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Comparative evaluation of surgical outcome after removal of impacted mandibular third molars using a Piezotome or a conventional handpiece: a prospective study

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Abstract

Our aim was to compare the use of a conventional rotary handpiece and a Piezosurgical unit for extraction of lower third molars. We studied 40 patients, who were allocated alternately to have the third molar removed with either the handpiece or the Piezosurgical unit. Pain, trismus, and oedema were evaluated at baseline and then postoperatively, together with paraesthesiae, on postoperative days 1, 3, 5, 7, and 15. Damage to surrounding tissue was checked on the same day whereas dry socket was evaluated from postoperative day 3 onwards. More patients complained of pain in the conventional group, they also required more analgesics, and they developed trismus more often than in the Piezosurgery group. There was also significantly more postoperative swelling in the conventional group. Patients were also evaluated using the subjective Postoperative Symptom Severity (PoSSe) scale. Our results suggest that apart from some inherent limitations with the Piezotome, it is a valuable alternative for extraction of third molars.

Keywords: Piezosurgery; Piezotome; Third molar surgery; PoSSe scale

Introduction

Removal of impacted teeth is one of the most common operations in the oral cavity.[1] The extraction may range from relatively easy to extremely difficult depending on its location, depth, angulations, and the density of the bone.[2] Regardless of the degree of difficulty, success depends primarily on correct preoperative planning, and on the careful execution that comes with extensive training and experience.[3–5]

One of the most critical steps in disimpaction is cutting the bone or osteotomy, for which many techniques are used, and if they are used injudiciously they can be dangerous.[6] However, rotary cutting instruments are potentially injurious because they produce excessively high temperatures during cutting of the bone, which can produce marginal osteonecrosis and impair regeneration and healing.[7] Recently, after painstaking research and the application of advanced principles of physics, newer instruments have been introduced to reduce the difficulty and morbidity in third molar surgery. One such innovation is Piezosurgery or the application of piezoelectric, ultrasonic vibrations to make precise and safe osteotomies.[8]

The purpose of this study was to compare the outcome of extraction of impacted mandibular third molars using a conventional handpiece and a Piezotome (Satelec).

The null hypothesis was that there is no difference in the outcome of extraction of mandibular third molars using the conventional handpiece and the Piezotome.

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Fig. 1. Osteotomy cuts made with the bone surgical kit.

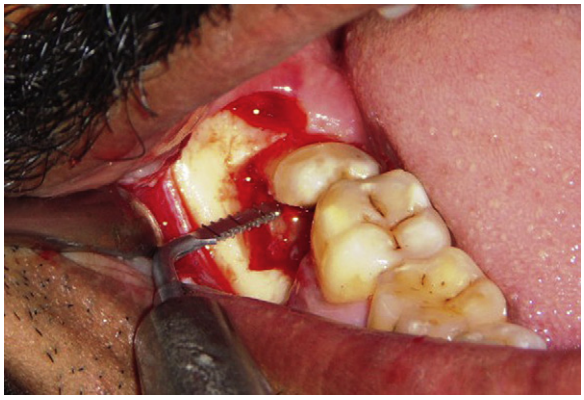

Fig. 2. Sectioning a tooth with a Piezotome Ninja tip.

Patients and methods

Forty consecutive patients who required removal of impacted lower third molars were recruited from the outpatient department of Oral & Maxillofacial Surgery, Santosh Dental College, Delhi-NCR. In 20 alternately chosen cases we used the conventional rotary handpiece, and in the remaining 20 we used a Piezosurgery unit. There were 8 women and 12 men in each group. Patients with a history of uncontrolled diabetes, blood dyscrasias, alcoholism, drug abuse, and heavy smoking were excluded, as were patients who had acute infections such as pericoronitis, acute alveolar abscess or oral submucous fibrosis at the time of operation. All patients were told about the procedure, the postoperative recovery time, possible complications, and were required to sign a detailed consent form. After we had taken a detailed medical and dental history, orthopantomogram (OPG) and intraoral periapical radiographs of the site were taken, and treatment started.

Surgical technique

All patients were given a prophylactic dose of amoxicillin with clavulanic acid 625 mg 1 h before operation. All operations were done by the same surgeon and assistant under local anaesthesia consisting of 2% lignocaine hydrochloride with 1:80,000 adrenaline bitartrate. In both groups the site was prepared with 5% povidone–iodine solution, and a conventional Ward's incision was made to reflect the flap. In the conventional group a mucoperiosteal flap was raised with a periosteal (Molt's No. 9) elevator to expose the impacted tooth and surrounding bone. A No. 6 carbide round bur in a straight handpiece was used at 35,000 rpm for trephination and guttering at the buccal or distal aspect of the tooth, or both. A straight fissure bur was used to section the tooth when needed. At all times cutting of bone and tooth was accompanied by copious irrigation with chilled saline solution. In the Piezosurgery group, the Piezotome was used to reflect the mucoperiosteal flap using a sinus lift 5 tip. For cutting bone, the bone surgical kit (Fig. 1) was used, and for tooth sectioning a Ninja tip was used (Fig. 2). The vibration frequency was maintained between 28 and 36 kHz and the microvibration amplitude between 30 and 60 μm/s. After the tooth had been removed, the extraction socket was debrided and closed with 4/0 silk sutures. The duration of operation was noted in each case. Postoperatively, patients were instructed to take amoxicillin with clavulanic acid 625 mg, 3 times daily for 3 days, and analgesics as necessary.

Evaluation

Pain, trismus, swelling, and thickness of the cheek were evaluated at baseline and then again postoperatively, together with neurosensory deficit/paraesthesiae, on postoperative days 1, 3, 5, 7, and 15. Damage to surrounding tissue was checked at the same time, and dry socket from the postoperative day 3 onwards. Both groups were evaluated by the same team who were unaware as to which surgical tool had been used for each individual case to avoid investigator bias.

Postoperative pain was assessed with a visual analogue scale (VAS) of 10 units together with a graphic rating scale.[9] The number of analgesic tablets taken was also recorded. Trismus was evaluated by measuring the interincisal distance at maximum mouth opening (cm) with a ruler.[10]

Swelling was measured (cm) using a tape measure from the tragus to the corner of the mouth and from the tragus to the pogonion.[11,12] Thickness of the cheek (swelling) was also measured using digital calipers from the lingual aspect of the crown of the first mandibular molar to the tangent of the skin of the cheek.[13] The preoperative measurement was the baseline value. The difference between each postoperative evaluation and baseline indicated the swelling for that day. Patients were further evaluated for paraesthesiae using the cotton wool test. Postoperative alveolar osteitis was checked for and documented if present.

Apart from the relevant objective assessments, a comprehensive questionnaire was given to each patient on postoperative day 7. The questions are commonly used in the clinical assessment of patients who have had third molars extracted, and constitute the Postoperative Symptom Severity (PoSSe) scale. The questions pertain to seven subscales that include patient's ability to enjoy food, speak properly, perceive altered sensation, and their appearance, pain, sickness,