or tetracycline paste on the clinical parameters of adult periodontitis patients. J Clin Periodontol 1994;21:351-5.
3. Rafiei M, Kiani F, Sayehmiri F, Sayehmiri K, Sheikhi A, Zamanian Azodi M. Study of Porphyromonasgingivalis in periodontal diseases: A systematic review and meta-analysis. Med J Islam Repub Iran 2017;31:62
4. Manthena S, Ramesh A, Srikanth A, Ramoji Rao MV, Preethi PL, Samatha YP. Comparative evaluation of subgingivally delivered chlorhexidine varnish and chlorhexidine gel in reducing microbial count after mechanical periodontal therapy. J Basic Clin Pharm 2014;6(1):24-8
5. Quirynen M, Teughels W, De Soete M, van Steenberghe D. Topical antiseptics and antibiotics in the initial therapy of chronic adult periodontitis: Microbiological aspects. Periodontol 2000.2002;28:72-90.
6. Kaldahl WB, Kalkwarf KL, Patil KD, Dyer JK, Bates RE Jr. Evaluation of four modalities of periodontal therapy: Mean probing depth, probing attachment level and recession changes. J Periodontol 1988;59:783-93
7. 7.P.K.Miani,C. do Nascimento ,S.Sato,A.V.Filho,M.J.da Fonseca,V.Pedrazzi,In vivo evaluation of a metronidazole-containing gel for the adjuvant treatment of chronic periodontitis: preliminary results, Eur.J.Clin.Microbiol. Infect.Dis.31(7) (2012) 1611-1618.
8. Dahiya P, Kamal R, Gupta R, Bhardwaj R, Chaudhary K, Kaur S. Reactive oxygen species in periodontitis. J Indian Soc Periodontol 2013;17(4):411-6.
9. 9 . Greenstein G, Polson A. The role of local drug delivery in the management of periodontal diseases: a comprehensive review. J Periodontol 1998;69(5):507-20.
10. 10. Magnusson I. Local delivery of antimicrobial agents for the treatment of periodontitis. Compend Contin Educ Dent 1998;19.

A Comparative Study to Evaluate the Efficacy of Antibiotic with Placental Extract Gel Versus Antibiotic Without Placental Extract Gel After Extraction

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Abstract

Introduction: Extraction is the most commonly performed dentoalveolar procedure in oral & maxillofacial surgery[1].This study was designed to compare the post extraction healing by using antibiotic with placental extract gel versus antibiotic without placental extract gel in control of pain, swelling, & wound healing.

Methodology: A study was conducted on 40 patients requiring extraction that will be selected for the study. Random allocation of 40 patients into in group a(maxilla) and group b(mandible) & their subdivision into study group and control group will be done. Preoperatively both the groups were administered Tab. Amoxycillin 1 gm orally. After the procedure application of placental extract gel will be done on the extraction site of the study group. Postoperative medication will be prescribed for both the groups. Patients will recall on 1st, 3rd and 7th days postoperatively for evaluation of pain, swelling, and wound healing.

Result: it was found that there was a statistically significant difference in the mean pain & wound healing in the study group as compared to control group on 1st, 3rd & 7th postoperative days.
This study concluded that: Antibiotic with placentrex® gel had more efficacy than antibiotic without placental extract gel after extraction in control of pain, swelling & wound healing.
Keywords: extraction, placentrex®, pain, swelling, wound healing.

INTRODUCTION

Extraction is the most commonly performed dentoalveolar procedure in oral & maxillofacial surgery [1]. There are numerous circumstances under which a tooth must be removed. Although careful attention to surgical details may help to reduce the rate of complications, but it has not been found to eliminate them[2].

The postoperative sequelae such as pain, swelling and infection is one of the most common causes of swelling and it can also cause distress to the patient and affect the patient's quality of life after surgery [3]. Trismus and wound dehiscence are some of the common complications. To control postoperative inflammation and associated symptoms, it is essential to provide an adequate anti-inflammatory therapy.

Antibacterial action of Placental extract has also been shown to induce interferon-γ (IFN-γ) produced by macrophages. [4,5] IFN-γ plays a major role in innate or adaptive immunity and in inflammation.[5] Placental extract has been demonstrated to have immunotropic or immune-stimulating effects at the cellular and humoral levels in both human and animal models. The extract probably increases igg and igm antibodies at the humoral level and total lymphokines at the cellular level. [8] igg and igm activate the classical pathway of the complement system. They produce specific antibodies, thereby neutralizing viruses and lysing Gram-negative bacteria. As wounds are susceptible to bacterial growth, this action is critical for efficient healing.

Clinical evaluation of the extract has revealed that it has anti-platelet aggregation activity, anti-inflammatory and helps activate the clotting cascade following trauma which results in platelet activation followed by aggregation. The use of placental extract gel at the extraction site is attributed to the fact that the extracts of this tissue have been used as a therapeutic agent and a biomodulator in the healing of wounds.[6] This might be as a result of the fact that it contains a variety of peptides, amino acids, nucleotides, PDRNS, and carbohydrates all of which aid in the healing process. The potency of the placental extract lies in the fact that it not only reduces the inflammatory phase of healing and lessens the microbial burden, but also assists cell migration formation and tissue regeneration, thereby ensuring sequential steps of healing. It is also reported that the extract promotes fibrogenesis (development or proliferation of fibers or fibrous tissue), neo angiogenesis and epithelialization.[7]

Materials & method

A comparative study was conducted in the department of oral and maxillofacial surgery, Jaipur dental college and hospital, Jaipur, Rajasthan on patients requiring extraction of tooth. This study was designed to compare the post extraction healing by using antibiotics with placental extract gel (placentrex – the original research product of albert David limited, India, a drug obtained from fresh term healthy human placentae) versus antibiotics without placental extract. In control of swelling, pain, wound healing following extraction. The ethical clearance for the study was obtained from the institutional ethical committee with the ref. No. MVGU/ADM/2021/869 (XIV).

METHOD OF COLLECTION OF DATA

Inclusion criteria: either sex, 18 - 40 years of age, patients with bilateral extraction.

Exclusion criteria: patients with history of recent anti-inflammatory medical treatment, patients unwilling to sign informed consent form, patients with suspected or verified pregnancy, patients with known hypersensitivity of any of the study related drugs.

Prior information was given to the patient in his language and written consent was taken from patients / subjects, parents / caretakers.

Procedure

A detailed case history was obtained from patients visited to the department of oral and maxillofacial

surgery requiring removal of tooth from those who gave written informed consent for study and meets inclusion criteria in a standardized performa designed to accumulate the various parameters required for meeting objectives of the study.

After confirmation of diagnosis based on clinical and radiological evaluation, treatment plan was finalized.

Random allocation of 40 patients into 2 groups using simple random sampling technique.

Group A: for maxilla

Group B: for mandible

Both the groups were further subdivided into study group and control group. Preoperatively, distance between marked points on facial regions was measured. Same surgeon operated on all the patients to avoid any variation in surgical technique. The procedure was carried out with proper aseptic precautions.

Method of application placental extract gel:

Placental extract gel (Placentrex – the original research product of Albert David Limited, India, a drug obtained from fresh term healthy human placentae) was applied on the socket of freshly extracted tooth in study group patients for both group a and group b and standard postoperative instructions were given. Patients were recalled on 1st, 3rd, and 7th day postoperatively for evaluation of pain, swelling, and wound healing. Sutures were removed on the 7thday from the procedure (if given). A single examiner performed all the measurements. For evaluation of pain visual analogue scale is used indicating no pain to severe pain from 0-8 readings [8].

For assessment of swelling distance from chin of mandible to tragus, distance from corner of mouth of mandible to tragus, distance from angle of mandible to corner of eye were measured using silk suture.

Fig 1A: distance from chin of mandible to tragus.

Fig 1B: distance from corner of mouth of mandible to tragus.

Fig 1C: distance from angle of mandible to corner of eye

Table 1: For assessment of wound healing IPR [9] scale was used:

Score T/phase	Parameter	Score 0	Score 1	Total score
Inflammatory T: 3–5 days	Bleeding, spontaneously or on palpation	Yes	NO	**/8**
	Granulation tissue	Yes	NO	
	Hematoma	Yes	NO	
	Tissue color	Redder or whiter than opposite side tissue	Like the opposite side tissue	
	Incision margins	Incomplete flap closure/ fibrin clot/ partial necrosis / complete necrosis	Complete flap closure/ fine fibrin line	
	Suppuration	Yes	NO	
	Edema VAS (1-10)	VAS 6-10	VAS 1-5	
	Pain VAS (1-10)	VAS 6-10	VAS 1-5	

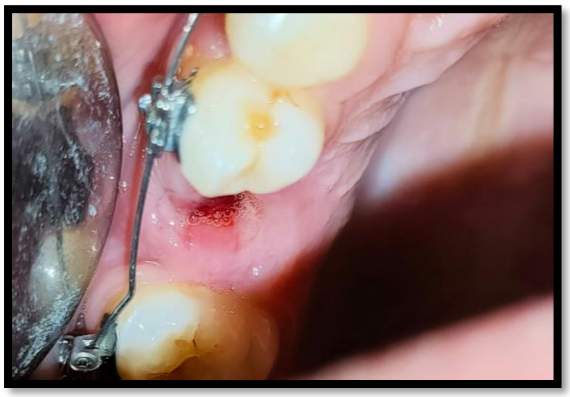


Figure 4: POST OPERATIVE HEALING WITHOUT PLACENTAL EXTRACT GEL IN CONTROL GROUP A

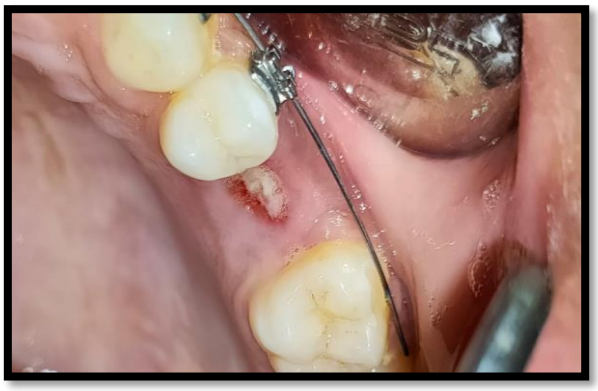


Figure 5: POST OPERATIVE HEALING WITH PLACENTAL EXTRACT GEL IN STUDY GROUP A.

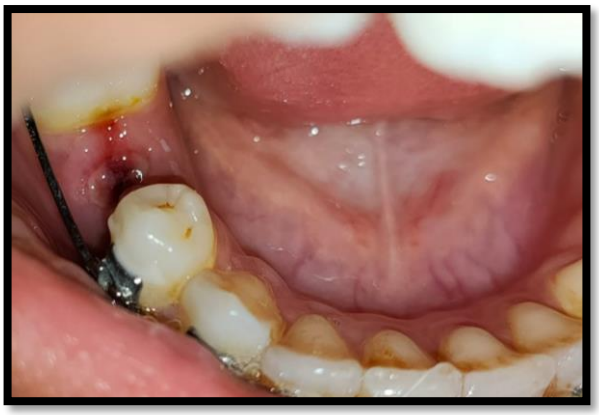


Figure 6: POST OPERATIVE HEALING WITHOUT PLACENTAL EXTRACT GEL IN CONTROL GROUP B.

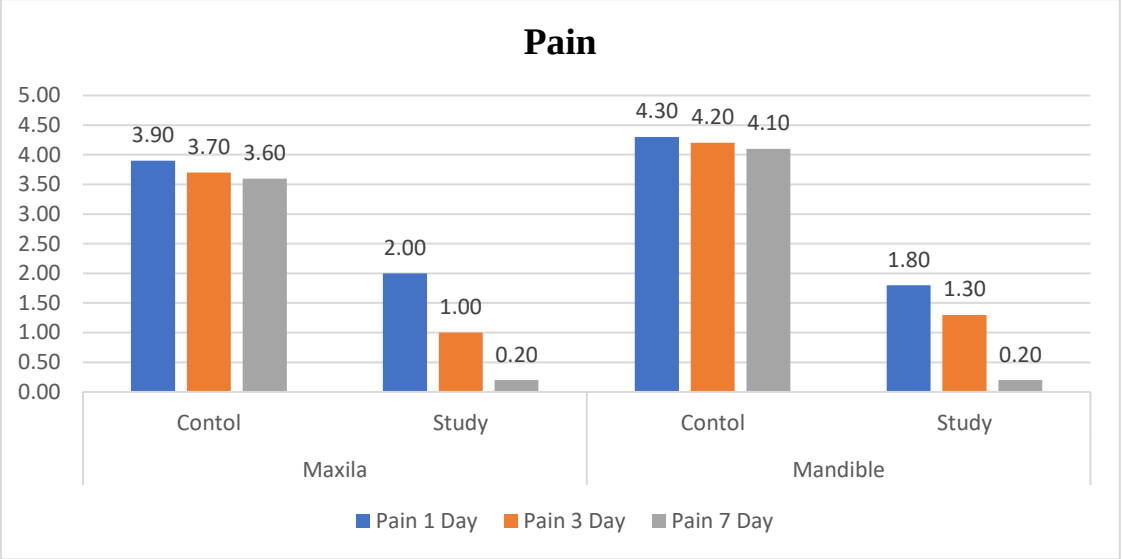
Figure 7: POST OPERATIVE HEALING WITH PLACENTAL EXTRACT GEL IN STUDY GROUP B.

RESULT

Statistical Analysis of Data:

- The data obtained were analyzed using the SPSS software (Statistical Package for the Social Sciences) version 21.0 is used, for Windows OS. Mean and standard deviations were calculated for the clinical parameter (pain, swelling, wound healing).
- Independent group t test was employed to compare the mean difference in the parameters between the two groups. Paired t test is used for comparing 1^{st},3^{rd}, 7^{th} postoperative day.

The data was statistically analyzed establishing relationships between the clinical parameter which were assessed by unpaired t- test.



- The mean pain score in group A (control and study) at 1st day, 3rd day, 7th day reveals there was a statistically significant difference in the mean pain score of patients in control and study group at given postoperative days.
- The mean pain score in group B (control and study) at 1st day, 3rd day, 7th day reveals there was a statistically significant difference in the mean pain score of patients in control and study group at given postoperative days.
- The mean swelling score in group A (control and study) at 1st day, 3rd day, 7th day reveals there was a statistically non-significant difference in the mean swelling score of patients in control and study group at 1st day, 3rd day postoperative days. But 7th postoperative day reveals statistically significant difference
- The mean swelling score in group B (control and study) at 1st day, 3rd day, 7th day reveals there was a statistically non-significant difference in the mean swelling score of patients in control and study group at given postoperative days.
- The mean wound healing score in group A (control and study) at 1st day, 3rd day, 7th day reveals there was a statistically significant difference in the mean wound healing score of patients in control and study group at given postoperative days.
- The mean wound healing score in group B (control and study) at 1st day, 3rd day, 7th day reveals there was a statistically significant difference in the mean wound healing score of patients in study and control group at given postoperative days.

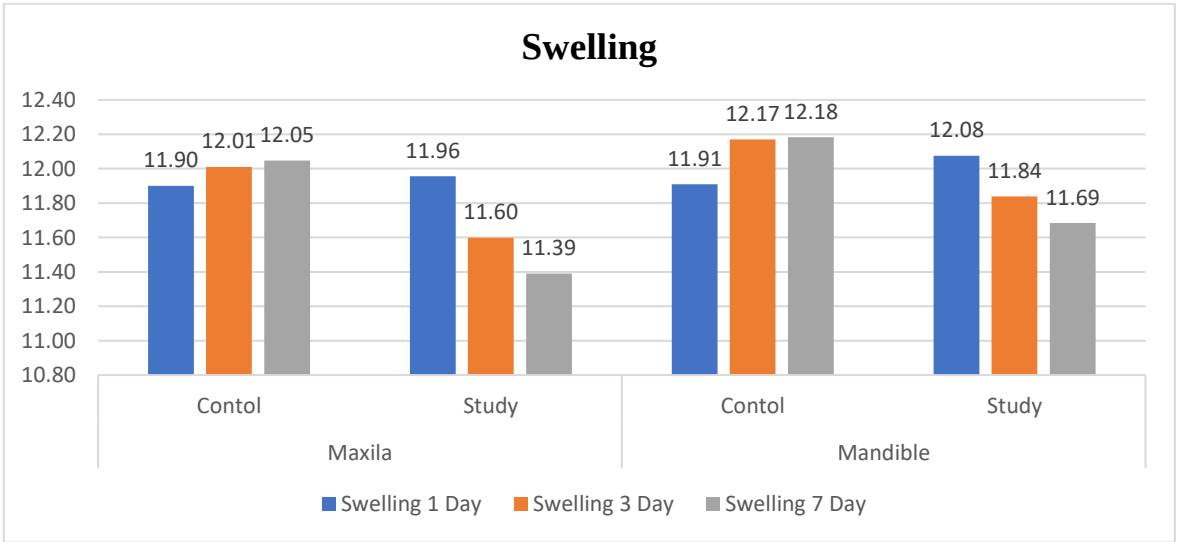


Table 2: Maxilla control and study group p values

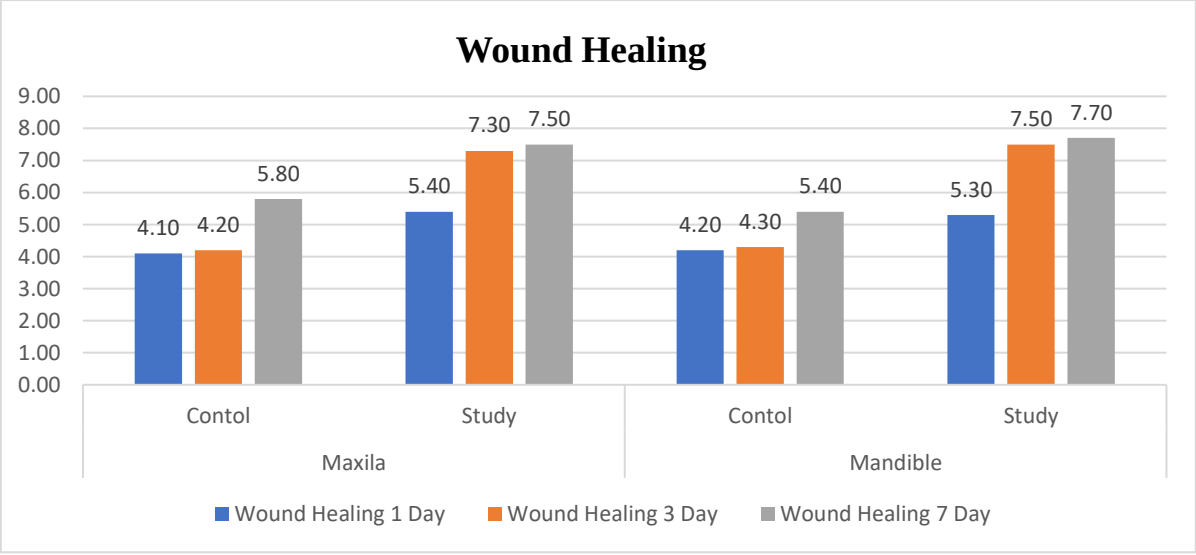
			N	Mean	Std. Deviation	Std. Error Mean	Mean Difference	'T' test	P value
Pain	**1 Day**	Maxilla Control	10	3.900	0.738	0.233	1.900	5.460	0.000
		Maxilla Study	10	2.000	0.816	0.258			
	3 Day	Maxilla Control	10	3.700	0.949	0.300	2.700	8.060	0.000
		Maxilla Study	10	1.000	0.471	0.149			
	7 Day	Maxilla Control	10	3.600	0.966	0.306	3.400	10.200	0.000
		Maxilla Study	10	0.200	0.422	0.133			
Swelling	**1 Day**	Maxilla Control	10	11.901	0.498	0.157	-0.056	-0.237	0.815
		Maxilla Study	10	11.957	0.558	0.176			
	3 Days	Maxilla Control	10	12.011	0.603	0.191	0.413	1.896	0.074
		Maxilla Study	10	11.598	0.333	0.105			
	7 Days	Maxilla Control	10	12.047	0.560	0.177	0.657	3.309	0.004
		Maxilla Study	10	11.390	0.283	0.089			
Wound Healing	**1 Day**	Maxilla Control	10	4.100	0.568	0.180	-1.300	-5.357	0.000
		Maxilla Study	10	5.400	0.516	0.163			
	3 Days	Maxilla Control	10	4.200	0.422	0.133	-3.100	-12.318	0.000
		Maxilla Study	10	7.300	0.675	0.213			
	7 Days	Maxilla Control	10	5.800	0.919	0.291	-1.700	-5.075	0.000
		Maxilla Study	10	7.500	0.527	0.167			

* p value < 0.05, significant

Table 3: Mandible control and study group p values

			N	Mean	Std. Deviation	Std. Error Mean	Mean Difference	'T' test	P value
Pain	**1 Day**	Mandibular Control	10	4.300	0.823	0.260	2.500	6.934	0.000
		Mandibular Study	10	1.800	0.789	0.249			
	3 Days	Mandibular Control	10	4.200	0.919	0.291	2.900	8.834	0.000
		Mandibular Study	10	1.300	0.483	0.153			
	7 Days	Mandibular Control	10	4.100	0.876	0.277	3.900	12.690	0.000
		Mandibular Study	10	0.200	0.422	0.133			
Swelling	**1 Day**	Mandibular Control	10	11.909	0.780	0.247	-0.166	-0.583	0.567
		Mandibular Study	10	12.075	0.450	0.142			
	3 Days	Mandibular Control	10	12.171	0.650	0.205	0.332	1.347	0.195
		Mandibular Study	10	11.839	0.430	0.136			
	7 Days	Mandibular Control	10	12.183	0.641	0.203	0.498	2.063	0.054
		Mandibular Study	10	11.685	0.414	0.131			
Wound Healing	**1 Day**	Mandibular Control	10	4.200	0.422	0.133	-1.100	-5.425	0.000
		Mandibular Study	10	5.300	0.483	0.153			
	3 Days	Mandibular Control	10	4.300	0.483	0.153	-3.200	-14.154	0.000
		Mandibular Study	10	7.500	0.527	0.167			
	7 Days	Mandibular Control	10	5.400	0.966	0.306	-2.300	-6.734	0.000
		Mandibular Study	10	7.700	0.483	0.153			

* p value < 0.05, significant



There was less pain in study group as compared to control group on 1st, 3 rd. And 7th postoperative days and the mean pain intensity scores were statistically significant. There was less swelling in experimental group as compared to control group on 7th postoperative day and there was a statistically significant difference in the mean wound healing score of patients in study group and control group.

DISCUSSION

Tooth extraction is the last treatment modality and mostly commonly performed procedure in oral and maxillofacial surgery which leads to disruption in tissue continuity. This breach in tissue continuity leads to activation of various mechanisms including activation of clotting mechanism, inflammatory mechanism, and most important body's defense mechanism. Healing of wound depends on degree of tissue disruption and factors surround the injured tissue.

Several studies have evaluated the effect of human placental extract (HPE) on wound healing and a considerable amount of data suggests that HPE promotes wound healing [10]. Tiwary in 2006 reported that placental-extract gel and cream are both effective topical agents for chronic nonhealing wounds. However, patient feels less pain and discomfort during dressing change with the placental-extract cream[11].

Sharma A et al[12,] compare clinical soft tissue parameters around periodontal pockets treated with & without human placental extracts delivered locally in 10 patients of chronic periodontitis, bilateral localized periodontal pockets of 4-6 mm depth were included. A statistically significant improvement in clinical parameters with notable difference in probing depth reduction & gain of clinical attachment level in the treatment group subjected to scaling & root planning (SRP) & Placental extract delivery. The clinical results showed a greater efficacy of SRP & concomitant use of placental extracts when compared to conventional treatment by SRP.

Katkurwar A [10], Clinically and histologically evaluated the depigmented gingival epithelium on application of human placental extract gel. 10 healthy patients were selected in the age group of 18-35 yrs which were indicated for depigmentation procedure. Application of human placental extract gel showed a statistically significant result clinically and histologically and concluded that application of human placental extract can be a successful approach to protect the raw wounded area of depigmented gingiva leading to better patient comfort and faster healing.

Morsy S.[13], investigated the effectiveness of the topical application of placental extract gel (PEG) in the treatment of RAS. 40 patients with RAS participated in this research. They were randomly allocated into two groups. Group I was control group which included 20 patients treated with topical application of benzydamine hydrochloride gel and group II was test group which included 20 patients treated with topical application of placental extract gel. The effectiveness of the treatment modalities was assessed by measuring the pain intensity and ulcer size at baseline, 3rd day and 7th day. He concluded that Topical PEG is an effective topical agent in RAS treatment, which enhances the patient's normal activities and daily life events.

Placental extract gel used in this study are HIV Antibody free, HCV antibody free and Hepatitis B-Surface Antigen free according to the product manufacturer description so it can be used safely in human.

The current study evaluated the effect of human placental extract gel after tooth extraction locally in terms of pain, swelling and wound healing. The study concluded that human placental extract gel is effective in reducing postoperative pain and also promotes wound healing. It is suggested that additional studies should be undertaken over a longer period of monitoring because the postoperative follow-up of the current study was short.

CONCLUSION

Antibiotics with placentrex® has more efficacy than antibiotics without placental extract after extraction in control of pain, swelling and wound healing.

BIBLIOGRAPHY

1. Dallaserra M, Poblete F, Vergara C, Cortés R, Araya I, Yanine N, Villanueva J. Infectious postoperative complications in oral surgery. An observational study. Journal of clinical and experimental dentistry. 2020 Jan;12(1): e65.
2. Venkateshwar GP, Padhye MN, Khosla AR, Kakkar ST. Complications of exodontia: a retrospective study. Indian journal of dental research. 2011 Sep 1;22(5):633
3. Gopinath KA, Chakraborty M, Arun V. Comparative evaluation of submucosal and intravenous dexamethasone on postoperative sequelae following third molar surgery: a prospective randomized control study. Int J Oral Care Res. 2017;5(3):191-5.
4. Bakhshi, G.D., Langade, D., Subnis, B.M. Comparative evaluation of human placental extract for its healing potential in surgical wounds (an open, randomized, comparative study). Bombay Hospital Jl 2007.
5. Shukla VK, Rasheed MA, Kumar M, Gupta SK, Pandey SS. A trial to determine the role of placental extract in the treatment of chronic non-healing wounds. Journal of wound care. 2004 May;13(5):177-9
6. Thakur G, Thomas S, Bhargava D, Pandey A. Does topical application of placental extract gel on postoperative fibrotomy wound improve mouth opening and wound healing in patients with oral submucous fibrosis?. Journal of Oral and Maxillofacial Surgery. 2015 Jul 1;73(7):1439-e1.
7. Chakraborty PD, De D, Bandyopadhyay S, Bhattacharyya D. Human aqueous placental extract as a wound healer. Journal of wound care. 2009 Nov;18(11):462-7
8. Haefeli M, Elfering A. Pain assessment. European Spine Journal. 2006 Jan;15(1): S17-24.
9. Hamzani Y, Chaushu G. Evaluation of early wound healing scales/indexes in oral surgery: A literature review. Clinical implant dentistry and related research. 2018 Dec;20(6):1030-5.
10. Katkurwar A, Chaudhari D, Mahale S, Mahale A, Kadam P. Human placental extract a miracle that heals the wound faster. Journal of Oral Research and Review. 2021 Jan 1;13(1):1.
11. Tiwary SK, Shukla D, Tripathi AK, Agrawal S, Singh MK, Shukla VK. Effect of placental-extract gel and cream on non-healing wounds. J Wound Care 2013; 15:325-8.
12. Sharma A, Sharma S, Nagar A. Comparative Evaluation to Assess the Effect of SRP With or Without Human Placental Extracts as Local Drug Delivery in Treatment of Localized Periodontal Pocket-A Randomized Controlled Clinical Trial.
13. Morsy S. The Effectiveness of Placental Extract Gel in the Treatment of Recurrent Aphthous Stomatitis: Randomized Clinical. Egyptian Dental Journal. 2022 Jul 1;68(3):2255-63.

Comparing Apical Microleakage Around Separated Rotary Instrument Sealed with Two Bioceramic Obturating Materials - An Invitro Study

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Abstract

Aims and Objective: The purpose of this study is to compare apical microleakage in root canal containing separated rotary instrument obturated with two materials i.e. ProRoot MTA and Biodentine.

Introduction: An optimal apical seal plays an important role in success of endodontic treatment and health of periapical tissues and can increase the success of endodontic treatment by up to 97%. Absence of apical seal has been reported as the most common cause of endodontic treatment failure. Instrument separation is an unfortunate sequela of endodontic instrumentation. Regarding the location of the separated fragment, a higher rate of separation is observed in the apical third (41% - 82.7%). The most common separation site is 2mm from the tip of the instrument.

Studies have shown that the separated instrument itself does not play a large role in the sealing ability as the obturation material and success of the root canal therapy. Root canal therapy was dependent on the coronal seal and absence of any residual irritant beyond the level of the separated instrument. In such type of cases, a good quality obturation is required so that the

sealer or the obturating material may seal the spaces between the flutes of the broken file resulting in an adequate apical seal.

Mineral trioxide aggregate (MTA) has been suggested as a root canal filling material due to its optimal sealing ability. Successful use of MTA for apical seal, apical plug and root perforation repair has been reported in many previous studies.

Another calcium silicate-based material named Biodentine which claims to have beneficial properties such as excellent sealing ability, biocompatibility, good dimensional stability with the added advantage of short setting time, improved mechanical strength easy manipulation.

Material and Method: A total sample size of 30 single rooted extracted premolars were divided into 3 groups **Group 1:** Biodentine, **Group 2:** ProRoot MTA and **Group 3:** Positive control. After breaking size 30 rotary file in the apical third, rest of the canal was obturated with Biodentine, ProRoot MTA and left empty in positive control group. Apical microleakage was measured using dye penetration under stereomicroscope at 40X.

Results: There was statistically significant (p value < 0.05) less microleakage in tooth obturated with Biodentine as compared to ProRootMTA and Positive control.

Conclusion: The result had found that microleakage in root canal containing separated instrument **Biodentine < Pro root MTA < Positive Control Group**

INTRODUCTION

Non-surgical endodontic treatment has a high success rate given that adequate cleaning and shaping and efficient obturation of root canals are performed1. Efficient obturation must provide a hermetic seal to prevent the reentry of microorganisms[2]. The absence of an apical seal has been reported as the most common cause of endodontic treatment failure[3]

Instrument separation is an unfortunate sequela of endodontic instrumentation. The fracture of the endodontic instrument has a multifactorial etiology, being influenced by diverse elements such as characteristics of the access cavity, the geometry of root canals, cross-sectional features of the root canals, which are influenced by the endodontic pathology, and age of the patient, design features of rotary instruments, metallurgical properties of various nickel-titanium rotary instruments, imperfections or manufacturing defects of the instrument, Instrumentation technique, Instrument dynamics in the root canal, number of sterilization cycles to which the instrumentation has been subjected and its number of uses, clinician's experience.[4]

When separation occurs, the clinician has the choice of leaving the instrument in the canal or attempting to remove it either surgically or non-surgically. The choice of retaining or removing the separated instrument depends upon various factors like the Initial condition of the pulp and periapical tissue, the location of separation, and the stage of the root canal treatment at which the separation occurred.

Canals followed by the precise endodontic obturation to achieve a fluid-tight seal using separated fragments as a part of obturation. The separated fragment is incorporated into the obturation, which makes it imperative that clinicians be offered more definitive, evidence-based information for predicting the potential consequences of this procedural complication.

Mineral trioxide aggregate (MTA) has been suggested as a root canal-filling material due to its optimal sealing ability. Successful use of MTA for apical seal, apical plug, and root perforation repair has been reported in many previous studies [5,6]. It is biocompatible and non-toxic and has bactericidal properties[7]. Long setting time, difficult handling, high cost, and difficult removal in case of requiring post-space preparation or retreatment are among its drawbacks[8]. Calcium-enriched mixture (CEM) cement is another root-filling material with hydrophilic and antimicrobial properties. It can provide an optimal apical and coronal seal as well[9]

A new active calcium silicate-based material named Biodentin claims to have beneficial properties such as excellent sealing ability, biocompatibility, good dimensional stability with the added advantage of short setting time, improved mechanical strength easy manipulation, and quite economical.

Given the existing concerns about managing root canals with a broken instrument, this study aimed to compare apical microleakage in root canals with broken instruments filled with two bioceramic materials.

MATERIALS AND METHODOLOGY

Preparation of the specimen:

The teeth were selected using random sampling; therefore, 10 teeth were included in each group. A total of 30 samples were included in the study.

Inclusion criteria

1. Only mandibular premolars with a single root canal are included in the study.
2. Teeth extracted for periodontal or orthodontic reasons.

Exclusion criteria

1. Extracted Incisor, Canine, and Molar tooth.
2. Premolar tooth having more than one canal
3. Teeth extracted due to caries.

Randomization: Simple random sampling was used for dividing the tooth between the groups.

Blinding: Single-blind technique (Statistician) was used in the study.

The study was conducted in the Department of Conservative Dentistry and Endodontics, RUHS College of dental Sciences, Jaipur. The teeth fulfilling the inclusion & exclusion criteria were included in the study. After collection, the teeth will be cleaned and disinfected by immersion in 5.25% sodium hypochlorite for one hour. They will then be stored in 0.9% saline at room temperature until the experiment.

The crowns were cut using a diamond bur and high-speed handpiece under water irrigation, and the roots were divided into three groups based on root canal filling.

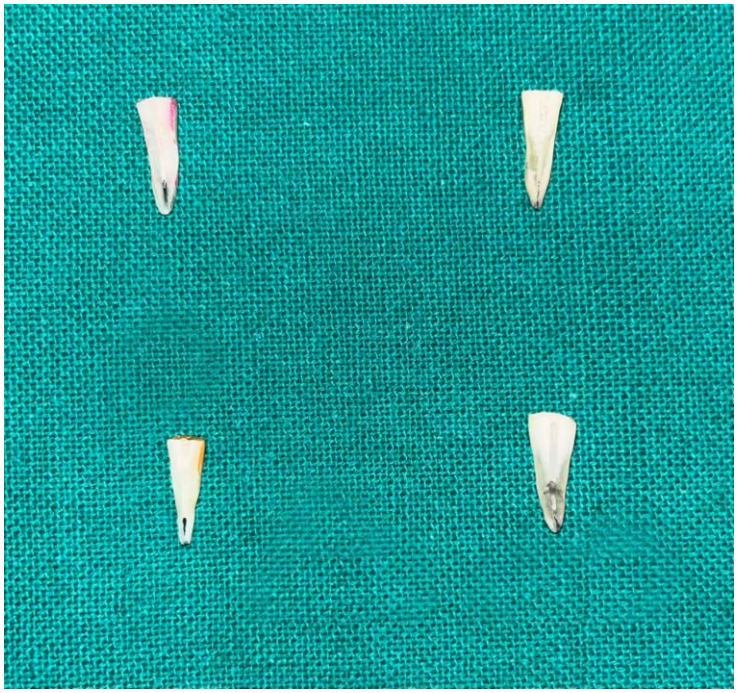
Group 1: Biodentine

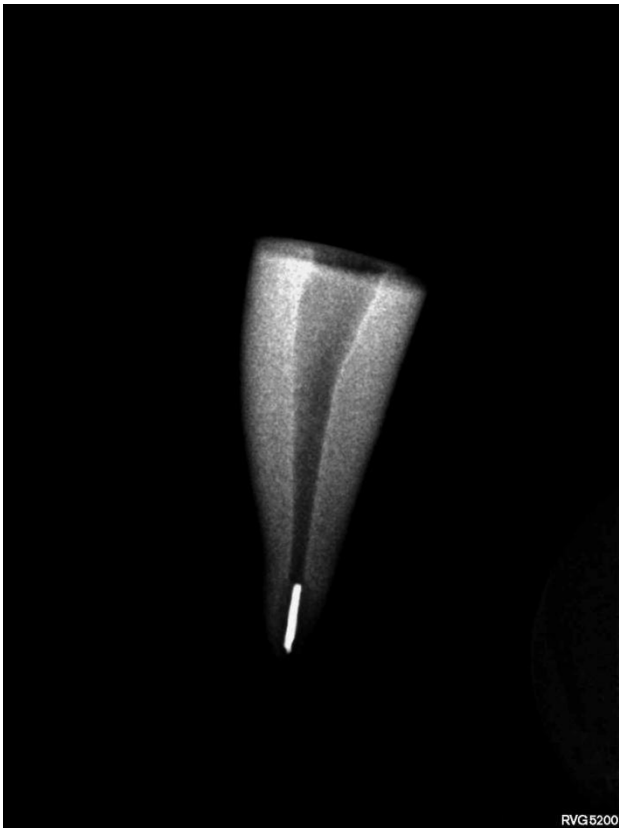
Group 2: ProRoot MTA

Group 3: Positive control

First, roots were radiographed in a buccolingual direction after mounting them in acrylic blocks. Next, the working length was determined, and the root canals were instrumented with hand K-files followed by Neoflex files fixed taper rotary files up to size 25/0.06 to the working length and 30/0.06 to 1.5 mm short of the working length. Next, recapitulation was performed between files, and root canals were irrigated with 5.25% sodium hypochlorite. A final rinse with 1.25% sodium hypochlorite was also performed, followed by 17% EDTA and 5 mL of saline.

A #30 rotary file was scratched at 3 mm from its tip by a high-speed handpiece and was intentionally broken in the canal in the apical region. The middle and coronal sections of the canals were filled with the root mentioned above canal filling materials/techniques. The roots were radiographed after file fracture and after filling. The roots were coated to 2 mm around the root apex with nail varnish. The coronal orifice was sealed with glass ionomer cement.

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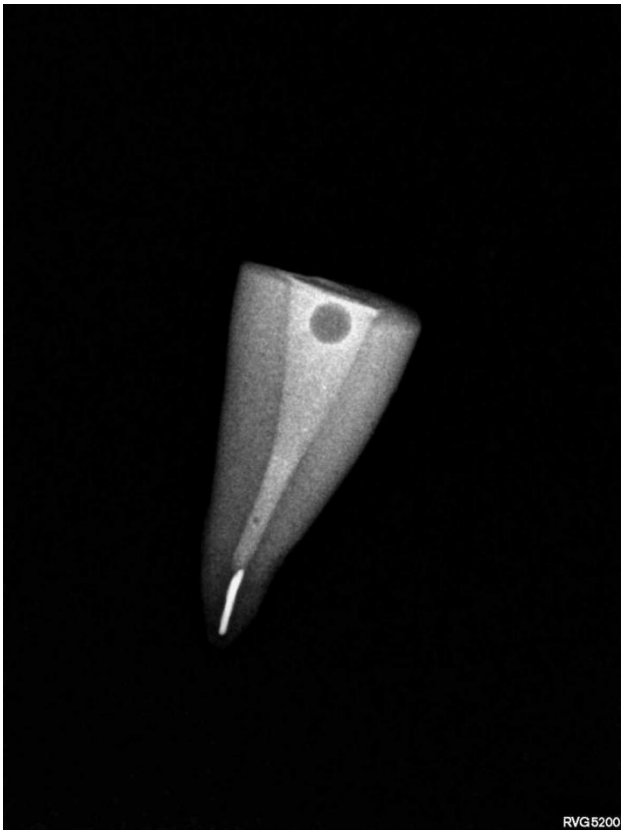
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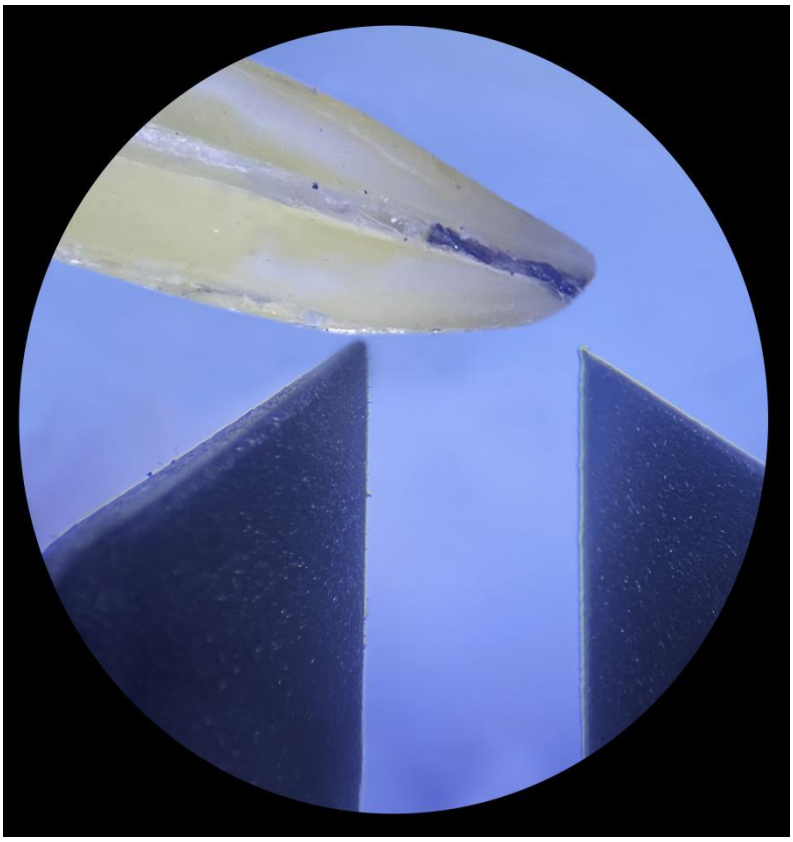

RESULTS

The mean depth of dye penetration in Biodentine was 3.31±0.61 mm, in Pro root MTA was 5.15±0.89 mm, and in the positive control group was 9.13±1.05 mm. One-way ANOVA test showed a significant difference between the groups with an F value of 115.39 and a p-value of 0.001.

The result was further evaluated by Post hoc Tukey test and unpaired student t-test to determine the difference between each pair of groups. The Post hoc Tukey test was performed to determine the difference between each pair of groups. The groups showed a significant difference between groups.

The mean depth of dye penetration in Biodentine was 3.31±0.61 mm, and in Pro root MTA was 5.15±0.89 mm. Student t-tests showed a significant difference between groups with a t-value of 3.90 and a p-value of 0.001. (Table 3)

The amount of Microleakage in Biodentine < Proroot MTA

The mean depth of dye penetration in Biodentine was 3.31±0.61 mm and in the positive control group was 9.13±1.05 mm. Student t-tests showed a significant difference between groups with a t-value of 18.31 and a p-value of 0.001. (Table 4)

The amount of Microleakage in Biodentine < Positive control group

The mean depth of dye penetration in Pro root MTA was 5.15±0.89 mm and in the positive control group was 9.13±1.05 mm. Student t-tests showed a significant difference between groups, with a t-value of 11.73 and a p-value of 0.001. (Table 5)

The amount of Microleakage in Pro root MTA < Positive control group

Inference

The result found that microleakage in the root canal containing separated instrument

Biodentine < Pro root MTA < Positive Control group.

Table 1: Comparison of Apical Microleakage in Root Canal Containing Separated Canals Using Different Filling Material Group

Group	N	Mean	Std. Deviation	Minimum	Maximum	F value	P value
Biodentine	10	3.31	**0.27**	3.00	3.8	115.391	.001**
Proroot MTA	10	5.15	**0.41**	4.5	5.80		
Positive Control	10	9.13	**0.66**	8.00	10.00		
Total	30	9.13	1.34	3.00	10.00		

Table 2: Comparison of Apical Microleakage in Root Canal Containing Separated Canals Using Biodentine and Proroot MTA Filling Material Group

Group	N	Mean	Std. Deviation	T value	P value
Biodentine	10	3.31	0.27	5.59	0.001**
Proroot MTA	10	5.15	0.41		

Biodentin has shown statistically lesser microleakage around separated instruments than ProRoot MTA

Table 4: Comparison of Apical Microleakage in Root Canal Containing Separated Instrument Using Biodentine Filling Material and Positive Control Group

Group	N	Mean	Std. Deviation	T value	P value
Biodentine	10	3.31	0.27	18.31	0.001**
Positive Control	10	9.13	0.66		

Biodentin has shown statistically lesser microleakage around separated instruments than in the control group.

Table 5: Comparison of Apical Microleakage in Root Canal Containing Separated Instrument Using Proroot MTA Filling Material and Positive Control Group

Group	N	Mean	Std. Deviation	T value	P value
Proroot MTA	10	5.15	0.41	11.73	0.001**
Positive Control	10	9.13	0.66		

ProRoot MTA showed lesser microleakage around separated instruments than the control group ($p < 0.05$)

DISCUSSION

Root canal treatment is one of the procedures to treat the infected pulp of a tooth, aiming to eliminate the infection and seal the canal from future microbial invasion apically and coronally.

The success in endodontics is the triad of root canal preparation, disinfection, and complete canal obturation.

Endodontic mishaps can happen at any of the steps mentioned above: the most troublesome endodontic iatrogeny is instrument separation during root canal preparation.

The outcome of the separated instrument depends on the following like success rates were reduced if the tooth had necrotic pulp at the beginning of the treatment, as a separated instrument hampers the ability to disinfect the canal, location of the fragment if it is located in the apical third beyond a severely curved root canal, stage at which the separation occurs, i.e., at the end stages of root canal preparation when the root apex has been cleaned and shaped.

Unfortunately, there has yet to be a consensus on management approaches in current practice..

Following are the different approaches for managing a separated instrument:

Retrieval of the fractured instrument, bypassing the separated fragment and managing the canal, retaining the separated instrument in the canal followed by management of the remaining portion, or retrieving by periapical surgery followed by its management.[10]

The approaches mentioned above to manage separated instruments have their disadvantages and should be performed considering the risks involved; ledge formation while attempting to retrieve the instrument will further worsen the prognosis, as they are potential areas of stress concentrations that may contribute to vertical root fractures, Secondary fractures; Ni-Ti instruments may fracture while attempting to remove via ultrasonics, perforations and vertical root fractures can occur because of the staging platform made for instrument removal, extrusion of the fragment apically or even beyond the root apex is a complication that usually results from excessive pressure applied on instruments used for removal or from the vibration of ultrasonic instruments.[10]

Standard endodontic procedures must be performed when the separated fragment is decided to be left in the canal. If the separated fragments cannot be retrieved, then the separated fragment may be left over in the canal. If the fractured segment binds snugly in the apical third, this method of treating the canal can be considered. Removal or bypassing the separated fragment is considered if the file binds in the coronal or middle third. Retaining the instrument in the canal may be especially applicable if the separation occurs toward the final stages of root canal preparation or the fragment is located in the apical third beyond a severely curved root canal.[10]

Fracture of the file in the canal occurs most commonly during endodontic treatment. Evidence shows that a broken instrument remaining in the root canal does not significantly affect the quality of the root canal seal by filling materials, and the success of endodontic treatment mainly depends on the coronal seal and cleaning of the middle and coronal thirds.

Microleakage in the root canal is the movement of periradicular tissue fluids, microorganisms, and their associated toxins along the interface of the dentinal walls and the root-filling material.

For many years, gutta-percha has been the most commonly used natural material for filling root canals and has been marked as a gold standard. It has several advantages, but these only satisfy the secondary requirements of an ideal obturating material. The primary requirements of being an antimicrobial material and sealing all the portals of exit in the root canal system are not satisfied by gutta-percha.Several alternative materials have been tried to overcome the drawbacks of GP, like plastics (Resilon), cement, and pastes (Calcium Phosphate, Gutta Flow, Hydron). However, many of these materials must meet the complete requirements for the obturation of root canal systems. Only calcium silicate-based materials like MTA and related bioactive cement have shown promising results.[11]

Mineral trioxide aggregate (MTA) has been suggested as a root canal-filling material due to its optimal sealing ability. Many previous studies have reported the successful use of MTA for apical seal, apical plug, and root perforation repair.[12-14] It is biocompatible and non-toxic and has bactericidal properties.[15] However, long setting time, complex handling, high cost, and difficult removal in case of requiring post-space preparation or retreatment are among its drawbacks.[16]

Another Calcium silicate-based material, Biodentine introduced in 2010, is composed of Tricalcium silicate (3CaO.SiO2) as the primary core material, dicalcium silicate (2CaO.SiO2) as the second core material, Calcium carbonate (CaCO2) as filler, Zirconium Oxide (ZrO2) as radio opacifier & Iron oxide as a coloring agent. Considering its physical properties (increased compressive strength, push-out bond strength, density, and porosity), biological properties (immediate formation of calcium hydroxide, higher release, and depth of incorporation of calcium ions), and handling properties (faster setting time), Biodentine has been advocated as an efficient alternative to mineral trioxide aggregate to be used in a variety of indicators.

In this study, the dye penetration technique was performed using Indian ink as a tracer to measure microleakage, as it is the most frequently used technique for assessing the sealing quality of root canal sealers.

The present study was conducted to compare and evaluate apical microleakage in root canals containing separated rotary instruments obturated with three different root canal filling materials, i.e., ProRoot MTA and Biodentine.

Godiny et al. 2017 [21] showed MTA and CEM cement to have better apical sealing ability around separated rotary instruments than laterally compacted gutta-percha and injected gutta-percha. Mashalkar et al. 2019 [22] showed Portland cement to have superior sealing ability than CLC gutta percha with AH Plus sealer around a stainless steel hand K file at the apical third.

Another study by Banga KS et al. 2021 [23] compared a 4mm plug of MTA and Biodentine coronal to the separated instrument with the rest of the canals obturated with gutta-percha using the CLC technique and thermoplasticized technique; their results showed no statistically significant difference between all the groups.

The present study compared apical sealing ability in separated instrument teeth of two bioceramic materials, i.e., Biodentin, ProRoot MTA filling the entire root canal and revealed that Biodentine

provided a better apical seal around the separated instrument and showed the least microleakage.

The microleakage showed by Biodentine was significantly ($p>0.05$) less. Both materials showed statistically significantly less leakage than the control group ($p>0.05$).

These bioceramic materials have been compared as root-end filling, pulp capping, and perforation repair. The results of the present study showing lesser microleakage in the case of Biodentine are consistent with many other studies. Khandelwal et al. 2015 [24], in their study, compared GIC, MTA, and Biodentine as root-end filling material & reported Biodentine to have a better marginal adaptation than MTA. Pathak et al. 2015 [25] also reported MTA to have a higher microleakage as a root-end filling material than Biodentine, which they owed to its higher setting time Nepal M et al. 2020 [26] et al also compared apical microleakage in MTA and Biodentine. They showed similar results as the present study, i.e., Biodentine showed less apical microleakage than MTA as a root-end filling material. Refaei et al. 2020 [27] also compared the ProRoot MTA with Biodentine and showed that Biodentine showed significantly less microleakage than MTA; these results are similar to the results

However, a study by Soundappan et al. [28] and Mandava P et al. [29] proved MTA to have surpassed Biodentine, with MTA having better marginal adaptation due to the expansion of the cement on the setting.

Naik et al. 2015[31] in their study, showed Biodentine to have tricalcium silicate and zirconium particles of finer particle size, thus a higher value for specific surface area. Furthermore, due to its optimized particle size distribution, the tricalcium silicate's reaction rate was higher for Biodentine than MTA. . Thus, the biomineralization ability of Biodentine, most likely through the formation of tags, more excellent calcium and silicon uptake from adjacent root canal dentine, and least microleakage compared with other retrograde filling materials are the probable reasons for its least dye absorbance.

Even if apical surgery is still indicated, only the apical part containing the broken instrument can be ressected following root canal filling with this endodontic cement, and there would be no need for a retrograde filling. Surgical procedure is greatly enhanced, and more predictable results may be obtained.

BIBLIOGRAPHY

1. Salehrabi R, Rotstein I. Endodontic Treatment Outcomes in a Large Patient Population in the USA: An Epidemiological Study. J Endod. 2004;30(12).
2. Leduc J, Fishelberg G. Endodontic obturation: a review. Gen Dent. 2003 May 1;51(3):232–3.
3. Rotstein: Ingle's endodontics - Google Scholar [Internet].
4. Amza O, Dimitriu B, Suciu I, Bartok R, Chirila M. Etiology and prevention of an endodontic iatrogenic event: instrument fracture. Journal of Medicine and Life. 2020 Jul;13(3):378.
5. Bragaxavier C, Weismann R, Gerhardtdeoliveira M, Fernandodemarco F, Humbertopozza D. Root-End Filling Materials: Apical Microleakage and Marginal Adaptation. J Endod. 2005 Jul;31(7):539–42.
6. Mah T, Basrani B, Santos JM, Pascon EA, Tjäderhane L, Yared G, et al. Periapical inflammation affecting coronally-inoculated dog teeth with root fillings augmented by white MTA orifice plugs. J Endod. 2003;29(7):442–6.
7. Torabinejad M, Parirokh M, Dummer PMH. Mineral trioxide aggregate and other bioactive endodontic cements: an updated overview – part II: other clinical applications and complications. Int Endod J. 2018;51(3):284–317
8. Camilleri J, Grech L, Galea K, Keir D, Fenech M, Formosa L, et al. Porosity and root dentine to material interface assessment of calcium silicate-based root-end filling materials. Clin Oral Investig. 2014 Jun;18(5):1437–46.
9. Zafar M, Iravani M, Eghbal MJ, Asgary S. Coronal and apical sealing ability of a new endodontic cement. Iran Endod J. 2009;4(1):15.
10. Madarati AA, Hunter MJ, Dummer PM. Management of intracanal separated inst ruments. Journal of endodontics. 2013 May 1;39(5):569-81
11. Eren, B., Ozasir, T., Kandemir, B., & Gulsahi, K. (2021). Comparison of Fracture Resistance of Endodontically Treated Teeth Restored with FiberSite Postsystem and Glass Fiber, Combined

with Different Root Canal Sealers. BioMed research international, 2021, 3818652.
12. Zafar M, Iravani M, Eghbal MJ, Asgary S. Coronal and apical sealing ability of a new endodontic cement. Iran Endod J. 2009;4(1):15.
13. 13.. Mousavi SA, Khademi A, Soltani P, Shahnaseri S, Poorghorban M. Comparison of sealing ability of ProRoot mineral trioxide aggregate, biodentine, and ortho mineral trioxide aggregate for canal obturation by the fluid infiltration technique. Dent Res J. 2018;15(5):307.
14. Beatty R g., Vertucci F j., Zakariasen K l. Apical sealing efficacy of endodontic obturation techniques. Int Endod J. 1986;19(5):237–41.
15. Smith MA, Robert Steiman H. An in vitro evaluation of microleakage of two new and two old root canal sealers. J Endod. 1994 Jan;20(1):18–21.
16. Sen BH, Pişkin B, Baran N. The effect of tubular penetration of root canal sealers on dye microleakage. Int Endod J. 1996 Jan;29(1):23–8.
17. Rangappa KG, Hegde J, Chikkamallaiah C, Rashmi K. Comparative evaluation of the sealing ability of different obturation systems used over apically separated rotary nickel-titanium files: An in vitro study. J Conserv Dent JCD. 2013 Sep;16(5):408–12.
18. Türker SA, Uzunoğlu-Özyürek E, Kaşikçi S, Öndeş M, Geneci F, Çelik HH. Filling quality of several obturation techniques in the presence of apically separated instruments: A Micro-CT study. Microsc Res Tech. 2021;84(6): 1265–71.
19. Rao CR, Chukka RR, Gandhi SA, Tiriveedi R, Senthilnathan N, Patil PR. Sealing ability of obturation with different sealers applied over apically separated rotary file–Retrograde bacterial leakage study. J Pharm Bioallied Sci. 2022;14(5):673.
20. Mehrotra A, Gutte NH, Mishra R, Ughade SP, Nanditha SK. Sealing ability of different obturating techniques in apically separated rotary files: An In Vitro study. J Pharm Bioallied Sci. 2022;14(5):884.
21. Godiny M, Hatam R, Khavid A, Khanlari S. Apical microleakage in root canals containing broken rotary instruments. Iran Endod J. 2017;12(3):360
22. Mashalkar S, Selvakumar G, Diwanji P, Indi S, Warad J. Apical microleakage in root canal-treated teeth containing broken hand files obturated with two different obturating materials: An in vitro study. Endodontology. 2019;31(1):68.
23. Shenoy SN, Banga KS. Comparison of Micro Leakage in Root Canals Containing Separated Rotary Instruments using MTA and Biodentine Barrier–An in-vitro study.
24. Ankita Khandelwal, J. Karthik, Roopa R. Nadig, Arpit Jain, "Sealing ability of mineral trioxide aggregate and Biodentine as root end filling material, using two different retro preparation techniques -An in vitro study," Int J Contemp Dent Med Rev, vol. 2015, Article ID: 150115, 2015.
25. Pathak, S., 2015. Comparative evaluation of sealing ability of root end filling materials: in-vitro study. Int. J. Dent. Med. Res. 1, 48–52.
26. Nepal M, Shubham S, Tripathi R, Khadka J, Kunwar D, Gautam V, et al. Spectrophotometric analysis evaluating apical microleakage in retrograde filling using GIC, MTA and biodentine: an in-vitro study. BMC Oral Health. 2020 Feb 3;20(1):37.
27. Refaei P, Jahromi MZ, Moughari AAK. Comparison of the microleakage of mineral trioxide aggregate, calcium-enriched mixture cement, and Biodentine orthograde apical plug. Dent Res J. 2020 Feb;17(1):66
28. Soundappan S, Sundaramurthy JL, Raghu S, Natanasabapathy V. Biodentine versus mineral trioxide aggregate versus intermediate restorative material for retrograde root end filling: an invitro study. Journal of Dentistry (Tehran, Iran). 2014 Mar;11(2):143.
29. Han L, Okiji T. Bioactivity evaluation of three calcium silicate-based endodontic materials. Int Endod J. 2013;46(9):808–14
30. Naik MM, de Ataide Ide N, Fernandes M, Lambor R. Assessment of apical seal obtained after irrigation of root end cavity with MTAD followed by subsequent retrofilling with MTA and Biodentine: An in vitro study. J Conserv Dent. 2015;18(2):132-135
31. Chang SW, Gaudin A, Tolar M, Oh S, Moon SY, Peters OA.Physicochemical and biological properties of four calcium silicate-based endodontic cements. Journal of Dental Sciences. 2022 Oct 1;17(4):1586-94.

An Alcove – Simplified Technique of Fabricating Hollow Denture - A Case Report.

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Abstract

Abstract: Aim and background: In different literature various techniques for the fabrication of hollow dentures have been described. However, the maximum available techniques are technique sensitive and have an indefinite result. Hence, this case report describes techniques to overcome these complications in order to achieve a patient-centred outcome that results in successful overall treatment.

Case Description: Patient gave a history of ill-fitting denture due to high weight of denture. Diagnosis includes the resorbed maxillary and mandibular ridges. So, hollow denture prosthesis planed for the patient with a 1 week and 1month follow up period.

Conclusion: It concluded that the denture fabricated with this new U-shaped frame technique is very light weight and effective as compared to the other techniques.

Clinical Significance: This technique provides the prosthesis with light weight denture, ease of fabrication, improved retention and stability as well as compliance of a patient.

Keywords: Hollow denture, U-shaped frame, Light weight denture, alginate mould.

INTRODUCTION

A complete denture is considered successful when it relies on retention, stability, and support principles. An increased interridge distance often results in heavy maxillary complete denture that further reduces the retention of the prosthesis.[1] In such cases, denture thickness is increased which results in a heavy prosthesis. In this situation, a hollow denture can be a treatment option for a successful complete denture. This case report focuses on alternate and simplified hollow denture prosthesis fabrication techniques.

PATIENT INFORMATION

A sixty-seven years old male patient reported to the department of prosthodontics, Pacific Dental College and Hospital, Udaipur. The patient was an old denture wearer and he came with the chief complaint of difficulty in mastication due to spontaneous cheek bites during chewing food and talking.

CLINICAL FINDINGS

On clinical examination extra-oral features of the patient were normal. Intra-orally Atwood's order – V ridge with maxillary and mandibular arch is seen with an increased inter-arch space (fig.1a, b). Because of increased inter-ridge distance, vertical dimension at rest & occlusion, cheek bite, and poor aesthetics we decided to fabricate a hollow prosthesis.

Timelines: Treatment has been divided into multiple phases

Phase 1 - Case history recording, clinical findings and diagnostic impression

Phase 2 - Border moulding and final impression

Phase 3 – Maxillomandibular relation recording

Phase 4 – Try in of waxed denture

Phase 5 – Final denture insertion

Phase 6 – Follow up

DIAGNOSTIC ASSESSMENT

Diagnosis of the patient done followed by diagnostic impression making and vertical dimension at rest was also measured for a good prognosis of the prosthesis.

THERAPEUTIC INTERVENTION

The first method used to make hollow dentures was the lost salt technique which led to a bulkier and heavier prosthesis because of the inability to remove the salt completely. Therefore, rebasing of the old denture was planned with a new simplified technique to fabricate hollow denture. This technique used modelling wax and self-cure acrylic resin. After clinical examination and case history recording the preliminary impressions were made with an irreversible hydrocolloid impression material. The secondary impressions were made with zinc-oxide eugenol impression material and master casts were fabricated. Maxillomandibular relation was recorded and mounting on a mean value articulator was done. Followed by teeth arrangement and try-in. Then the flasking of the sealed denture with a double poured method was carried out (Figure 1). To measure the hollow space the impression of this dewaxed flask was made with the help of alginate impression material. Alginate was poured into a base flask followed by closing the counter flask. (Figure 1). The set alginate mould was retrieved from the flask and height was measured using a metallic ruler and endodontic file with a stopper (Figure 1,2). Then the U-shaped frame of measured dimension was fabricated with the help of modelling wax by keeping a distance of 2-3 mm from all sides to create a space for heat cure acrylic resin while final packing (Figure 2). Then a thin shell of self-cure acrylic resin was made over the wax u-shaped frame by using sprinkle on technique. After this the wax was removed from the 3 walled shell with the help of a lacron carver (Figure 2). After this the fourth wall of the shell was fabricated by adapting a thin layer of heat cure acrylic resin material over the glass slab by a sprinkle on technique and the 3 walled shell was pressed over the glass slab (Figure 2). A hollow 3-dimensional U-shaped frame was created and trimming, finishing and polishing of the hollow acrylic U-shaped frame was done (Figure 3)., and then this hollowed-out shell was rechecked by placing it in a dewaxed flask (Figure 4). After this, a thin layer of heat cure acrylic was placed in the flask on top of which the hollowed-out frame was placed and over it, a final layer of heat cure resin was added and the counter flask was closed. After processing the denture was retrieved, finished, and polished (Figure 4). The weight of the denture was measured and compared with the denture made with the lost salt technique (Figure 5). Floating test showed floating maxillary denture (Figure 5). Final insertion of the prosthesis was done (Figure 5).

FOLLOW-UP AND OUTCOMES

Follow-up of the patient is done after 7 days and 1 month. The patient was completely satisfied with retention, stability, mastication, and phonetics with the hollow denture prosthesis.

SIGNIFICANCE

The technique described in this case report is a simplified, time-saving procedure that resulted in a much lighter denture as compared to the lost salt technique.

DISCUSSION

In the majority of techniques, a tedious effort is required to remove the material from the denture, and yet lightweight dentures cannot be obtained. Jaiswal PR et al. described a method of the fabrication of a hollow denture using play dough and auto polymerizing acrylic resin.[4] Aggarwal *et al*. used the lost salt technique.[5] In the lost salt technique, uniformity of the hollow part is not maintained, and the salt reacted with heat-cured acrylic resin which leads to porosity. So, this method is advantageous over the conventional as no removal of the material is required for creating hollow space.

PATIENT PERSPECTIVE

Patient showed very good response for the new hollow denture as it was light in weight compared to old denture prosthesis, as said by patient. Patient also talked about the improvement in retention of prosthesis as well as better phonation.

INFORMED CONSENT

Patient has been informed regarding the benefits of the hollow denture and appropriate consent regarding the same has been taken from patient. Consent for his images and other clinical information has been taken he also has been informed regarding his name and other information will not be published and efforts will be made to conceal identity.

CONCLUSION

Hollow denture allows clinician to provide a specialised denture that will enhance patient compliance and also reduce the amount of detrimental forces transmitted on underlying tissues. Also, it improves the comfort & quality of life of the patient. The method described in this case report is simplified, time saving procedure which provides promising results. It overcomes the demerits of other popularised methods in order to achieve a successful outcome.

Figure Legends

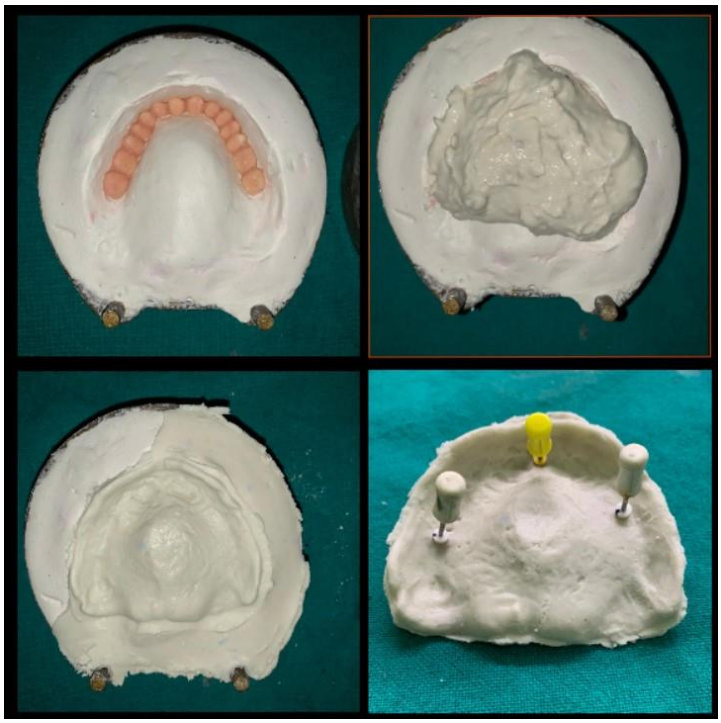

Figure 1 – A. Counter flask after dewaxing with an acrylic tooth before rebasing. B. Flask filled with alginate impression material. C. Flask and counter flask with a set alginate impression. D. Maxillary irreversible hydrocolloid impression mould including Endodontic files with stopper embedded in alginate mould.

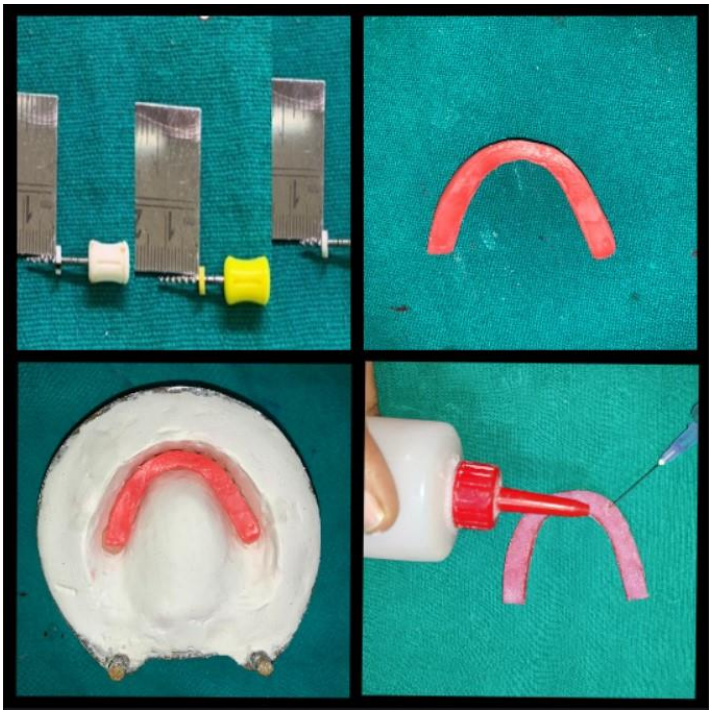

Figure 2 – A. The height was measured using a metallic ruler and endodontic file with a stopper. B. Waxed U-shaped frame. C. Trial of waxed U-shaped frame in the flask. C. Fabrication of self-cure acrylic resin shell with the help of sprinkle on technique over waxed U-shaped frame.

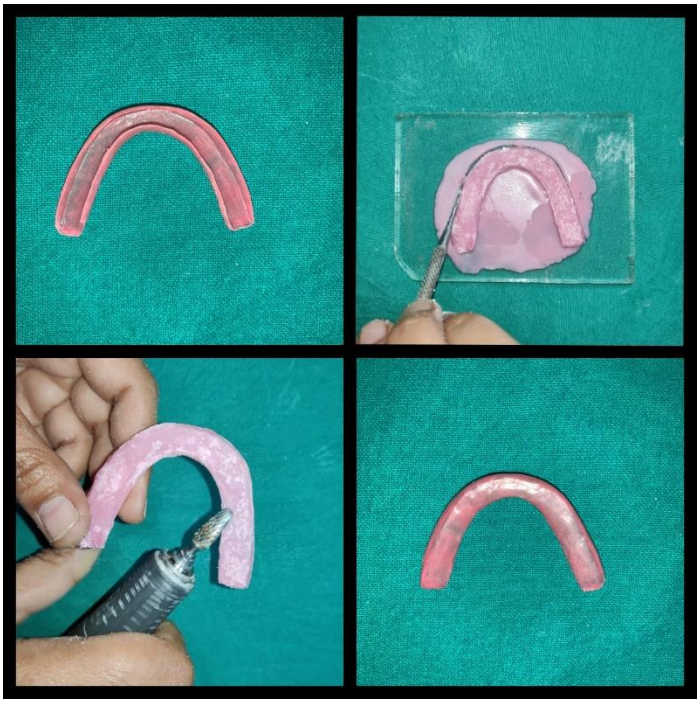

Figure 3 – A. 3 walled self-cure acrylic U-shaped shell. B. Over thin layer of self-cure acrylic resin fabricated on glass plate the 3 walled U-shaped shell was pressed and excess material was removed. C. Trimming, finishing and polishing of U-shaped frame of self-cure acrylic resin. D. Final polished self-cure acrylic U-shaped hollow frame.

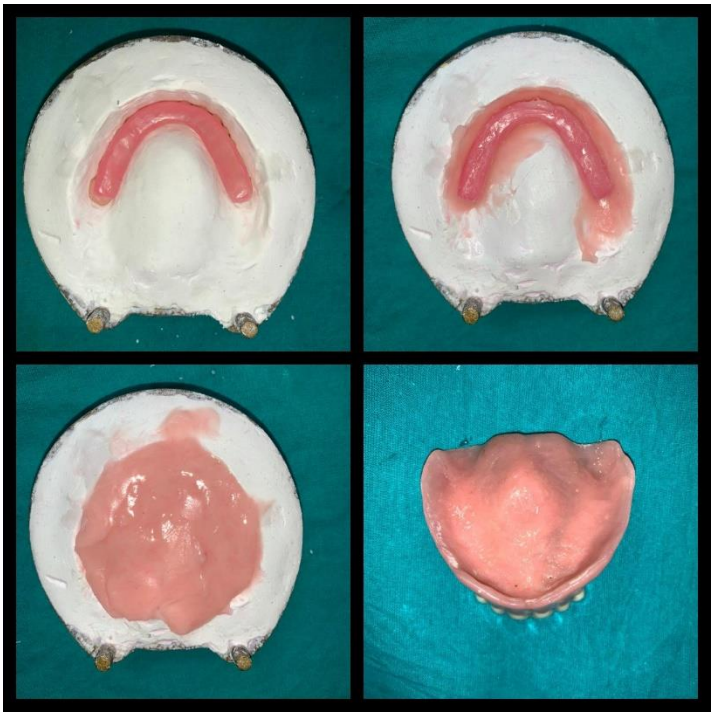

Figure 4 – A. Trial of the U-shaped Hollow frame before packing. B. U-shaped shell placed over a thin layer of heat cure acrylic resin. C. Second layer of heat cure acrylic resin placed over the U-shaped shell. D.Intaglio surface of final prosthesis having U shaped hollow shell interposed between two layers of heat cure acrylic resin.

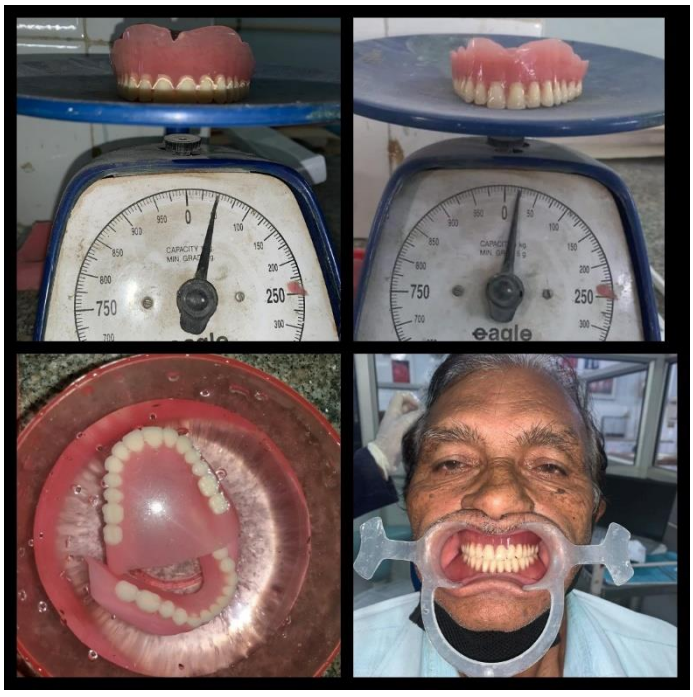

Figure 5 – A and B. Comparison between old denture without hollow and denture with hollow. C. Floating test showing hollowed maxillary denture and sunk mandibula denture. D. Final insertion of hollow denture prosthesis.

Prevalence of Various Developmental Dental Anomalies in Population of Hazaribag District, Jharkhand: A Hospital Based Study

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Abstract

Background: To investigate Developmental anomalies of teeth are clinically evident abnormalities. The effect of dental anomalies can lead to functional, esthetic and occlusal problems. Careful observation and appropriate investigations are required to diagnose the condition for appropriate treatment. The Purpose of the study was to determine the prevalence and distribution of selected developmental dental anomalies in Hazaribag population, Jharkhand.

Material and Methods: The study was based on clinical examination and radiograph of children who visited the OPD at Hazaribag College of Dental Sciences & Hospital, Hazaribag. These patients were examined for dental anomalies in size, shape, number, structure and position. Data collected were entered and analyzed for statically purpose.

Results: Of the 1000 subjects (500 Males, 500 Females) examined, 138 subjects (13.8%) presented with selected dental anomalies. On intergroup comparison, number anomalies was the most common anomaly with missing teeth (4.1%) being the most common anomaly. The Prevalence of size anomalies were Microdontia (1.0%) and Macrodontia (1.8%). The prevalence of Shape anomalies were Dilaceration (1.2%), Talon cusp (0.9%), Fusion (0.6%) & Taurodontism (0.7%).The prevalence of Positional anomalies were Ectopic eruption (0.5%) and Rotation (1.1%). The prevalence of structural anomalies were Amelogenesis imperfecta (0.6%) Dentinogenesis imperfecta (0.1%)

Conclusions: A significant number of subjects had dental anomaly with missing teeth being the most common anomaly and Dentinogenesis imperfecta being the rare anomaly in the study.

INTRODUCTION

The tooth is a specialized part of the human body, understanding the development of which is enigmatic and still challenging. The successful development of tooth depends on a complex reciprocal interaction between the dental epithelium and underlying ectomesenchyme. The interaction involves a complex series of molecular signals, receptors and transcription control systems.[1]

Dental anomalies arise due to genetic and environmental factors in the morpho differentiation stage of odontogenesis lead to alteration in the normal color, contour, size, number and degree of development of teeth.[2–4]

In industrialized countries, there are about 10% of children with developmental disturbances, whereas in developing countries like India their percentage is higher, ranging between 15% and 20%.[5]

Dental anomalies not only cause aesthetic problems but also can lead to dental problems such as functional disorders, dental caries, pulp disease, malocclusions and in particular masticatory problems for infants and children. If untreated, these may persist throughout life leading to physical growth disorder.[6]

This study was conducted to address the prevalence of dental anomalies in a group of Hazaribag population, with the possible existence of gender-based associations.

MATERIAL & METHOD

A prospective study was conducted during a period from January 2022 to January 2023. This study comprised of 1000 subjects (500 males & 500 females), with age ranging from 14-70 years. The clinical details including the patient's age, gender and selected anomalies were carefully checked, and recorded. A comprehensive clinical examination was carried out to detect the presence of selected dental anomalies related to number, size, structure and shape of the teeth. Digital orthopantomograms of these patients taken with orthopantomogram and were examined in a standard manner under good lighting conditions, standardized screen brightness and resolution. The clinical and radiographic examination were studied by the principal investigator to eliminate inter examiner differences.

Inclusion criteria

1. Subjects of Indian origin

Exclusion criteria

1. Subjects belonging to the pediatric age group (under the age of 14 years).
2. Subjects with history of extraction or orthodontic treatment.
3. Subjects with syndromes such as Down's syndrome, ectodermal dysplasia, etc.
4. Subjects having cleft lip and palate.
5. Subjects with misshaped teeth due to wasting diseases and dental treatment.
6. Subjects with teeth missing due to dental caries, periodontal disease and trauma.
7. Subjects with history of extraction or orthodontic treatment.

The diagnosis of oral anomalies was made according to the clinical criteria described by Shafer et al. in 2020.[7] A descriptive analysis was done with the help of Microsoft excel 2010.

RESULT

The study population composed of 1000 subjects with 500 males & 500 females. 138 children with a prevalence rate of 13.8 % had dental anomalies (Table1). The distribution by gender was 89 males (17.8%) and 49 females (9.8%). Distribution of dental anomalies according to shape, number, structural & position show in Table 2 & Graph 5.

Congenitally missing teeth 41 (4.1%) were the most common anomaly in this study (Graph 2). The most commonly missing teeth were mandibular second premolars followed by maxillary permanent lateral incisors. Macrodontia was the next common anomaly with the prevalence rate of 1.8% (Graph 1).

The prevalence of Shape anomalies were Dilaceration (1.2%), Talon cusp (0.9%), Fusion (0.6%) & Taurodontism (0.7%) (Graph 2). The prevalence of structural anomalies were Amelogenesis imperfecta (0.6%) Dentinogenesis imperfecta (0.1%) (Graph 3).The prevalence of Positional anomalies were Ectopic eruption (0.5%) and Rotation (1.1%) (Graph 4).

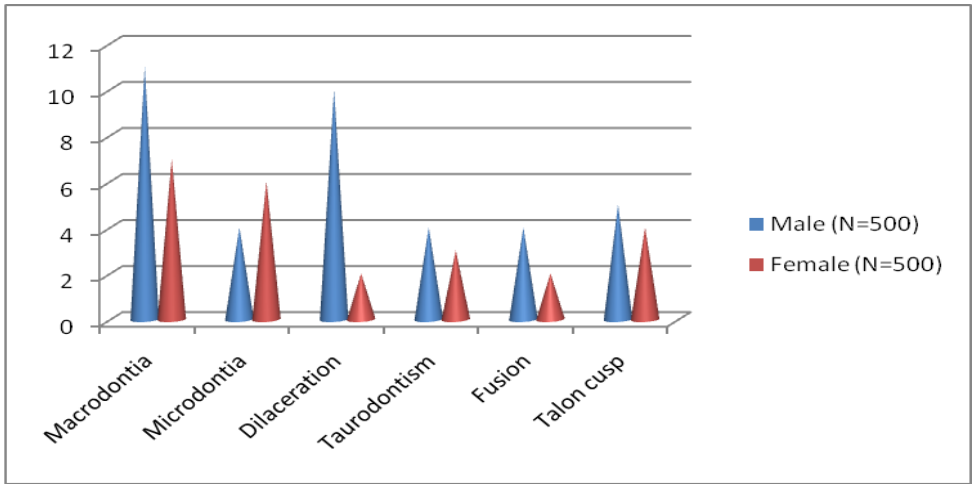
Table1: Prevalence of dental anomalies among the study population among the gender

Dental Anomalies	Male (N=500)	%	Female (N=500)	%	Total (N=1000)	%
Shape Anomalies						
Macrodontia	11	2.2	7	1.4	18	1.8
Microdontia	4	0.8	6	1.2	10	1.0
Dilaceration	10	2.0	2	0.4	12	1.2
Taurodontism	4	0.8	3	0.6	7	0.7
Fusion	4	0.8	2	0.4	6	0.6
Talon cusp	5	1.0	4	0.8	9	0.9
Number Anomalies						
Missing	25	5.0	16	3.2	41	4.1
Supernumerary	9	1.8	3	0.6	12	1.2
Structural Anomalies						
Amelogenesis imperfecta	4	0.8	2	0.4	6	0.6
Dentinogenesis imperfecta	0	0.0	1	0.2	1	0.1
Positional Anomalies						
Ectopic Eruption	4	0.8	1	0.2	5	0.5
Rotation	9	1.8	2	0.4	11	1.1
Total	**89**	**17.8**	**49**	**9.8**	**138**	**13.8**

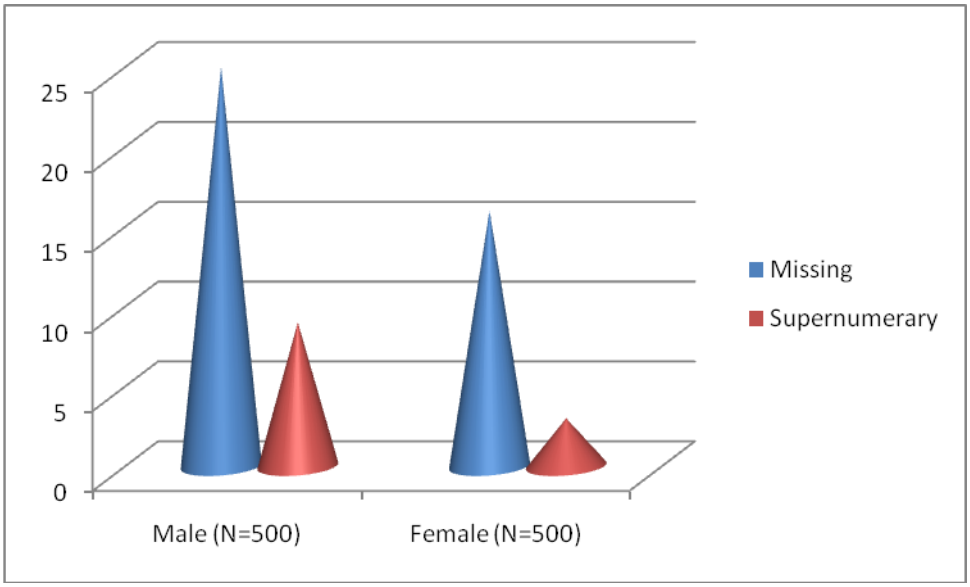
Table 2: Distribution of dental anomalies

Dental anomalies	No. of subjects (N=1000)	%
Shape anomalies	62	6.2
Number anomalies	53	5.3
Structural Anomalies	07	0.7
Positional Anomalies	16	1.6

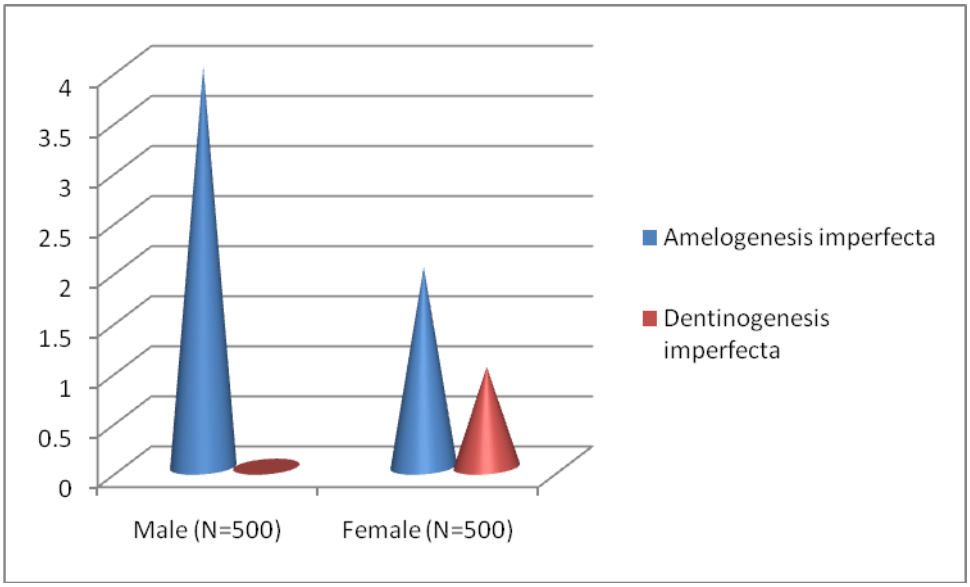
Graph1:Distribution according to shape of teeth anomalies



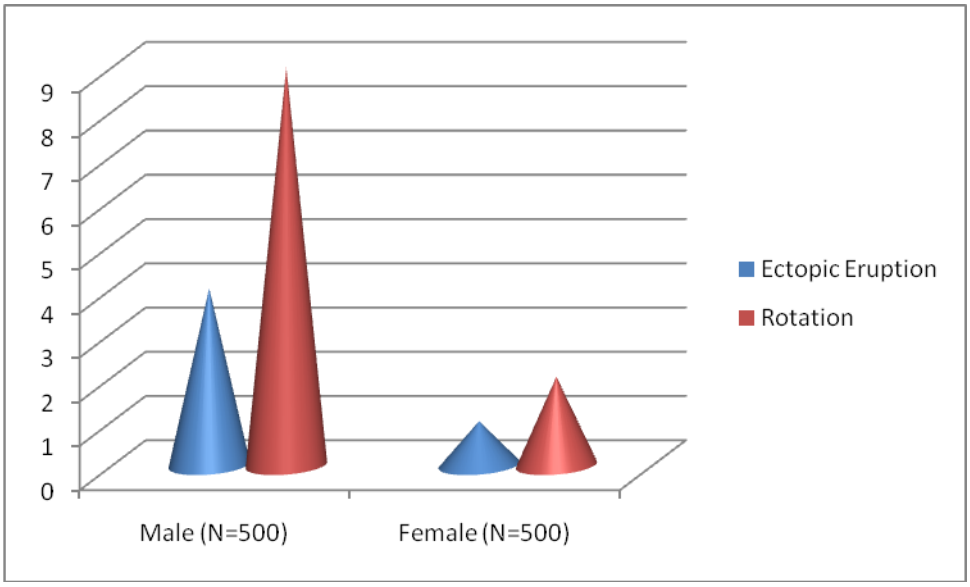
Graph2: Distribution according to number of teeth anomalies



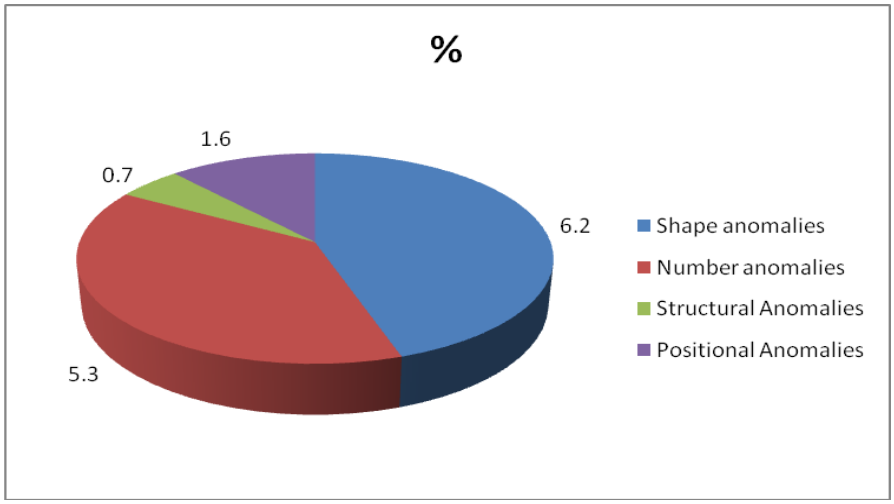
Graph3: Distribution according to Structural anomalies of teeth.



Graph4: Distribution according to positional anomalies of teeth.



Graph5: Distribution of dental anomalies



DISSCUSION

The purpose of the present study was to investigate the prevalence of dental anomalies among Hazaribag population. Mostly these anomalies develop earlier than the eruption of dentition, and are often hereditarily. The effect of the dental anomalies leads to functional, aesthetic and occlusal problems.[6]

The results of the present study supported the findings that the prevalence of Hypodontia was the most common anomaly in this study. Among the numerical anomalies congenitally missing permanent teeth were the most prevalent anomaly in children, which is similar to the findings reported by previous studies.[8,9]

However, regarding the congenitally missing permanent teeth, the types of teeth reported to be missing varied in different ethnic groups. The European and Caucasian populations mostly reported higher missing prevalence of the mandibular second premolar followed by either the maxillary or mandibular central incisors, or the maxillary second premolars.[10,11] However, the mandibular lateral incisor appears to be the most frequently missing tooth in Japanese people.[12]

In the present study, mandibular second premolar was the most frequently missing permanent teeth. Similar results were reported by previous study.[10,11]

The study showed tooth size discrepancy such as macrodontia, microdontia and peg shaped lateral incisor separately. There was no data related to

peg-shaped lateral incisors where as many studies have this finding varied between 0.3 and 8.4%.[13,14]

In the present study, supernumerary teeth were seen among 1.2% subjects and mostly in the maxillary arch and these results are more than as observed in study done Gupta et al that showed prevalence 2.40% of participants with supernumerary teeth.[15]

The least prevalent anomaly was the structural anomaly with Dentinogenesis imperfecta being the least followed by Amelogenesis imperfecta. The prevalence rate of Amelogenesis imperfecta was 0.3% while only one case of Dentinogenesis imperfecta was seen in the study, which is in line with previous results reported by Gupta SK *et al.*[15] in Indian population. However these results are in contrast to the results reported by Temilola DO *et al.* [16], in which structural anomaly was the most common form of dental anomalies with a prevalence rate of 16.1% in Nigerian population.

CONCLUSION

Thus, to conclude, the tooth number anomalies were more common followed by shape, number, positional and structural anomalies respectively in Haaribag population. Early recognition and management of dental anomalies can prevent child suffering from esthetic, orthodontic and periodontal problems.

BIBLIOGRAPHY

1. Thesleff I. Epithelial–mesenchymal signaling regulating tooth morphogenesis. J Cell Sci. 2003;116:1647-8.
2. Primožič J, Farčnik F, Ovsenik M. Places in the dental arch that show a greater variability in tooth number, shape and position – a prevalence study. Arch Oral Biol 2012;57(6):744–748.
3. Altug-Atac AT, Erdem D. Prevalence and distribution of dental anomalies in orthodontic patients. Am J Orthod Dentofacial Orthop 2007;131(4):510–514.
4. Kazanci F, Celikoglu M, Miloglu O, et al. Frequency and distribution of developmental anomalies in the permanent teeth of a Turkish orthodontic patient population. J Dent Sci 2011;6(2):82–89.
5. Kathariya MD, Nikam AP, Chopra K, Patil NN, Raheja H, Kathariya R. Prevalence of Dental Anomalies among School Going Children in India. J Int Oral Health 2013; 5(5):10-4.
6. Osuji O, Hardie J. Dental anomalies in a population of Saudi Arabian children in Tabuk. Saudi Dent J. 2002;14(1):11–4.
7. Rajendran R. Chptr: 1. Developmental disturbances of oral and paraoral structures. In: Rajendran R, Sivapathasundharam B, editors. Shafer's Textbook of Oral Pathology. 9th ed. Elsevier: Pub; 2020. p. 39-59.
8. Patil S, Doni B, Kaswan S, Rahman F. Prevalence of dental anomalies in Indian population. J ClinExp Dent. 2013; 5:e183-6.
9. Guttal KS, Naikmasur VG, Bhargava P, Bathi RJ. Frequency of Developmental Dental anomalies in Indian population. Eur J Dent. 2010; 4(3): 263–9.
10. Walton VT, Nieminen P, Arte S, Lobato PC, Torrent JMU, Céspedes MCM. An epidemiological study of dental agenesis in a primary health area in Spain: Estimated prevalence and associated factors. Med Oral Patol Oral Cir Bucal. 2010; 15:e569-74.
11. Behr M, Proff P, Leitzmann M, Pretzel M, Handel G, Schmalz G, et al. Survey of congenitally missing teeth in orthodontic patients in Eastern Bavaria. Eur J Orthod. 2011; 33:32–6.
12. Endo T, Ozoe R , Yoshino S , Shimooka S. Hypodontia patterns and variations in craniofacial morphology in Japanese orthodontic patients. Angle Orthod. 2006; 76:996-1003.
13. Brin I, Becker A, Shalhav M. Position of the maxillary permanent canine in relation to anomalous or missing lateral incisors: a population study. Eur J Orthod 1986;8(1):12-6.
14. Ooshima T, Ishida R, Mishima K, Sobue S. The prevalence of developmental anomalies of teeth and their association with tooth size in the primary and permanent dentitions of 1650 Japanese children. Int J Paediatr Dent 1996;6(2):87-94.
15. Gupta SK, Saxena P, Jain S, Jain D. Prevalence and distribution of selected developmental dental anomalies in an Indian population. J Oral Sci 2011;53(2):231-8.
16. Temilola DO, Folayan MO, Fatusi O, Chukwumah NM, Onyejaka N, Oziegbe E, et al. The prevalence, pattern and clinical presentation of developmental dental hard-tissue anomalies in children with primary and mix dentition from Ile-Ife, Nigeria. BMC Oral Health. 2014; 14:125.