What's new for the clinician?

Summaries of and excerpts from recently published papers

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1. Does post-operative irrigation with drinking tap water reduce inflammatory complications following lower third molar removal?

Ghaeminia H, Hoppenreijs TJM, Xi T, *et al*. Clinical Oral Investigations. 2017;21:71-83.

Surgical removal of third molars is often accompanied by pain, swelling, trismus, and oral dysfunction which normally clears within two to three days. However, wound healing may be delayed due to alveolar osteitis (AO) or wound infection at surgical sites. These complications are accompanied by painful symptoms and exert a significant impact on the quality of life, resulting in loss of productivity and working days for the patient.[1]

The most common complication following mandibular third molar removal is AO, more commonly referred to as "Dry Socket." This is a painful debilitating condition that occurs as a complication of tooth extraction in the permanent dentition. There appears to be no consensus on the criteria used to determine the diagnosis of AO. Thus the wide range (1-30%) in the rate of incidence reported in published papers and reviews must be viewed with caution. Generally, though, the signs and symptoms usually occur 1-3 days after an extraction and include features such as postoperative pain (unrelieved by analgesics) in and around the extraction site, a partially or totally disintegrated blood clot within the alveolar socket, halitosis and/or necrotic debris. Various factors have been considered to be associated with an increased risk for developing AO, such as the female gender, smoking, inadequate oral hygiene, surgical trauma, and removal of teeth with pre-existing infection or pathology.[1]

To support the standard of oral hygiene in and around the tooth socket and to prevent inflammatory complications following surgical removal of lower third molars, some surgeons instruct the patient to irrigate the surgical site with drinking tap water using a syringe. Surprisingly, the efficacy of this simple non-invasive method has not yet been investigated. Ghaeminia and colleagues (2017)[1] reported on a multicentre clinical trial that sought to evaluate the effectiveness of postoperative irrigation of the surgical site with drinking tap water, using a Monoject® syringe, on postoperative complications following lower third molar removal. The secondary objective was to investigate the impact of wound infection and alveolar osteitis on quality of life measures and to identify risk factors associated with these complications.

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ACRONYMS

AO: alveolar osteitis
ITT: intention-to-treat
TR: treatment received

MATERIALS AND METHODS

This multicentre randomized controlled clinical trial was conducted at Nijmegen in the Netherlands. Patients who required third molar extraction were included in this trial. All mandibular third molars were removed under local anaesthesia without antibiotic prophylaxis or pre- and postoperative antiseptic rinses. Intra-operative variables, such as experience of the surgeon, duration of surgery, technique of third molar removal, number and shape of roots were recorded. All patients received a pain diary with a visual analogue scale (VAS) and a validated version in Dutch of Oral Health Related Quality of Life (OHIP-14) forms one day before until seven days after surgery. A review appointment was scheduled seven days after surgery.

Patients were randomly allocated to one of two groups:

- Monoject® syringe group. After surgery, a curved tip Monoject® syringe (12cm^3) was provided to the patient. In addition to the standard postoperative care instructions, the participants received instructions with regard to the use of Monoject® syringe (by bringing the tip at the distal side of the second molar in or above the tooth socket and irrigate four times a day with plain tap water). To avoid early removal of the blood clot, patients were instructed to start irrigating the wound 48 hours after surgery until the first postoperative visit seven days after surgery. Patients were asked to demonstrate how the Monoject® was used. If the patient failed to use the Monoject®, or if the Monoject® was not used according to the instructions (adequate irrigation by bringing the tip at the distal side of the second molar in or above the tooth socket), this was recorded.
- Standard post-operative care instructions, without the use of a Monoject® syringe. The standard postoperative instructions were: biting on a gauze for 30 min, no rinsing and spitting for the first 24 hours, and starting regular tooth brushing the day after surgery. Paracetamol (1000mg, 4 times a day) in combination with ibuprofen (600mg, 3 times a day) were prescribed postoperatively.

The primary outcome measures were the number of lower third molars with postoperative inflammatory complications, which included surgical wound infection and AO. The secondary outcomes consisted of quality of life measures, including pain

(VAS score), trismus (change in maximum interincisal distance), OHIP-14, number of emergency visits, and missed days of work or study. One blinded investigator per centre assessed the primary and secondary outcome measures.

Surgical wound infection was defined as the presence of a local abscess, onset of facial or cervical abscess/cellulitis, and other signs suggesting an infection (redness, swelling, purulent discharge, fever). The diagnosis of AO was based on the Blum criteria: postoperative pain in and around the extraction site, which increased in severity at any time between one and three days after the extraction, accompanied by a partially or totally disintegrated blood clot within the alveolar socket, with or without halitosis. A distinction was made in patients with more severe symptoms: irradiating pain, which was not adequately relieved by standard analgesics.

The number of post-operative visits and possible postoperative interventions such as wound irrigation, use of antibiotics, abscess incision, and drainage or exploration of the wound within two months were also recorded.

The primary and secondary outcome measures were analyzed with reference to the intention-to-treat (ITT) and treatment received (TR) data. In the TR group, the protocol violations (patients not attending for the postoperative visit one week after surgery and surgical sites not being irrigated according to the instructions) were excluded from analyses.

RESULTS

280 adult patients who together underwent extraction of 333 randomised third molars completed the trial. The majority of the third molars were impacted (68%), which most often necessitated surgical bone removal (76%).

In the Monoject® group, 67 of the 158 surgical sites (42.2%) were not irrigated by the patient according to the instructions and were therefore excluded from the analyses of the TR data.

None of the baseline characteristics differed significantly between the two intervention groups, the ITT and the TR.

The overall incidence of inflammatory post-operative complications following third molar removal was 15.6%. Analysis revealed that these complications developed in 18 cases in the Monoject® group (11.4%) compared with 34 (19.1%) in the control group, a significant difference (Fisher's exact test, two-tailed, $p = 0.04$). This was primarily the result of a significantly lower incidence of AO ($p < 0.005$) in the Monoject® group (5.5%) compared with the control group (15.7%). For the TR analyses, the incidence of inflammatory complications was 8.7% for the Monoject® group and 20.9% for the control group ($p < 0.01$).

Patients with AO and surgical wound infections following third molar removal had significantly higher pain scores ($p < 0.0001$) and worse quality of life scores ($p < 0.0001$) for the first seven post-operative days compared with patients without these complications. Patients presenting with AO and surgical wound infections resulted in a reduced mean mouth opening of 18.2mm compared with a mean reduction of 8.3mm in cases of normal healing one week after surgery. Patients proceeded with work or study after a mean period of 1.7 days in case of normal healing compared with a mean period of 3.3 days in the case of inflammatory complications ($p = 0.01$).

Multivariate regression analysis demonstrated that the female gender (OR 5.6, 95 % CI 2.2–14.4, $p < 0.001$), high amount of debris at surgical site ($p < 0.001$), age >26 years ($p = 0.04$), resident surgeons ($p < 0.02$), bone removal ($p=0.03$), and class III depth of impaction ($p = 0.04$) were significantly associated with inflammatory complications following mandibular third molar removal.

CONCLUSIONS

The authors concluded that postoperative inflammatory complications following removal of third molars had a significant impact on the quality of life of patients, resulting in an increased number of missed days of work and study. Female gender, increasing age, deeply impacted mandibular third molar, bone removal, less experienced surgeons, and debris remnants in and around the tooth socket were associated with an increased risk to develop these postoperative complications. The incidence of alveolar osteitis following surgical removal of mandibular third molars can be significantly reduced by postoperative irrigation with plain drinking tap water. Starting 48 hours after surgery, using a curved tip Monoject® syringe and rinsing four times a day over five days seems to be an effective protocol for this commonly performed surgical procedure.

IMPLICATIONS FOR PRACTICE

This trial provides evidence of a cheap and readily available method to reduce the risk of complications following third molar removal in the dental chair. However, special care should be provided on the postoperative instructions on how to use the syringe.

Reference

1. Ghaeminia H, Hoppenreijs TJM, Xi T, *et al.* Postoperative socket irrigation with drinking tap water reduces the risk of inflammatory complications following surgical removal of third molars: a multicenter randomized trial. Clinical Oral Investigations. 2017;21:71-83.

2. Post-operative endodontic pain of three different instrumentation techniques in asymptomatic necrotic mandibular molars with periapical lesions.

Shokraneh A, Ajami M, Farhadi N, Hosseini M, Rohani B. Clinical Oral Investigations 2017; 21:413-8.

Root canal preparation is regarded as one of the most important steps in endodontic treatment. Its main goals are to remove the infected and necrotic tissue out of root canals, to create smooth walls facilitating irrigation and obturation, to preserve the anatomy of apical foramina, and to conserve the sound root dentine for long term effect.[1] Many kinds of Nickel-Titanium (Ni-Ti) rotary files have been introduced to facilitate root canal preparation, such as ProTaper Universal (Dentsply/Maillefer) and Wave-One files (Dentsply/Maillefer). The application of these files has greatly improved cutting efficiency and safety compared with stainless steel files. Wave-One files works in a reciprocating mode and finishes root canal preparation with only one file in most cases. ProTaper Universal system is one of the conventional multi-file rotary systems, which prepares the root canals with six files: three

shaping files and three finishing files. A unique design element is varying tapers along the long axes of the instruments. The three shaping files have tapers that increase coronally, and the reverse pattern is seen in the three finishing files.

Post-operative pain is a common sensation after endodontic treatment. Shokraneh *et al* (2017) reported on a prospective, randomized, double-blind study that sought to compare postoperative pain in patients with asymptomatic mandibular molar teeth with necrotic pulps and periapical lesions, using three different instrumentation techniques: hand, multi-file rotary (ProTaper Universal), and the reciprocating single-file (Wave-One) system.

MATERIALS AND METHODS

This prospective randomized double-blind clinical trial was performed on the first or second mandibular molars of 96 patients aged of 20–45 years referred to a dental hospital in Iran. All the subjects were healthy and had not taken antibiotics or any medications alleviating or altering the pain sensation, such as narcotics, sedatives, and anti-anxiety or anti-depressant agents during the past week. Allergy to anaesthetics, pregnancy, breastfeeding, vital teeth, unrestorable teeth, and teeth associated with pain or swelling were other exclusion criteria. The clinical diagnosis of necrosis was confirmed by no response to an electric pulp test, and the diagnosis of periapical lesion was confirmed by a periapical radiograph. Informed consent was obtained from all the subjects after the nature of the procedure and the possible discomforts and risks were fully explained. A Heft-Parker visual analog scale (VAS) was explained to the patients, and they were instructed how to use it.

Using a block randomisation method, all the patients who agreed to participate in the study were divided into three groups of 32 patients each: Hand instrumentation group (G1), ProTaper Universal instrumentation group (G2), and Wave-One instrumentation group (G3). Allocation was done by a trained dental assistant who was blinded to the study procedures. All the root canal treatments were performed by an experienced endodontist.

Ten minutes after inferior alveolar nerve block administration with one cartridge of 2% lidocaine with 1:80,000 epinephrine, each patient was asked whether they had any signs of soft tissue anaesthesia. After adequate anaesthesia was confirmed, the tooth was isolated with a rubber dam, and endodontic treatment was undertaken. Root canal preparation was performed after electronic root canal measurement with a Root ZX (Morita Corporation). The working length (WL) of each root canal was set at 1mm shorter than “Apex” mark of the Root ZX, and this was confirmed with a periapical radiograph. A standardised protocol for obturation and irrigation was used for all patients within each group.

A 5.25% solution of sodium hypochlorite was used as an irrigant between each instrument during root canal preparation. The smear layer was removed by irrigating with 17% ethylenediaminetetra-acetic acid, followed by irrigation with normal saline solution. The root canals were then dried and filled with gutta-percha and AH26 (Dentsply) root canal cement using the lateral condensation technique. The teeth were restored temporarily using a sterile cotton pellet and Cavit (3M ESPE). At the end of the root canal therapy, a single dose of 400mg ibuprofen tablet was administered to each patient.

A trained dental assistant who was blinded to the study procedures instructed the patients to complete a Heft-Parker VAS pain score to rate their pain at 6-, 12-, 18-, 24-, 48-, and 72-h post-operative intervals. No pain, mild pain, moderate pain, and severe pain were indicated by 0-mm, 1–54mm, 55–113mm, and 114–170mm divisions, respectively. The patients were instructed to use mild analgesics (400mg of ibuprofen every 6h) if they felt pain and required pain relief. However, they were also asked to record the number of analgesic tablets on their Heft-Parker VAS forms.

ACRONYMS

VAS: Heft-Parker visual analog scale
WL: working length

RESULTS

A total of 96 patients participated in the study initially, but three were excluded because they did not return their Heft-Parker VAS forms (two in group 1 and one in group 2). The remaining 93 patients (47 males and 46 females) completed the study, with 30, 31, and 32 patients in groups 1, 2, and 3, respectively. There were no significant differences in age, gender, and type of mandibular molar teeth between the three groups at baseline ($P > .05$).

There were no significant differences between gender and the level of postoperative pain in the three groups ($P > .05$). Spearman’s correlation analysis showed no correlation between age and postoperative pain in this study ($P > .05$, $r = 0.28$). Cochrane Q test showed that in all the three groups, the patients’ pain levels had significantly decreased by 72 h ($P < .05$).

Kruskal-Wallis test showed that the patients in group Three reported significantly lower postoperative pain levels at 6, 12, and 18 h compared with the patients in the two other groups ($P < .05$). In addition, the patients in group Two reported significantly lower post-operative pain levels at 6 and 12 h compared with the patients in group One ($P < .05$). There was no significant difference in postoperative pain between the three groups at the other time intervals ($P > .05$), although the trend shown by the raw data indicated less pain in group Three.

The mean consumption of analgesics by patients in groups One, Two and Three were 2.43 ± 0.98, 1.22 ± 0.12, and 1.12 ± 0.16 tablets respectively. The consumption was significantly higher in group One ($P < .05$), with no difference between the two other groups ($P > .05$).

CONCLUSION

The authors reported that in patients with asymptomatic mandibular molar teeth with necrotic pulps and periapical lesions, preparation of the root canal system with the Wave-One reciprocating single-file instrumentation technique resulted in significantly less postoperative pain and required less analgesic consumption than the multi-file rotary instrumentation technique with ProTaper Universal and hand instrumentation techniques.

IMPLICATIONS FOR PRACTICE

This trial, which used patient-centred measures (Heft-Parker VAS forms), provides evidence of the superior performance of Wave-One for important clinical outcomes (post-operative pain and analgesic consumption).

Reference

1. Shokraneh A, Ajami M, Farhadi N, Hosseini M, Rohani B. Postoperative endodontic pain of three different instrumentation techniques in asymptomatic necrotic mandibular molars with periapical lesion: a prospective, randomised, double-blind clinical trial. Clinical Oral Investigations 2017; 21:413-418.