Comparing the Efficiency of Two Different Extraction Techniques in Removal of Maxillary Third Molars: A Randomized Controlled Trial

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Abstract

Introduction Extractions are routine procedures in dental surgery. Traditional extraction techniques use a combination of severing the periodontal attachment, luxation with an elevator, and removal with forceps. A new technique of extraction of maxillary third molar is introduced in this study—Joedds technique, which is compared with the conventional technique.

Methods and Material One hundred people were included in the study, the people were divided into two groups by means of simple random sampling. In one group conventional technique of maxillary third molar extraction was used and on second Joedds technique was used. Statistical analysis was carried out with student's *t* test.

Results Analysis of 100 patients based on parameters showed that the novel joedds technique had minimal trauma to surrounding tissues, less tuberosity and root fractures and the time taken for extraction was <2 min while compared to other group of patients.

Conclusion This novel technique has proved to be better than conventional third molar extraction technique, with minimal complications. If Proper selection of cases and right technique are used.

Keywords Extraction · Maxillary third molar · Joedds technique

Introduction

Extractions are routine procedures in dental surgery. Traditional extraction techniques use a combination of severing the periodontal attachment, luxation with an elevator, and removal with forceps. If the elevator fails to cause noticeable separation of the tooth from the socket, the forceps accomplish the work through intermittent apical and lateral forces [1, 2].

The development of many surgical techniques and newer designs of instruments have enabled the practitioners to carry out extractions with lesser complications. But even now extraction of third molars can be an unpleasant procedure for patients and dentists, due to the wide anatomic variance of the teeth and poor access and visibility, than for other groups of teeth.

As root fusion is common in these cases, the extraction of the upper third molars can be less difficult than the extraction of the other molars of the human dentition. On the other hand, the often-cited complication of maxillary tuberosity fracture and the connected discussion about the optimum instrumentation for extracting an upper third molar—forceps or lever—indicate that the extraction of the upper third molars is fraught with a range of difficulties [3, 4].

The conventional method of extracting erupted maxillary 3rd molars is by using universal #210s forceps, or using an elevator alone. This method involves wedge, lever or wheel and axle principles of the elevators and the forces in different directions exerted by the forceps, such as the apical, buccal, palatal and the coronal forces [1].

Here we describe a technique in which the #217 lower cowhorn forceps is used for luxation of maxillary third molar. The beaks of the #217 lower cowhorn act as wedges down the periodontal ligament, tears the fibres and thereby

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luxates the tooth out of the socket. This is the first form of study carried in this direction.

Aim and objective of this study was to prove the effectiveness of Joedds technique compared to conventional technique in upper third molar extractions.

Methodology

Pretested interview schedule was used in this clinical based experimental study.

Sample Size and Sampling Technique

A simple random sample of 50 each was selected from each group of experimental and control groups.

Sample size calculation

$$n = [4s^2(Z_{cv} + Z_{power})^2]/D^2$$

n, sample size; s, standard deviation; Z_{cv} , critical value for α ; Z_{power} , Z value for 1-beta; D, the expected difference between the two means; α value, 0.05.

Substituting values in the equation

$$n = 31.4 \sim 50$$

Data Collection

Patients who reported to Azeezia College of Dental Sciences and Research for the extraction of upper third molar in a time period of 6 months from July 2014 to January 2015 was taken for the study. Patients in the age groups of 18–50 years only were included. Normal healthy patients with type 2–3 bone density (Lekholm and Zarb [6] classification based on RVG) and without any severe systemic disease were included in this study. Exclusion criteria included persons aged less than 18 years and more than 50 years, patients with severe systemic disease, isolated third molars and grossly decayed third molars. Patients were divided equally according to gender. According to pretested interview schedule, data were taken as odd and even numbers. Data with odd numbers underwent conventional technique and with even numbers underwent Joedds technique. All extractions were performed by a single surgeon. One person was assigned to collect data. Main variables taken were time taken for extraction, trauma to surrounding soft tissues, root fracture and tuberosity fracture.

Procedure

Data was collected according to these variables.

Armamentarium

Lower cowhorn forceps (#217), conventionally used for the removal of carious molars with extensive destruction of crown with an intact furcation, designed to function using wedging action below the bone crest into the furcation.

Technique

This technique involves slight deviation from the conventional method. The mucoperiosteum strip was the same as that of the conventional technique. The lower cowhorn forceps (Fig. 1) (which should be held in palm down grasp) was held in palm up grasp (Fig. 2). The wedge principle works when the sharp ends of the beak engages in the interproximal area between the 2nd and 3rd molars (Fig. 3). With the thumb of the opposite hand, the 2nd molar was supported on the occlusal aspect of it (prevent accidental occlusal displacement), the handle of the forceps was then compressed very gently wedging the interdental area and the force is held for a few seconds and the tooth is pushed occlusally and distally thus facilitating easy removal of the tooth with the upper third molar forceps (Fig. 4). For extraction of a right maxillary third molar the operator adopted a 10 O' clock position and for extraction of left maxillary third molar an 8 O' clock position was preferred (Figs. 5, 6).

Statistical Analysis

Data was reported as mild, moderate, and severe according to the variables as described in Table 1. Analysis was done by student's t test.

Results

All patients underwent extraction of upper third molar under strict aseptic precautions. Out of 100 patients two patients from the experimental group and four patients

Fig. 1 Mandibular cow horn forceps

Fig. 2 Mandibular cow horn forceps held in palm up grasp

Fig. 3 Beak of mandibular cowhorn forceps wedging the interdental space

Fig. 5 Immediate post-operative picture of the extraction site

from the control group who failed to come for follow-up review were excluded from the study. After extraction, 50 patients who underwent Joedds technique had minimal trauma to surrounding tissue and the time taken for them was <2 min while compared to the other group of patients. Two patients in the experimental group had fracture of roots and three patients had tuberosity fracture which was managed with minimal complications; in the control group five patients had root fracture and eight patients had tuberosity fracture (Table 2).

Discussion

During the extraction of a tooth, the dento alveolar bone surrounding the socket expands and the periodontal ligament is severed. While these physical changes undoubtedly

Fig. 4 Removal of maxillary third molar with conventional third molar forceps

Fig. 6 **a** Post operative picture on the fifth day, showing minimal trauma to the interdental papillae and the soft tissue around the extraction socket with excellent healing. **b** 3 months post extraction

RVG showed good bone healing at the extraction site along with maintaining the architecture of tuberosity

Table 1 Working definition for data collection

Groups	Time (min)	Trauma	Root fracture	Tuberosity fracture
Mild	<2	Nil	Nil	Nil
Moderate	>5	Present	Present	Present
Severe	>30	Present	Present	Present

Table 2 Measured parameters and mean values for experimental and control groups

Parameters	Experimental group		Control group	
Time taken for extraction	1 min 32 s $\pm$ 30 s		3 min 55 s $\pm$ 46 s	
Trauma to surrounding tissue	Mild		Moderate	
	Right side	Left side	Right side	Left side
Root fracture	2	0	2	3
Tuberosity fracture	1	2	3	5

occur, biochemical changes also occur that are arguably more important. When the periodontal ligament is traumatized with forceps or elevators, hyaluronidase is released.

This enzyme catalyzes the hydrolysis of hyaluronic acid, which comprises a substantial portion of the extracellular matrix of all human tissue, including the periodontal ligament. Once the chemical breakdown of the periodontal ligament by hyaluronidase is sufficient, the tooth is released from its attachment to the alveolus and can be easily removed.

The more hyaluronidase released per unit time, the more efficient the release of the tooth, and the less trauma there is to the alveolar bone. This explains why the Physics Forceps (Golden-Misch), with its steady, unrelenting pressure on the periodontal ligament, quantitatively creates

a greater release of hyaluronidase in a shorter period of time than traditional forceps or elevator extractions, because the trauma from those techniques is intermittent [5]. Complications of the conventional method involves the maxillary tuberosity fracture, luxation of the adjacent tooth when used as fulcrum, post-operative complications like alveolitis sicca, infection, radix in antro highmori etc. [1, 7–11]. Although elevators are very useful instruments for facilitating extraction of teeth, but their misuse or misjudgment may lead to some complications, part of it may be serious such as Injury to the soft tissues, like injury to the tongue, floor of the mouth, soft and hard palate, caused by slipping of elevator during its use [1].

Wrong application of force or excessive force may lead to fracture of jaw especially the lower jaw at the angle of the mandible, also excessive force may lead to crushing of

the alveolar bone and fragmentation [12–14]. In maxilla, fracture of maxillary tuberosity can occur especially in extraction of upper third molars [3, 4].

Uncontrolled force may lead to displacement of roots into maxillary sinus, infratemporal fossa, buccal soft tissue, submandibular space or inferior dental canal. Use of elevator in periapical area of abscessed tooth may cause spread of infection to the surrounding tissue. Tip of instrument (working blade) may be fractured and remain in the socket causing postoperative infection or delay healing, so always check the tip of instrument after use [1, 2, 12]. Several techniques were used over time for removal of tooth with minimal complications. Rubber band extractions were tried in haemophilic patients over decades. Regev et al. [15] tried orthodontic elastics for extraction of teeth in bisphosphonate treated patients and they were able to remove the tooth atraumatically. Hariharan et al. [16] did a split-mouth comparison of physical forceps and extraction forceps in orthodontic extraction of upper premolars and they concluded that the physical forceps group had lower visual analogue scores for pain in first post-operative day and there were no other significant differences between the two groups in operative complications, inflammatory complications and operating time. Karl Schumacher (Southampton, PA) has introduced a new surgical protocol using apical instrumentation that allows for the preservation of the hard and soft tissues by focusing on occlusal movement of the tooth during extraction. This technique allows for the removal of most broken-down teeth using a closed (non-flap) procedure [17]. Considering all the above factors, a new technique has been tried for the extraction of maxillary 3rd molars with mandibular cowhorn forceps.

Advantages of this technique include delivering lesser amount of force and hence easy extraction with minimal chances of tuberosity fracture, soft tissue tear and slippage of the tooth provided if all standard protocols are followed.

Disadvantages include rare chances of occlusal displacement of the adjacent 2nd molar, when it is not adequately supported and if the beaks are not in the interdental area, or if the force is not given correctly, it may lead to the fracture of the distal cusps or part of the 2nd molar—which were not encountered in this study. All the maxillary tuberosity fractures encountered in the present study were mild. More number of tuberosity fractures and root fractures were reported in the current study because even <3 mm of alveolar bone fractured or removed along with the maxillary third molar roots were included in the category of tuberosity fractures and tooth with all root forms even if it was a severely dilacerated root were extracted in this study.

Conclusion

To summarize, this novel technique involving the extraction of maxillary 3rd molars using #217 lower cowhorn forceps may effectively reduce the complications of the conventional extraction of maxillary 3rd molars. Since this technique ensures minimum trauma and acceptable ease, we advocate and encourage the use of #217 lower cowhorn forceps for extraction of maxillary 3rd molars. This technique has some limitations—it cannot be adapted in isolated third molar extractions and in grossly decayed second or third molars with proximal caries.

Compliance with Ethical Standards

Conflict of interest None.

References

- Peterson LJ, Ellis E, Hupp JR, Tucker MR (1988) Contemporary oral and maxillofacial surgery. CV Mosby, St Louis, pp 265–283
- Waite DE (1987) Textbook of practical oral and maxillofacial surgery. Lea & Febiger, Philadelphia, pp 120–134
- Thirumurugan K, Munzanoor RRB, Prasad Sankar K (2013) Maxillary tuberosity fracture and subconjunctival haemorrhage following extraction of maxillary third molar. J Nat Sci Biol Med 4(1):242–245
- Susarla SM, Blaeser B, Magalnick D (2003) Third molar surgery and associated complications. Oral Maxillofac Surg Clin N Am 15:177–186
- Santhoshkumar MP (2015) Newer methods of extraction of tooth. Int J Pharm Bio Sci 6(3):679–685
- Lekholm U, Zarb GA, Albrektsson T (1985) Patient selection and preparation. Tissue integrated prostheses. Quintessence Publishing Co. Inc., Chicago, pp 199–209
- Oluseye SB (1993) Exodontia: A retrospective study of the reasons, methods and complications of tooth extraction in oral and maxillofacial surgery clinic, Lagos University Teaching Hospital. NPMC dissertation. National postgraduate medical college of Nigeria
- Heasman PA, Jacobs DJ (1984) A clinical investigation into the incidence of dry alveolus. Br J Oral Maxillofac Surg 22:115–122
- Wagaiyu EG, Kaimenyi JT (1989) Frequency of alveolar osteitis (dry alveolus) at Kenyatta National Hospital Dental outpatient Clinic—a retrospective study. East Afr Med J 66:658–662
- Simon E, Matee M (2001) Post-extraction complications seen at a referral dental clinic in Dar es Salaam, Tanzania. Int Dent J 51:273–276
- Belinfante LS, Marlow CD, Meyers W et al (1973) Incidence of dry socket: complications in third molar removal. J Oral Surg 3(1):106–109
- Van Cool AV, Tendosch JJ (1977) Clinical consequences of complaints and complications after removal of mandibular third molars. Int J Oral Surg 6:29–37
- Bouloux GF, Steed MB, Perciaccante VJ (2007) Complications of third molar surgery. Oral Maxillofac Surg Clin North Am 19:117–128
- Bui CH, Seldin EB, Dodson TB (2003) Types, frequencies, and risk factors for complications after third molar extraction. J Oral Maxillofac Surg 61:1379–1389

15. Regev E, Lustmann J, Nashef R (2008) Atraumatic teeth extraction in bisphosphonate-treated patients. *J Oral Maxillofac Surg* 66:1157–1161
16. Hariharan S, Narayanan V, Soh CL (2014) Split-mouth comparison of physics forceps and extraction forceps in orthodontic extraction of upper premolars. *Br J Oral Maxillofac Surg* 52(10):137–140
17. Hoexter DL (2007) Preservation of surrounding tissue with new instrumentation. *J Inside Dent* 3(4). <https://www.dentalaegis.com/id/2007/04/preservation-of-surrounding-tissue-with-new-instrumentation>. Accessed 16 Apr 2016