



EVALUATION OF EFFICACY OF PERIOTOME IN ORTHODONTIC EXTRACTIONS: A SPLIT MOUTH CLINICAL STUDY

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ABSTRACT

Background and Objectives: The present study was designed to evaluate the efficacy of periotome in orthodontic extractions.

Materials & Methods: Twenty five patients who required bilateral premolars extractions for orthodontic purpose were included in this study. The subjects were randomized into 2 methods of extractions. In first method, extraction done using periotome and conventional forceps and in second method, extractions done using periosteal elevator and conventional forceps. All the parameters like pain was assessed using visual analogue scale (VAS) in 1st, 3rd, 7th day postoperatively , gingival laceration , duration of surgery , success rate of extraction , other complication (if present) were also noted.

Results: The data for each method was collected, tabulated, coded & fed in SPSS (IBM version 23) for statistical analysis. Descriptive statistics included mean & standard deviation. Interferential statistics included one was ANOVA test followed by post hoc Tuckeys test. The level of significance was set at 0.05 at 95% confidence interval. On comparison, all parameters were statistically significant in method I (extraction using periotome) from method II (extraction using conventional forceps) (p<0.05).

According to the results of the present study, the extraction using Periotome showed significant difference in all the parameters when compared to extraction using the conventional forceps.

Conclusion: From the study it can be concluded that periotome maintains the integrity of gingival and surrounding periodontium. So extractions using periotomes are less invasive over conventional forceps and it can be considered as reliable method of extraction requiring comparative less intra operative time. Periotome found to be helpful in leaving the shape of extracted socket undisturbed & alveolus intact which favoured for further implant placement.

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INTRODUCTION

The objective of the clinical split mouth study was to determine the evaluation of efficacy of periotome in orthodontic extractions.

A clinical split mouth study included 25 patients requiring bilateral premolars extractions were performed. The subjects were randomized into 2 methods of extractions , in 1st method subject underwent extractions using periotome & conventional extraction forceps and in the 2nd method subject underwent extractions using periosteal elevator & conventional forceps.

All the parameters like pain was assessed using visual analogue scale (VAS) in 1st, 3rd, 7th day postoperatively, gingival laceration, duration of surgery, success rate of extraction, other complications (if present) were also noted.

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The data for each method was collected, tabulated, coded & fed in SPSS (IBM version 23) for statistical analysis. Descriptive statistics included mean & standard deviation. Interferential statistics included one way ANOVA test followed by Post hoc Turkeys test. The level of significance was set at 0.05 at 95% confidence interval. On comparison, all parameters were statistically significant in method I (extraction using periotome) from method II (extraction using mucoperiosteal elevator and conventional forceps) (p < 0.05).

According to the results of the present study, the extraction using periotome showed significant difference in all the parameters when compared to extraction using conventional forceps.

List of Abbreviations Used

AET	Atraumatic extraction techniques
VAS	Visual analogue scale
PDL	Periodontal ligament
mm	Millimeter
Min	Minute
SPSS	Statistical Package for the Social Science

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DISCUSSION

Traditional extraction methods involve stripping of periodontium around the tooth followed by luxation with an elevator and conventional extraction forceps. Abulkasim (1050 to 1122AD), the first person to apply an elevator using one lever mechanism, who used the elevator at the base of the teeth to remove them from the socket. Dental elevators and periotome also act on wedge principle, by applying a relatively smaller force it can overcome a larger resistance.^{1,2}

In traditional extraction method includes elevators, surgical hand piece, chisel and mallet along with the conventional forceps. Chisel and mallet and surgical handpiece was used to remove the bone in order to get surgical exposure of impacted teeth and to section their roots to facilitate their removal. Severely decayed, ankylosed, multirrooted teeth were also removed using the same technique. Other than this advance the instrument and techniques used in the removal of teeth have remained essentially unchanged for the last century.²

However , traditional extraction methods have a history of not only producing postoperative pain but also damaging the hard and soft tissue surrounding the tooth. It leads to difficulty in maintaining the socket integrity due to hard and soft tissue

damage and thus making future prosthetic replacement difficult.⁷

Analyzing the post operative complication associated with exodontias, due to conventional methods , Adeyemo et. al have mentioned about presence of alveolitis in 11% sockets and mild pain in 12% cases. In an another study by Adeyemo et. al they discussed about the various pre operative complications such as accidental crown ,root or alveolar bone fractures which often lead to healing complications and even increased time of extraction due to such complications healing to disturbance in healing.⁸ Bortoluzzi et. al in their study observed an incidence of 0.6 (2 cases each) for both alveolar infection and dry socket.⁹

Venkateshwar et.al found tooth fracture of cortical plates and dry socket to be the most common complication while wound dehiscence and postoperative pain were the rare complications and fracture of maxillary tuberosity and displacement to the adjacent spaces among the rarest complications encountered during tooth extraction.¹⁰ Baniwal S conducted on study over 8,455 tooth extractions in 6,639 patients and observed the 90 complications (1.06%) were observed.53(58.89%) complications were intraoperative and 37(41.12%) complications were postoperative .¹¹

Even the oral health – related quality of life following nonsurgical routine tooth extraction deteriorates with conventional method of extraction described by Adeyemo.¹²

To avoid all the above mentioned complications related to traditional extractions techniques ,this paradigm shift gave birth to “Atraumatic extraction technique” (AETs) which intend the removal of tooth or tooth root , while maintaining a harmonious relation with gingival , bone and other surrounding hard and soft tissue structure. The rationale behind such techniques is to make the socket heal faster with minimum bone loss, so as to make it available immediately for prosthetic rehabilitation. The ultimate goal achieved is better functional and esthetic outcome in a very short duration of time.² This newer technique include Benex vertical extractor, powered periotome, piezosurgery, sonosurgery, physics forceps, ogram system, Easy X-Trac system help in achieving this noble goal.^{3,13}

As comparing the atraumatic extraction with the traditional extraction method, the advantages supersede the disadvantages. The concise comparison between the methods

Traditional extraction method	Atraumatic extraction method
Expansion of socket	No expansion
No prior sectioning	Sectioning required
No vertical traction	Vertical traction +ve
No palatal /lingual instrumentation	Palatal /lingual instrumentation +ve
Compression of socket	No compression of socket
Reflection of flap	Flapless

In our study, we have used periotome as a means of atraumatic extraction. Periotome, it helped in removing the firm tooth and retained roots without damaging the surrounding thin alveolar plates of bone and minimally lacerating the soft tissue as well. This may aids in providing a completely supportive environment for both immediate and delayed implant placement. Periotome, also helpful in atraumatic surgical extrusion described by Chandrasekharan et. al, in which periotome was used into the PDL space of teeth to luxate the tooth without inducing surgical trauma.¹⁴

Periotome is a specially designed instrument for atraumatic extraction & the technique has the advantages of minimizing the risk of dehydration of PDL and root never extruded out of the socket during the entire surgical procedure hence, the healing pattern is normal as the vitality of the periodontal ligament and cementoblastic ligament is maintained. Periotome surgical extrusion is more conservative in the maintenance of bone architecture when compared with osseous resection, so it can be used successfully to treat a severely damaged tooth, especially in the anterior esthetic zone.¹⁵

Powertome (West Port Medical Inc, Salem, Oregon, USA) automated periotome is an effective device for expedient atraumatic extraction with preservation of adjacent bone and gingival architecture.¹⁶

Periotomes are the instruments that employ, the mechanism of “wedging” and “severing” to facilitate tooth removal. Periotomes are composed of very thin metallic blade that are gently wedged down the periodontal ligament (PDL) space in a respective circumferential fashion. In addition to minimally invasive luxation, the periotome blade severs Sharpey’s fibers that secure the tooth within the socket. Once a majority of Sharpey’s fibers has been separated from the root surface, rotational movements allow for extraction of tooth with minimal pressure. This reduces potential trauma to adjacent bone & associated gingival structure.¹⁷

In our present study, we have used periotome as a mean of atraumatic extraction. We have used HUFRIDY periotome (P1, P2, P6). The present study was conducted to assess and compare the extraction using periotome with conventional method of extraction. In I method where periotome was used, duration of surgery, postoperative pain evaluation, gingival laceration grade, success rate of extraction and other complications was compared with the extractions with conventional method.⁷

Postoperative pain in extraction done by periotome and conventional method using visual analogue scale was also measured in the present study. Results suggested that there was statically significant difference in VAS score in both the group is ($p < 0.001$). As the periotome helps to sever the periodontal ligament which helps the removal of tooth with causing minimal pain. However we noticed lesser score (VAS score) found with the group using periotome and higher score in the group using conventional method. The results suggested that lesser postoperative pain found in extraction using periotome as comparative of extraction using conventional method.

In the present study there is significant difference of mean changes in pre extraction and post extraction gingival laceration grade was found using periotome and conventional method which suggested that using periotome was comparatively less traumatic to the gingival tissue when compare to the conventional method.

In this study we found complete absence of gingival laceration on marginal gingiva in method I and in method II it was 4% with the significance of ($p < 0.05$). So it was concluded that periotome can perform extraction less traumatically than conventional method.

Complications associated with tooth extractions can range from simple ones like root and crown fracture to uncommon serious ones like displacement of root fragments in maxillary sinus. In the present study the success rate of extraction using

periotome is 100% where we found root fracture 8% (2 cases) using conventional method. In the present study we found mild swelling on 1st postoperative day in 8% (2 cases) in extraction using conventional method. However we found absolutely no complication associated with extraction using periotome.

Encouraging results found in the present study with periotome in preservation of tooth surrounding structure following extractions opens a new direction in atraumatic extraction techniques. From the present study we noticed that periotome maintains the integrity of gingival and surrounding periodontium. So extractions using periotome are less invasive over conventional forceps and can be considered as reliable method for extraction requiring comparatively less intraoperative time.

Limitation of the study are limited sample size and inclusion of only premolar teeth. Further prospective clinical studies are required to check the efficacy of periotome in molar teeth and grossly destructed teeth.

CONCLUSION

From the study it can be concluded that Periotome maintains the integrity of gingival and surrounding periodontium. So extractions using periotomes are less invasive over conventional method and it can be considered as reliable method for extraction requiring comparative less intra operative time. Periotome seemed to be helpful in maintaining the soft & hard tissue architecture without damaging the osseous housing. Periotome found to be helpful in leaving the shape of extracted socket undisturbed & alveolus intact which favored for further implant placement.

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