

Usefulness of mandibular third molar coronectomy assessed through clinical evaluation over three years of follow-up

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Abstract. The aim of this study was to investigate the 3-year morbidity of coronectomy of the lower third molar and to monitor the behaviour and migration pattern of the retained roots postoperatively. A total of 92 patients (111 teeth) who had undergone a coronectomy between October 2005 and July 2009 were investigated. Patients were followed up at 3 months and 1, 2, and 3 years for clinical evaluation and dental computed tomography imaging of the coronectomy sites. In total, 10 cases (9%) required tooth root extraction within the 3 years after coronectomy. In seven of them, the distal pocket of the lower second molars remained connected to the roots within the first year. Of the cases in whom a pocket did not remain at an early stage, none showed peri-apical lesions on transmission images of the retained roots in the apical area, which usually result from necrosis of the pulp. Root migration increased in the first 2 years after coronectomy but stabilized between the second and third years. In addition, a significant difference was noted in root migration between patients of different ages and sex. Retained roots after coronectomy in the lower third molars led to no complications in terms of infection or the development of pathologies within the first 3 years postoperatively.

Key words: coronectomy; prevent paraesthesia; long-term safety; migration pattern of the retained roots.

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Extraction of the mandibular third molar, or wisdom tooth, is a relatively minor surgery performed daily in our oral and maxillofacial surgery department. The incidence of postoperative complications such as abnormal sensation and numbness is 1–5%.^{1–3} Such symptoms can reduce the quality of life of patients and

sometimes result in a malpractice lawsuit.⁴ When performing a mandibular third molar extraction, accurate assessment of the positional relationship between the wisdom tooth and the mandibular canal is necessary to prevent the development of paraesthesia due to injury to the inferior alveolar nerve (IAN). In recent years,

dental computed tomography (CT) has been used to obtain detailed information on the positional relationship between the wisdom tooth and the mandibular canal, making it possible to predict the risk of paraesthesia. However, the actual safety measure taken at many dental clinics to prevent paraesthesia is to perform the

wisdom tooth extraction carefully. At the same time, coronectomy has received considerable attention in recent years.

When mandibular third molar extraction is likely to damage the IAN, a coronectomy is performed to remove only the crown of the tooth, leaving the root in place.⁵⁻⁷ Compared with the conventional extraction method, coronectomy has been found to effectively prevent nerve damage in several randomized clinical trials.⁸⁻¹⁰ Long et al. recently performed a systematic review and meta-analysis of coronectomy and the conventional extraction method and reported the utility of coronectomy as a surgical procedure for preventing nerve damage during wisdom tooth extraction.¹⁰ Our department also performs coronectomy in patients showing contact between the mandibular canal and the third molar on dental CT, and the authors have previously reported the efficacy of coronectomy for preventing nerve damage.¹¹⁻¹³

In this study, the authors assessed the retained roots and surrounding tissue on dental CT to investigate the long-term outcome (up to 3 years) of coronectomy in patients who underwent this procedure between 2005 and 2009.

Materials and methods

Subjects

Coronectomy was performed on 111 teeth in 92 patients (33 teeth in 29 men and 78 teeth in 63 women; mean age 33.8 years), between October 2005 and July 2009. This study included patients who had complete annual follow-ups for 3 years and excluded those who did not return for follow-up observation.

Indications for coronectomy and surgical method

Dental CT is performed in our department when a close positional relationship between the mandibular third molar and the mandibular canal is suspected on panoramic radiographs. Coronectomy is indicated in the presence of at least one of the following seven findings: deviation of the canal; narrowing of the canal; peri-apical radiolucent area; narrowing of the root apex; darkening of the root apex; curving of the root apex; and loss of lamina dura of the canal.

Dental CT images were obtained for 301 patients (365 teeth). The authors excluded patients for whom there was distance between the root and the IAN (146 teeth in 125 patients). When contact

between the mandibular canal and the wisdom tooth was verified on dental CT, patients chose traditional extraction (46 teeth in 34 patients) or coronectomy (173 teeth in 142 patients).

Coronectomy was started using the same ordinary incision and tissue separation techniques used to extract an impacted tooth and form a mucoperiosteal flap. The crown of the tooth was then removed and the resection surface was trimmed to 3-4 mm below the edge of the bone to ensure no remaining enamel. Primary closure of the extraction wound was performed by periosteal release to ensure it was tension-free. The authors did not treat the pulp of the retained root.^{8,12,13} All patients were operated on by the same specialist in oral and maxillofacial surgery certified in Japan. A 3-day course of antibiotics was prescribed after the coronectomy for the prevention of postoperative infection (cefcapene pivoxil hydrochloride hydrate).

Evaluation and analysis

The coronectomy was assessed on the basis of clinical evaluation, panoramic radiography, and dental CT performed at 3 months and 1, 2, and 3 years after the procedure. Evaluation items are listed below.

Analysis of cases with root extraction

Histopathological testing was performed to investigate the conditions of cells and tissues in the root in cases where the extraction of the retained root was necessary during the postoperative observation period and where the root was extracted en bloc.

Condition of the retained roots and surrounding tissue at the 3-year follow-up

Gross clinical examination for infection was performed at 3 months and 1, 2, and 3 years after coronectomy. In addition, dental probes were used to directly palpate the surrounding tissue and periodontal probes were used to examine the distal pocket (≥ 4 mm) of the mandibular second molar. Diagnostic imaging was performed to evaluate coronal bone formation over the retained root, the condition of the root apex, and contact with the mandibular canal.

Analysis of root migration during the 3-year follow-up

Dental CT images were used to set the baseline for calculating the distance of root migration. Three lines were identified on follow-up CT images: line 1 was tangent to the distal part of the mandibular second molar; line 2 connected the root apex and the centre of the crown in the mandibular third molar; and line 3 was perpendicular to line 1 and passed through the root apex of the mandibular third molar. If the root of the mandibular third molar was bifurcated, lines 2 and 3 were generated from the midpoint of the bifurcation. After placing these lines on the CT images, a specific formula was used to calculate the migration distance (Fig. 1).

Statistical analysis

The statistical analysis was performed using IBM SPSS Statistics for Windows, version 19.0 (IBM Corp., Armonk, NY, USA). Migration distances were compared using Friedman's repeated measures two-way analysis of variance (ANOVA).

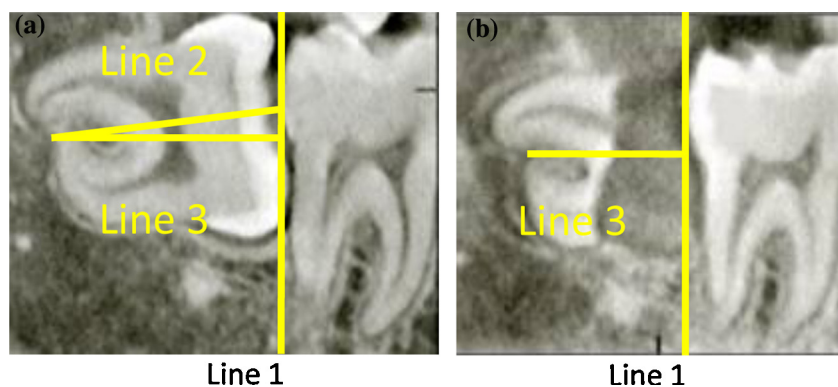


Fig. 1. Measurement of root movement. Line 1: tangential line on the distal part of the crown of the mandibular second molar. Line 2: line connecting the centre of the mandibular third molar crown and the midpoint between the proximal and distal roots. Line 3: perpendicular line connecting line 1 and the centre of the mandibular third molar root apex. (a) Preoperative. (b) Postoperative.

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