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What's new for the clinician? - Excerpts from and summaries of recently published papers

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1. Online follow-up improves the quality of life of patients who undergo extraction of impacted mandibular third molars - A randomized controlled trial

X Zheng, J Zhao, Z Wang, et al. Postoperative online follow-up improves the quality of life of patients who undergo extraction of impacted mandibular third molars: a randomized controlled trial. Clin Oral Invest. 2021; 25: 993-9.

INTRODUCTION

Surgical removal of impacted 3rd molars is a common surgical procedure carried out by both general and specialist oral health professionals. This procedure is often associated with postoperative pain, swelling and bleeding which affects the patients eating and speaking and oral health related quality of life.

Very little published studies have investigated the effect of postoperative follow-up on the quality of life of affected patients. Traditional postoperative follow-up via telephone has proven to be effective and it has effects such as reducing the cost of consultation compared with conventional on-site follow-up. However, in clinical practice, telephone follow-up was found to greatly increase the time consumption of doctors and nurses, as they have to repeat the same instructions or guidelines, and patients often reject the calls, as they think that these unknown incoming calls are harassing calls.

The increase in online medical care facilitates patients' access to medical services and also enables doctors to manage their cases more efficiently and follow up with their registered patients quickly and accurately to obtain important clinical data. Zheng and colleagues form China (2021) used the Good Doctor Online mobile app to follow up registered patients after tooth extraction. The primary aim of their study was to evaluate the effectiveness of postoperative online follow-up on patients' quality of life following impacted mandibular third molar removal.

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A further objective was to investigate the application value of online medical care in the field of oral therapy.

MATERIALS AND METHODS

The study was a prospective, randomized, double-blind clinical trial. Healthy patients with no history of major systemic disease, aged 18-45 years old, with impacted mandibular third molars indicated for surgical removal were included in this study. Smokers, those with poor oral hygiene, and/or severe periodontitis, pregnant patients or those with systemic disease were excluded from this study.

This study tested the null hypothesis that there were no differences in the clinical outcomes of patients without online follow-up vs. those with online follow-up, against the alternative hypothesis of a difference. All measurements were taken by independent blinded assessors.

A standardized procedure was performed for the surgery. A cone beam CT (CBCT) was taken before the operation and the position of the 3rd molar was recorded using the Pell and Gregory classification.

Patients were assigned to one of two groups: one group recei-ved follow-up the other did not. The PoSSe scale which is a questionnaire with good reliability and validity, was used to evaluate the quality of life of patients after operation.

Postoperatively, patients were placed on antibiotics (amoxicillin 750 mg p.o. three times a day for 3 days; patients with a history of allergy to penicillin were prescribed clindamycin 300 mg p.o. four times a day for 3 days), a NSAID (ibuprofen 600 mg p.o. at least 12 h apart when necessary), and a mouthrinse (0.12% chlorhexidine mouthwash twice a day for 7 days).

Patients in the test group were asked to download the Good Doctor Online mobile app on their mobile phones and register their personal information. The surgeon used the mobile app to group and actively follow up with the patients on the first, third, and fifth days after surgery to monitor their postoperative response, reemphasize the postoperative instructions, and answer the patients' questions.

Patients in the control group did not receive a postoperative online follow-up. Patients in both groups were followed up with in the hospital for suture removal and completion of the PoSSe scale 7 days after the surgery. The PoSSe scale was used as a measure to effectively evaluate the quality of life of the patients, including their eating, talking, feeling, appearance, pain scale, nausea, and other daily life activities.

Patients with poor compliance, patients without follow-up, and patients whose operation time was too long (>45 min) were excluded from the final analysis of the data.

The approval rate of an online follow-up after tooth extraction by 20 senior doctors (≥40 years old) and 20 young doctors (<40 years old) was also recorded. A visual analogue scale (VAS) was used for the analysis, in which a score of 0 represented lack of approval and a score of 10 represented high approval. None of the 40 doctors participated in the clinical trial, and they did not know the results of the clinical trial.

RESULTS

In this study, 145 patients were enrolled, and 12 patients were excluded. The remaining 133 patients were randomly divided into the test group (68 cases) and control group (65 cases). Thirteen patients did not come to the on-site follow-up, and 122 patients were finally analysed, including 62 in the test group and 60 in the control group.

There was no significant difference in age, operation time, sex, Pell and Gregory classification, Winter classification, relationship with inferior alveolar nerve canal, osteotomy, crown cutting, or root splitting between the two groups ($P>0.05$).

All patients successfully underwent tooth extraction. In the test group, in addition to our active follow-ups, 18 patients still actively asked questions through the app. There was 1 case of postoperative haemorrhage and 1 case of postoperative swelling that failed to improve on their own under the online guidance of the doctor and needed to be followed up with in the hospital. The remaining cases were provided nursing advice and did not need to come to the hospital, which minimized the burden of patient visits. In the control group, 9 patients returned to the hospital for follow-up treatment, including 2 cases of postoperative haemorrhage, 3 cases of discomfort due to swelling, and 4 cases of foreign body sensation in the wound. Among these 9 patients, only 1 case of postoperative haemorrhage required postoperative wound re-suturing after examination by the doctor, and the remaining cases were provided explanation and given comforting treatment. Thirty-two patients in the control group said they had questions during the whole healing process, but because they could not get the doctor's response in time, they could only query the Internet or ask friends who had had their teeth removed. In the on-site follow-up 7 days after surgery, the scores of the other PoSSe scale items were significantly lower in the test group than in the control group. Higher scores on the PoSSe scale represent more severe symptoms and worse quality of life of patients.

The VAS scores of young doctors and senior doctors for the approval of an online follow-up after tooth extraction were 8.05 ± 1.46 and 4.45 ± 2.21, respectively, indicating that the young doctors' approval of a postoperative online follow-up was significantly higher than that of senior doctors ($P<0.05$).

CONCLUSIONS

The researchers concluded that postoperative online follow-up effectively improved the quality of life of patients who underwent extraction of impacted mandibular third molars. Young doctors (<40 years old) were more likely to approve the online follow-up after tooth extraction than senior doctors (>40 years old).

Implications of practice

The COVID pandemic has forced clinicians to minimize any unnecessary face to face consultations. The use of mobile apps was found to be effective for follow-up and patient monitoring in this study.

Reference

1. Zheng X, Zhao J, Wang Z, et al. Postoperative online follow-up improves the quality of life of patients who undergo extraction of impacted mandibular third molars: a randomized controlled trial. Clin Oral Invest. 2021; 25: 993-9.

2. Working length accuracy in endodontics - Electronic versus visual methods

AA Klemz, ATG Cruz, L Piasecki, E Carneiro, VPD Westphalen, UX da Silva Neto. Accuracy of electronic apical functions of a new integrated motor compared to the visual control of the working length - an *ex vivo* study. Clinical Oral Investigations. 2021; 25: 231-6.

INTRODUCTION

The determination of the proper working length is an important factor for successful root canal treatment. This is variously expressed either as an extension to the apical constriction or 0.5-2 mm short of the radiographic apex (RA) or as an extension to the cementodentinal junction (CDJ). However, this is not always feasible in clinical practice. Therefore, all working length (WL) assessment methods aim to determine the optimal approach of this anatomical structure, which may considerably vary from one tooth, root or wall to the other.

There are many different ways to determine the working length, for example by use of anatomic averages and knowledge of apical anatomy, tactile sensation, presence of moisture on paper points, radiographs and electronic apex locators (EALs). Also, given that the CDJ cannot be precisely located on radiographs, there are arguments supporting the termination of preparation in necrotic cases at 0.5 to 1 mm short of the radiographic apex and at 1 to 2 mm short in cases involving irreversible pulpitis.

Electronic apex locators (EALs) are currently the most reliable method for determining the working length (WL) for endodontic procedures.[1] Compared to the traditional radiographic method, the use of Electronic apex locators (EALs) is faster, does not require radiation exposure, and is more accurate for detecting the canal terminus under different conditions.[1]

Tri Auto ZX2 is a new version of the cordless electric endodontic motor with a built-in apex locator. In addition to a continuous rotation, the Tri Auto ZX2 is capable of two new motions, the optimum torque reverse (OTR) and optimum glide path (OGP). The OTR allows continuous clockwise rotation of the instrument under minimal intracanal stress and then switches to a 180° clockwise and a 90° counter-clockwise reciprocation if the pre-set torque value is reached.

The apical functions of most integrated motors control the apical limit by either stopping or reversing the motion when the instrument tip reaches the pre-set apical point. 1 Tri Auto ZX2 also features a new apical function named Optimal Apical Stop (OAS), which slightly reverses the instrument (one half to one full rotation) prior to stopping the motion.

Klemz et al. (2021) reported on a trial that sought to evaluate the accuracy of the new Tri Auto ZX2 endodontic motor in maintaining the WL while shaping canals using the apical functions auto apical reverse (AAR) and Optimal Apical Stop (OAS) in combination with the continuous rotation (CR) or optimum glide path (OTR) motion, compared to the conventional visual control using rubber stoppers. The null hypothesis is that the different combinations of motions and electronic apical controls would result in the apical limit of preparation similar to the conventional visual control.

MATERIALS AND METHODS

One-hundred ten human, single-rooted, mandibular premolars were selected from a pool of extracted teeth stored in a 0.1% thymol solution. The teeth were evaluated under an operating microscope at ×10 magnification to exclude roots presenting with cracks, calcified canals, immature apices, resorptive defects, caries, or lateral foramina.

The teeth were scanned by means of cone-beam computed tomography (CBCT) to evaluate and standardize the anatomical parameters. Eighty standardized teeth characterized by Vertucci's Type I configuration, apical curvature less than 10°, and apical diameters up to 0.25 mm were selected. The teeth were washed in saline, and dental crowns were cut with a diamond disk to obtain a plain surface and a root length of approximately 18 mm. Endodontic access was performed using round burs. A manual size 15 K-file was used to confirm the presence of a single canal and a patent major apical foramen.

The coronal thirds of the root canals were pre-flared using a nickel-titanium (NiTi) SX rotary instrument using 2.5% sodium hypochlorite as the irrigating solution. Visual measurements were performed under ×10 magnification using a size 15 K-file introduced into the root canal until the tip became visible at the most coronal border of the apical foramen (AF) opening. At that point, the rubber stop was carefully adjusted to the coronal flat reference point. The distance between the file tip and the rubber stop was measured in triplicate using a digital calliper with 0.01 mm precision. The mean length was defined as the pre-operative actual root canal length (AL).

The teeth were randomly divided into five groups ($n = 16$). To prevent movement of the teeth during the root canal preparations, they were fixed to an acrylic platform: a customized rectangular small acrylic box containing a lid with five rounded orifices. Four teeth at a time were fixed at the CEJ level to the orifices using auto-polymerizing acrylic resin, and the fifth orifice was used to connect the contrary electrode of the motor. Before placing the lid containing the teeth, the acrylic box was filled with freshly mixed alginate. The canals were irrigated with 2.5% sodium hypochlorite.

The canal measurement function of TriAuto ZX2 set at the 0.5 mark was used to determine the electronic working length of the teeth to be prepared with conventional visual control. The length obtained was measured using the digital calliper to a 0.01-mm precision and approximated to the nearest half millimeter. For the conventional visual control (CVC) group, the rubber stoppers were carefully adjusted using the pre-calibrated lengths of an endodontic ruler.

The files were activated using the continuous rotation (CR) motion of TriAuto ZX2 motor, set at 300 rpm, 2.5 N·cm, and no apical control function. Then, the operator slowly advanced the calibrated proTaper instruments into the canal, and visually controlled their insertion according to the coronal flat reference point.

For each of the four experimental groups, it was assigned a combination of one of the tested motions (continuous rotation (CR) or optimum glide path (OTR) motion) and one of the apical action functions (auto apical reverse (AAR) and Optimal Apical Stop (OAS). For both motions, the speed was adjusted to 300 rpm, with “auto start” set to “on” and “auto stop” set to “off.” For the continuous rotation (CR) motion, the torque was adjusted to 2.5 N·cm, and the options “apical slow down,” “torque slow down,” and “apical torque down” were set to “off.”

For the OTR motion, the 180° rotation angle was selected, and the trigger torque was set to 0.2 N·cm. For both apical actions, the “0.5” position was selected in the meter’s display. The Tri Auto ZX2 motor was turned on, and the contrary electrode (lip clip) was placed inside the alginate. The NiTi instrument was inserted into the contra angle, which contains a built-in electrode designed to close the electric circuit. Thus, when the NiTi instrument was placed inside the wet canal, the motor automatically started the rotation. In these four groups, all the rubber stoppers were removed, and the ProTaper instruments were slowly advanced inside the canal until the apical action of the motor reversed (AAR) or stopped (OAS) the motion.

The canals in all groups were shaped using the ProTaper Universal rotary NiTi instruments up to an F3 size. The chemical-mechanical preparation was performed by a single operator trained to use the new motor. After each NiTi instrument used, irrigation was performed with 2 mL of 2.5% sodium hypochlorite, and patency was checked. Final irrigation was performed using 17% EDTA.

The last ProTaper instrument used (F3) was introduced manually into the full extent of the prepared root canal, and the rubber stop was adjusted to the reference point. The distance between the instrument tip and the rubber stop was measured using a digital calliper and recorded as the WL. The teeth were removed from the alginate, washed in saline, and then visualized under ×10 magnification. A size 15 K-file was inserted up to the Apical Foramen to measure the actual length after preparation. All visual measurements were performed by a single operator who was blinded to the groups.

RESULTS

The mean pre-operative actual root canal length (AL) was 18.3 mm (SD ± 0.38), the mean length after preparation (AL2) was 18.27 mm (SD ± 0.36), and the mean WL was 17.75 (SD ± 0.42). A *t* test revealed no difference ($P>0.05$) between AL and AL2 measurements, but WL measurements were significantly different from those for AL2 ($P<0.05$).

The multiple comparisons revealed a statistically significant difference only between conventional visual control (CVC) and the combination of Continuous rotation (CR) motion and Optimal Apical Stop (OAS).

There was no significant differences between the groups when mean length after preparation (AL2) and WL measurements were obtained using the different motions and apical controls ($P>0.05$).

CONCLUSIONS

Within the limitations of this in-vitro study, the tested combinations of motions and apical controls for the Tri Auto ZX2 motor were able to provide an adequate apical limit for the mechanical preparation of root canals, similar to conventional visual control using rubber stoppers. There was no significant difference between the motorised and manual processed used to determine working length.

Implications for practice

The Tri Auto ZX2 cordless electric endodontic motor with a built-in apex locator is effective for use in determining working length for teeth with single root canals.

Reference

1. Klemz AA, Cruz ATG, Piasecki L, Carneiro E, Westphalen VPD, da Silva NetoUX. Accuracy of electronic apical functions of a new integrated motor compared to the visual control of the working length - an *ex vivo* study. Clinical Oral Investigations. 2021; 25: 231-6.