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# The Root of the Cause: A Clinical Case Report of the Surgical Removal of a Retained Root via an Extra-oral Approach

**Abstract:** Retained roots are commonly seen as an incidental finding in general practice following radiographic examination, many being asymptomatic. However, over time they may migrate, develop pathological change and become symptomatic for the patient. This article illustrates root migration using an interesting clinical case to demonstrate how it can present, and the surgical techniques required in its removal. In this particular case, the retained root of a lower right second molar migrated to below the right side of the inferior alveolar nerve.

**CPD/Clinical Relevance:** It is important to recognize when referral for a specialist opinion is appropriate.  
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Retained roots are commonly seen as an incidental finding, with many being asymptomatic. A general dental practitioner (GDP) may notice this incidental finding in practice following radiographic examination. Over time the retained root may migrate, develop pathological change and become symptomatic for the patient. Long-term chronic pathology can lead to a cystic change<sup>1</sup> and result in dental pain. A

surgical extraction is often indicated in order to resolve the problem. In this circumstance, the patient may be referred to an oral and maxillofacial department for further investigation.<sup>2</sup>

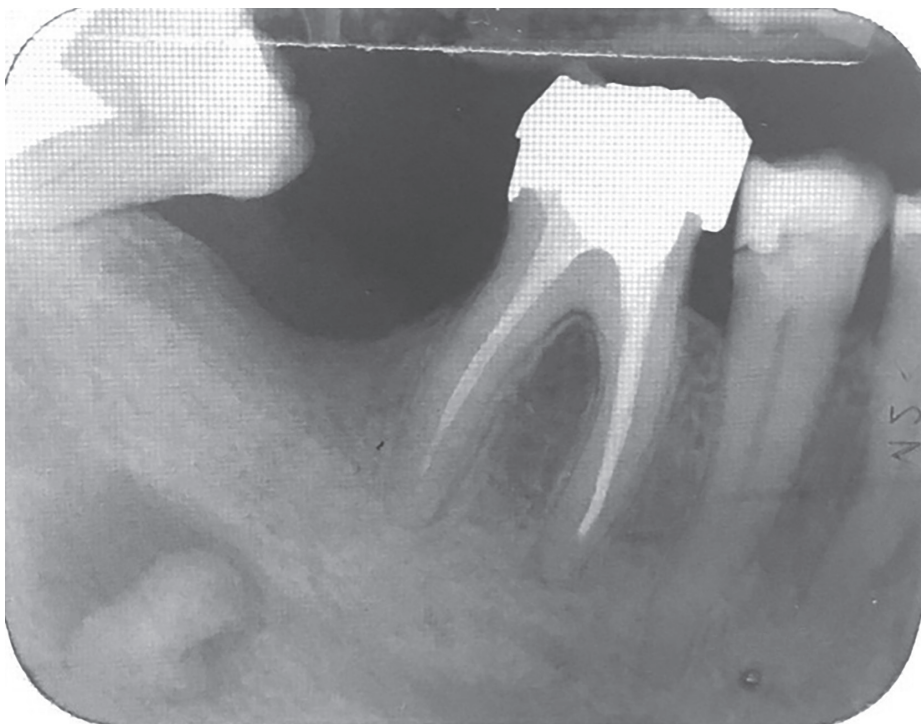
The literature shows that mandibular roots are more likely to be retained than maxillary roots following attempted dental extraction, and that posterior teeth are six times more likely to be retained than anterior teeth.<sup>3</sup> It is also

known that the clinical experience of the operator is another factor involved with teeth fracturing upon attempted extraction, as more experienced dentists are less likely to have post-extraction complications.<sup>3</sup>

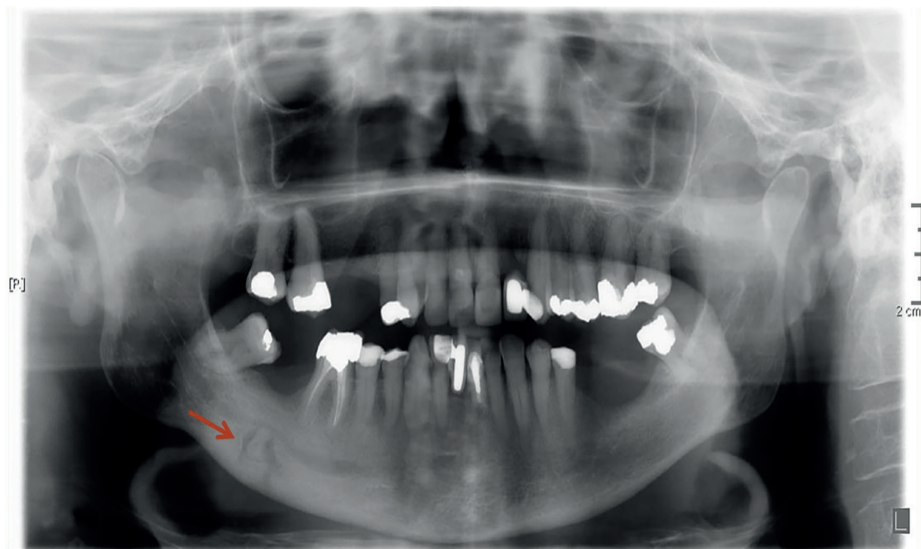
The removal of retained roots is within the GDC scope of practice for performing oral surgery for GDPs.<sup>4</sup> If GDPs are able to remove these roots in practice, it would reduce the number of referrals to an oral and maxillofacial department, which would help reduce long waiting times for patients, particularly those in pain. However, it is also important for GDPs to recognize when referral for a specialist opinion is appropriate, as it was with this case.

The surgical removal of retained roots is a commonly performed procedure in oral and maxillofacial surgery. Indications for this procedure include cystic change, apical infection, pain and damage to adjacent anatomical structures; however,

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**Figure 1.** Original peri-apical radiograph taken by the patient's GDP in 2012 showing a radiopaque mass with a surrounding radiolucent area in the edentulous space between the remaining lower right molars.



**Figure 2.** Pre-operative OPG radiograph showing the LR7 retained root, which appeared to have migrated below the ID nerve (as indicated by arrow).

they rarely require an extra-oral surgical approach. During this process, history, and radiographic examination is used to achieve a diagnosis and plan the surgical technique. Often, cone beam computed tomography (CBCT) is indicated to ascertain the relationship with adjacent anatomical structures, such as the inferior dental (ID) nerve.

## Case report

### History

A 64-year-old female was referred by her GDP to the oral and maxillofacial department following a history of recurrent facial swelling over the right-hand side of her mandible. A peri-apical radiograph was provided by the GDP (Figure 1) that showed

a conical radiopacity in the region of the lower right second molar (LR7). During this consultation, the patient reported no concerns and declined invasive treatment.

### Background

The patient's medical history included long-term oral bisphosphonate use for osteoporosis, levothyroxine for hypothyroidism and well-controlled asthma. True allergies included penicillin, co-codamol and ibuprofen. A rash was reported with these medications. The patient was a teetotal non-smoker who had retired.

### Investigations

The patient returned to the department 2 years later, presenting with an extra-oral palpable non-tender lump over the region of the lower right second molar. An orthopantomogram (OPG) radiograph (Figure 2) showed a provisionally diagnosed retained root with surrounding radiolucency, appearing below the level of the ID nerve. A further CBCT was obtained (Figure 3) to ascertain the relationship and proximity of this root to the right-side inferior alveolar nerve. Further special investigation,<sup>5</sup> in the form of a CBCT, assisted with planning the optimal approach for removal of this tooth root and assisted with minimal risk of inferior alveolar nerve damage.<sup>6</sup> The CBCT reported a retained root fragment in the LR7 edentulous area measuring 5 x 6x 7 mm with a bony cavity surrounding it, consistent with chronic infection and possible cyst formation. The ID canal passed superiorly over this root and was slightly deviated in its course.

### Differential diagnoses

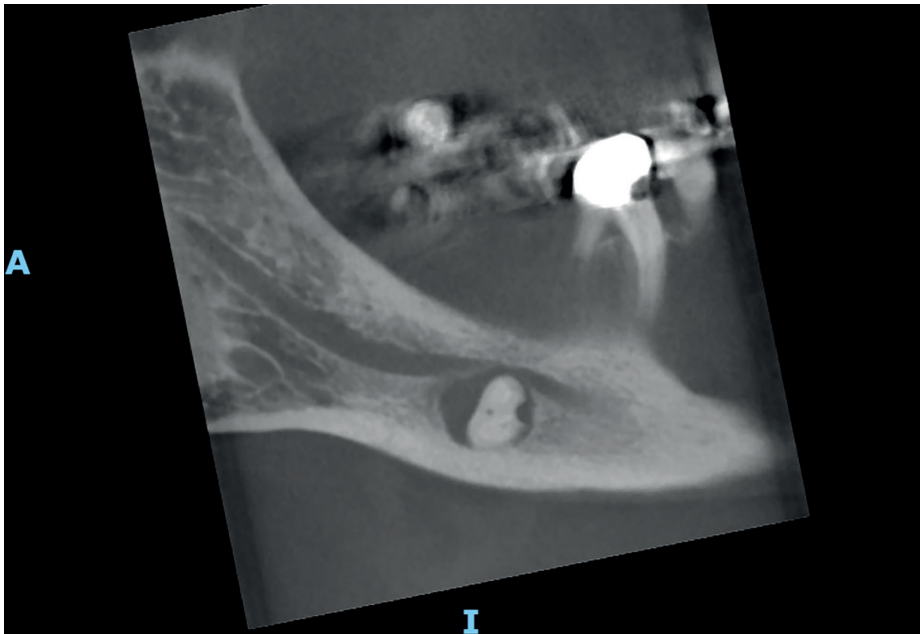
From the initial presentation, various clinical working diagnoses were made including:

- A retained root following an attempted extraction (most likely);
- Odontome;
- Supernumerary tooth.

### Treatment

The patient underwent a general anaesthetic procedure for the removal of this root via an extra-oral approach. This extra-oral approach allowed for improved visibility and access, in comparison to an intra-oral surgical approach.

The pre-operative image shows the patient's extra-oral sinus (Figure 4). The surgical site was marked as two fingers below the lower border of the mandible



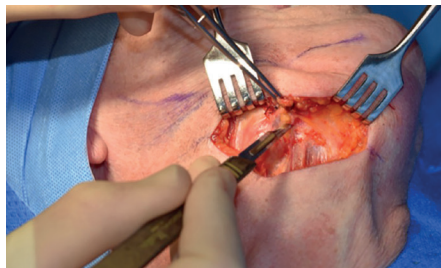
**Figure 3.** CBCT showing the retained root with surrounding cystic change and deviation of the ID nerve.



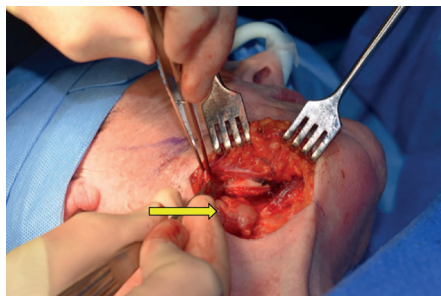
**Figure 4.** Pre-operative photograph showing the patient's extra-oral draining sinus.



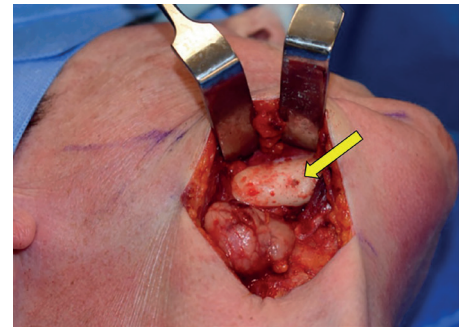
**Figure 5.** The surgical site is marked as two fingers below the lower border of the mandible.



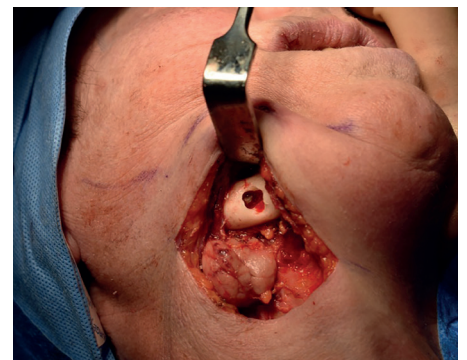
**Figure 6.** The platysma is incised and the facial artery and vein is tied off.



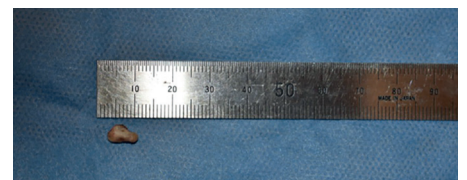
**Figure 7.** Submandibular gland, as indicated by arrow.



**Figure 8.** The mandible is exposed, periosteum elevated and sinus is identified (as indicated by arrow).



**Figure 9.** The perforation through the mandible is extended with a handpiece.



**Figure 10.** The retained root is elevated and removed.

(Figure 5), the platysma was incised and the facial artery and vein were tied off (Figure 6). The submandibular gland was identified and protected, which can be seen in Figure 7. The periosteum was elevated from the mandible and the sinus was identified (Figure 8). The perforation through the mandible was then extended with a handpiece (Figure 9). The retained root was removed, along with any granulation tissue (Figure 10) and was

irrigated with copious saline. The platysma was then closed with Vicryl Rapide and subcutaneous Monocryl sutures were placed (Figures 11 and 12). There was no iatrogenic damage noted to the facial nerve during the surgical procedure.

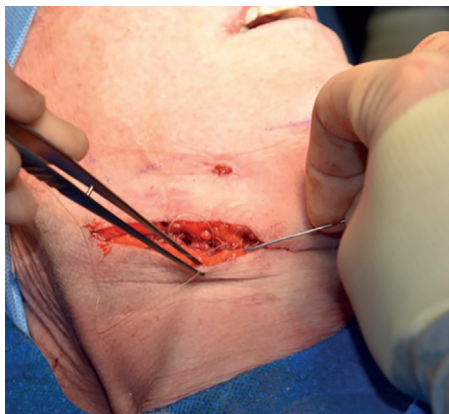
**Outcome and follow-up**

The patient was reviewed 1 month after the operation and her only complaint was of an

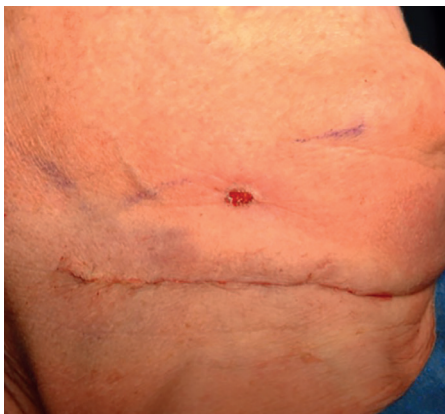
altered sensation to her chin. She was not overly concerned about this complication and had been adequately consented to the likelihood of paraesthesia to right side of lip, tongue and chin. There was minimal extra-oral scarring and no obvious signs of suppuration or erythema indicative of infection. She was discharged from the oral and maxillofacial surgery department back to her GDP.

**Discussion**

Retained roots following dental extractions are not an uncommon finding. The ability of a dentist to appropriately refer the patient promptly into a secondary care setting is necessary<sup>2</sup> to ensure the patient's best interests.<sup>7</sup> Patients should be made aware of the impact of long-standing infection should



**Figure 11.** The wound is closed with resorbable sutures.



**Figure 12.** The final result following subcutaneous closure.

the problem not be resolved. In this case, arguably, if the root had been removed prior to its migration below the ID nerve, treatment could have occurred under local anaesthetic via a direct intra-oral approach.

**Compliance with Ethical Standards**

Conflict of Interest: The authors declare that they have no conflict of interest.

Informed Consent: Informed consent was obtained from all individual patients included in the article.

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