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TO ASSESS SOFT TISSUE TRAUMA AND TO CHECK THE FRACTURE RATE OF UPPER 1ST PREMOLARS IN THERAPEUTIC EXTRACTIONS – A COMPARATIVE SPLIT MOUTH STUDY USING CONVENTIONAL PREMOLAR FORCEPS AND ATRAUMATIC PREMOLAR FORCEPS

MURALI S[1*] AND MADHULAXMI M[2]

1: Post Graduate Student , Department Of Oral And Maxillofacial Surgery , Saveetha Dental College And Hospitals, Saveetha Institute Of Medical And Technical Sciences, Saveetha University, No 162, Poonamallee High Road, Velappanchavadi, Chennai – 600077, Tamilnadu, India

2: Professor, Department Of Oral And Maxillofacial Surgery, Saveetha Dental College And Hospitals, Saveetha Institute Of Medical And Technical Sciences, Saveetha University, No 162, Poonamallee High Road, Velappanchavadi, Chennai – 600077, Tamilnadu, India

***Corresponding Author: Swetha Murali: E Mail: swetha6792@gmail.com; Phone number: +91 9008606792**

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ABSTRACT

Aim: The aim of the current clinical trial is to evaluate the soft tissue trauma and to assess which forceps has caused less damage to the interdental bone and the extraction has been done In-Toto.

Materials and methods:

The study population included 30 patients who had been referred to oral and maxillofacial surgery department at Saveetha dental college Chennai for therapeutic extraction. The patients were randomly assigned to 2 groups: group 1, extraction of premolars using conventional premolar forceps; and group 2, extraction of premolars using atraumair premolar forceps. It is a comparative split mouth study. Primarily fracture rate of upper premolar root was assessed by comparing these two forceps. In addition, the pain intensity levels for each patient were recorded during the application of forceps using VAS pain assessment tool.

Results:

A total 30 patients participated in the study, of which 16 were females and 14 were males, the age distribution was in between 11-26years. Participants were divided into two groups. Being a split

mouth study same participant had application of two different forceps on either side of the quadrant. All the participants had their upper and lower 1st premolars extracted. There was a significant difference in pain control of the two treatment groupswith a p value of 0.007654 .Statistically analysis showed that there were significant differences between control and treatment groups ($p<0.05$).

Conclusion:

Within the limitations of the study, atraumatic premolar forceps had significantly shown better results in VAS scale compared to that of universal conventional premolar forceps. And clinically there was less to too little tissue damage noted where atraumatic premolar forceps were used for extraction.

Keywords: Therapeutic extraction, conventional premolar forceps, atraumatic premolar forceps, upper 1st premolar extraction, VAS pain scale, soft tissue trauma

INTRODUCTION

Dental extraction (exodontia) is defined as removal of a tooth from the mouth. Exodontia is the most common procedure performed in oral surgery and is often the first surgical procedure done by young dentists and maxillofacial surgeons **[1]**.

An Atraumatic Extraction is the process of extracting a hopeless tooth in the most delicate and conservative technique, this includes using special instruments that sever the tooth's attachment to its socket. Atraumatic Extractions help preserve both bone and soft tissues that surrounded the tooth. This ensures a better esthetic and functional restoration. Although all precautions are taken to preserve and maintain teeth in the oral cavity, it is still mandatory to remove teeth for variety of reasons, which mainly includes deep caries, fractured tooth, malopposed tooth, and also for orthodontic corrections **[2]**.

An ideal tooth extraction may be defined as the painless removal of the whole tooth or tooth roots with minimal trauma to the investing tissues, so the wound heals uneventfully with no postoperative prosthetic problems **[3]**.

Improvements in local anaesthetics as well as its delivery armamentarium have resulted in painless extraction but the fear of post extraction pain deters many patients from undergoing tooth extraction **[4-9]** the ultimate goal of traditional extraction techniques is removal of the tooth from its socket. In certain circumstances, achieving this goal involves fracturing or surgical removal of surrounding bone. Traumatic damage to the dentoalveolar housing during extraction can result in significant ridge deformities upon healing. In addition to compromising esthetics, such deformities may preclude dental implant placement or result in sub-pontic food trapment beneath traditional fixed partial dentures **[10, 11]** and also affect the orthodontic treatment in cases of therapeutic extractions.

In the current trend the atraumatic way of extracting tooth has a lot of hype, due to its ability in preserving the surrounding alveolar process and also causing less damage to the surrounding soft tissue, ‘‘Atraumatic’’ dental extraction techniques have gained prominence and may ultimately become the standard technique for teeth removal. Atraumatic extraction preserves bone, gingival architecture, and allows for the option of future or immediate dental implant placement **[12-14]**.

In this study the emphasis is given on therapeutic extractions, as extraction of maxillary and mandibular premolars is routinely advocated for orthodontic treatment. In such cases it is very important for the maxillofacial surgeon to follow atraumatic extraction technique and preserve integrity of buccal and palatal/lingual cortical plates. For extraction of maxillary premolars with forceps more of buccal movement is made as compared to palatal, and fracture of buccal root is more likely due to its thinness. Poor extraction technique while retrieving this root can result in fracture of buccal cortical plate and fragmentation of bone around the socket and may lead to undesirable conditions for further orthodontic treatment. The aim of the current study is to assess the soft tissue trauma clinically and to note the fracture rate of upper 1st premolar by comparing the conventional premolar forceps and the atraumatic premolar forceps in therapeutic extractions.

Study design:

Patients and methods:

The present randomized split-mouth comparative clinical study was designed to compare the clinical outcomes of two treatment modalities for therapeutic extractions. The study was conducted in line with the principles of the Helsinki Declaration; all participants were provided informed consent. All surgical procedures were performed by the same oral and maxillofacial surgeon, and all post-treatment follow-up examinations were performed by the same independent examiner unrelated to the present study.

Study population and clinical parameters:

The study population included 30 adult patients (16 women and 14 men) who had presented with a chief complaint of extraction of upper and lower 1st premolars for orthodontic treatment purposes at the Department of Oral and Maxillofacial Surgery (Saveetha Dental College Chennai) during an 02month period from august 2017 to September 2017.

MATERIALS AND METHODS

Patients were selected who had come for extraction of upper and lower 1st premolars for orthodontic treatment purposes, the study was conducted over a period of 2

months and in every patient both the forceps were used for extraction of upper and lower premolars. As the study is a split mouth comparative study for the entire sample size the same operator extracted the teeth. And in every patient two different types of forceps were used for extraction. Tooth extractions were carried out aseptically under local anesthesia (2 % lignocaine with 1:2,00,000 adrenaline) 1st and 4th quadrant received the conventional premolar forceps for extraction and 2nd and 3rd quadrant received the atraumatic premolar forceps for extraction and post extraction instructions were given to each patient.

Tab. Zerodol-SP (aceclofenac-100mg+serratiopeptidase-15mg+paracetamol-325mg) was given immediately after completion of extraction and 1 Tab SOS later as analgesic **[15-16]**. No other postoperative medication was prescribed. They were followed-up for a minimum period of 1 week for evaluation of wound healing. During the operative phase, pain was assessed using visual analogue scale, for each patient that is listed in the table below, soft tissue trauma was noted clinically and fracture of upper first premolar was noted clinically, and gingival lacerations were graded.

VAS score was evaluated for 30 patients and were divided into two groups namely

Group (1) comprising of upper premolars and

Group (2) comprising of lower premolars

All the patients in the study were blinded to avoid bias.

Inclusion criteria: for both conventional premolar forceps and atraumatic premolar forceps

1) Patients with teeth having 3 mm or more of intact tooth structure above the gingival margin with at least the minimum of 2 intact surfaces.
2) Patients undergoing orthodontic treatment
3) Patients whose only 1st upper and lower premolars are indicated for extraction.

Exclusion criteria: for both conventional premolar forceps and atraumatic premolar forceps

1) Patients with teeth having abnormal root morphology (as dilacerated, severely curved, bulbous roots, etc.) as depicted by preoperative periapical X-ray examination.
2) Patients with uncontrolled systemic disease, that compromise dental extraction.
3) Patients with root canal treated upper and lower 1st premolar
4) Patients undergoing 2nd premolar extraction for orthodontic treatment.

Sample size calculation:

A sample size of 30 is required to test the hypothesis with 95% confidence interval

and 80% power to reject the null hypothesis.

Statistical analysis was done using SPSS, version 12 and the significant level was set at p value of <0.05.

t tests - Correlation: Point biserial model

Analysis: A priori: Compute required sample size

Input: Tail(s) = One

Effect size |ρ| = 0.525

α err prob = 0.05

Power (1-β err prob) = 0.95

Output: Noncentrality parameter δ = 3.3786111

Critical t = 1.7011309

Df = 28

Total sample size = 30

Actual power = 0.9505731

RESULTS

A total of 30 patients participated in this study, with an overall 100% participation. The age distribution was in between 11-27years, with 16 female participants and 14 male participants, and participants were divided into two study groups.

Each study group was evaluated for soft tissue trauma, gingival lacerations, fracture of upper 1st premolar root, and pain score.

For each patient fracture rate of upper 1st premolar was noted and was tabulated in a bar diagram, and the soft tissue laceration and the position of the beak while holding the premolar circumferentially while using an atraumatic forceps is shown in the clinical pictures. And also VAS score for each patient was noted in both the study groups:

Interpretation: the graph clearly states that the group that received extraction using conventional premolar forceps had fracture of the buccal root of upper 1st premolar compared to those who got the tooth extracted using atraumatic premolar forceps, and likewise the fracture rate was minimal in lower premolars in both the groups. And in some patients there was fracture of buccal root where atraumatic premolar forceps were used.

Figure 1: upper atraumatic premolar forceps

Figure 2: lower atraumatic premolar forceps

Figure 3: position of the beak

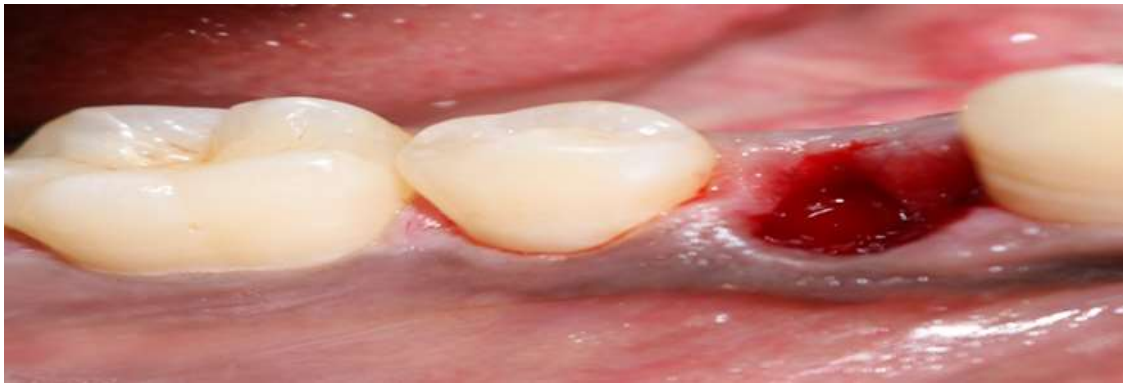

Figure 4: absence of soft tissue laceration

Figure 5: absence of upper root fracture

DISCUSSION

Tooth extraction is an art, and extracting tooth in an atraumatic fashion is and in-Toto is of prime importance when it comes to therapeutic extractions, there is a lot of hype these days in regards to achieving atraumatic extractions. This hype is largely related to the desire to preserve bone for

dental implants. The procedure of placing dental implants is to replace damaged or missing teeth (i.e., bad teeth) with artificial teeth that function and appear like a real tooth. Dental implants offer an alternative to dentures or bridgework that may not always fit as well in the patient's mouth. Dental implants are surgically placed in your jawbone and serve as the roots of missing bad teeth.

Over the last decade or so there has been a great interest in atraumatic extractions, which is attributable largely to the desire for dentists wanting to do immediate dental implant placement. Atraumatic extractions are desired more and more to preserve bone for immediate implant placement. In general, the benefit of dental implants is solid support for the patient's new teeth, which requires the bone around the dental implant to heal. Depending on how the tooth extraction is performed, the healing time required can vary greatly, hence the desire to perform an atraumatic extraction.

Atraumatic forceps are the most innovative oral surgical instruments in recent years, that has not only eased the operator but had tremendously reduced the fear of extractions among patients, and in cases such as orthodontic extractions were preservation and minimal trauma is mandatory, atraumatic forceps plays a vital role in such scenarios. This study had aimed to compare the soft tissue trauma and the fracture rate of the upper first premolar by comparing conventional premolar forceps and atraumatic premolar forceps. Upper premolars shows a lots of variations in its morphology and is one of the tooth which has bifurcated roots and generally the buccal root of the upper 1st premolar tends to fracture because during extraction more of buccal traction is given and buccal root being comparatively thinner there are maximum chances for it to break. Atraumatic extraction Forceps have advanced beak designs which refine your atraumatic extraction technique and promote aesthetic success atraumatic Extraction Forceps have holes in the handles and unique beak designs to aid in the performance of an atraumatic extraction.

Atraumatic Extraction Forceps have diamond grit handles and beveled beak designs that enable the forceps to engage the crown and root while performing an extraction. The serrations on the beak provides an extra grip while engaging the tooth during extraction

The main advantage of atraumatic forceps over conventional forceps is related to their unique design that can deliver a powerful mechanical advantage by employing an efficient first-class lever, the extraction technique differs from any other extraction technique in that the beaks have a slender projection which easily adapts

circumferentially around the crown of the premolar and thus creating a more efficient class I lever system. The beaks of an atraumatic premolar forceps are designed in such a way that they adapt into the cemento-enamel junction of the crown of the tooth and hold the tooth in a circumferential fashion; this prevents the fracture of the buccal root of the upper premolar and thus extracting the tooth in-Toto. By combining the biomechanical advantages of a first class lever with the biochemical reaction, extraction of the teeth became easier with atraumatic premolar forceps than conventional type with less incidence of crown and root fracture. When the periodontal ligament was traumatized with forceps, hyaluronidase was released. Once this chemical breakdown of the periodontal ligament by hyaluronic acid was sufficient, the tooth was released from its attachment to the alveolus and could be removed easily. Traditional forceps grasp, squeeze, twist, and exert crushing forces on the crown leading to increase in the incidence of crown fracture in conventional forceps group. These results were concomitant with the study of Misch and Perez **[17]** who concluded that the handles of conventional forceps allow the operator to grasp the tooth but do not assist in the mechanical advantage to remove it. The atraumatic forceps applies a constant and steady pressure, as this forceps requires a minimal amount of strength and a maximum amount of patience, that helping to decrease the incidence of buccal bone fracture; finally, can atraumatic forceps replace conventional forceps in routine dental extraction? It is suggested from this study that the atraumatic forceps and its associated slender beak design with serrations which engages the tooth circumferentially is clinically valuable in atraumatic tooth removal and in preserving the buccal bone plate, which is mainly critical for orthodontic extractions and also for implant placement **[18-20]**.

CONCLUSION

The present study concluded that the use of atraumatic premolar forceps have shown better results compared to that of conventional premolar forceps in therapeutic extractions, there was minimal to no gingival and soft tissue damage, and there were only few cases with fracture of buccal root of upper 1st premolar with application of a traumatic premolar forceps. Additional larger scale trials should be conducted to confirm the benefits.

There was significant difference in pain control of the two treatment groups with a p value of 0.007654. Statistically analysis showed that there were significant difference between control and treatment groups with ($p<0.05$). Therefore have “an atraumatic forceps to ease extractions and smile”.

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