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## Cone beam computed tomography in pre-surgical assessment of mandibular third molars

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**Question:** Does pre-operative use of cone beam computed tomography compared with panoramic radiography reduce the risk of inferior alveolar nerve damage?

**Design** Multicentre, randomised controlled clinical trial.

**Intervention** Patients referred for third molar removal received a digital panoramic radiograph (PR). Adults with one or more lower third molars in a close relationship with the mandibular canal were eligible for the study. Patients randomised to the cone beam computed tomography (CBCT) group received a high resolution CBCT scan in addition to the PR. All lower third molar extractions were performed under local anaesthesia without sedation and without antibiotic prophylaxis. Information on variables such as experience of the surgeon, duration of surgery and technique for third molar removal were recorded.

**Outcome measure** The primary outcome measure was the number of patient-reported altered sensations one week after surgery. Secondary outcomes included the number of patients with an objective IAN injury; permanent IAN injury (>6 months); occurrence of other postoperative complications (wound infection, alveolar osteitis); Oral Health Related Quality of Life-14, questionnaire responses; pain (VAS score); duration of surgery; number of emergency visits; and number of missed days of work or study.

**Results** Three hundred and forty-one patients with 477 lower third molars were randomised from three centres. Two hundred and sixty-eight patients with 320 mandibular third molars were analysed according to the intention-to-treat principle for the primary and secondary outcomes. The overall incidence of patient-reported altered sensations one week after surgery was 6.3%. At one week there was no difference in subjective IAN injury between the CBCT and PR group. No significant differences were noted between the two groups for any of the secondary outcomes recorded.

**Conclusions** Although CBCT is a valuable diagnostic adjunct for identification of an increased risk for IAN injury, the use of CBCT does not translate into a reduction of IAN injury and other postoperative complications, after removal of the complete mandibular third molar. In these selected cases with a high risk for IAN injury, an alternative strategy, such as monitoring or a coronectomy, might be more appropriate.

## Commentary

Removal of mandibular third molars is one of the most common surgical procedures carried out in oral and maxillofacial surgical units. One of the post-operative complications associated with this procedure is damage to the inferior alveolar nerve (IAN), which can result in transient or permanent neurosensory impairments affecting the lower lip and chin. The risk of temporary IAN injury following mandibular third molar removal is reported at between 0.26% and 8.4%, and permanent IAN injury at between 0.1% and 0.9%<sup>1-4</sup>, and is associated with a significant negative impact on quality of life<sup>5</sup>.

The most predictive factor for assessing risk of IAN damage is the radiographic proximity of the third molar root to the inferior alveolar canal (IAC)<sup>4</sup>. Panoramic radiography (PR) is the standard diagnostic tool for this purpose, however if assessment of the panoramic radiograph indicates an intimate relationship between the third molar and the IAC, additional investigation using cone beam computed tomography (CBCT) may be recommended to verify the relationship in three dimensions. With the increased costs and radiation exposure associated with CBCT, it is important that the potential benefits are carefully assessed.

A systematic review concluded that evidence regarding the efficacy of CBCT for impacted teeth is still limited<sup>6</sup>. The aim of this randomised controlled trial was to investigate the effectiveness of CBCT compared to PR in reducing the risk of IAN injury following removal of mandibular third molars in patients at increased risk of IAN injury.

This study is a well designed multicentre, randomised controlled clinical trial, with a defined population and clear intervention (pre-operative CBCT) and control (PR only) groups, with clear inclusion criteria and randomisation to each group by computer random generator.

The inclusion of nonblinded patients in this trial could be considered a weakness, especially considering that the primary outcome is patient-reported altered sensations one week post-surgery. It is reported that patients aware of their treatment may differ from blinded patients in how they report symptoms<sup>7</sup>. An overview of seven meta-epidemiological studies reported an average 22% exaggeration of odds ratios in trials not double-blind where outcomes were subjective<sup>8</sup>. Another systematic review found that lack of blinding of patients exaggerated effect sizes by an average of 0.56 (0.71 to 0.41) standard deviation when outcomes were patient-reported<sup>7</sup>.

The trial is otherwise well designed with similar patient demographics in control and intervention groups and outcome measures assessed by a single blinded investigator.

With the study powered to 80% at a significance level of 5%, control and intervention groups were both short of the required patient numbers by 6 and 14 patients respectively.

There was no significant difference in patient-reported altered sensations one week post-surgery found between the CBCT and PR group, although it is debateable whether this outcome is the most appropriate to measure postoperative IAN injury. There was equally no significant difference between groups on the degree of patient morbidity following third molar removal.

This RCT provides moderate quality evidence that CBCT imaging provides no reduction in postoperative patient morbidity compared to PR following third molar removal, despite the increased radiation exposure and costs associated with CBCT.

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