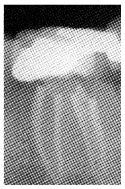

CASE REPORT

Garrè's osteomyelitis managed by root canal treatment of a mandibular second molar: incorporation of computed tomography with 3D reconstruction in the diagnosis and monitoring of the disease

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Abstract

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Aim To report the healing of Garrè's osteomyelitis involving a mandibular second molar following root canal treatment.

Summary To describe the endodontic management of Garrè's osteomyelitis involving a mandibular second molar. In this case, computed tomography (CT) was used to evaluate the status of the periapical lesion. Five years after root canal treatment, the tooth and supporting tissues appeared healthy both clinically and radiographically and were functioning well.

Key learning points

- Garrè's osteomyelitis of an adult can be managed by root canal treatment.
- Computed tomography could be used for diagnosis and treatment planning in endodontics.

Keywords: 3D reconstruction, computed tomography, Garrè's osteomyelitis, long-time follow-up, root canal treatment.

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Introduction

Garrè's osteomyelitis is thought to result from a low-grade irritation and infection that stimulate the active periosteum of young individuals to lay down new bone. Treatment is directed towards removing identifiable sources of inflammation. When an involved tooth is not restorable, extraction is indicated (Topazian 1994). The primary challenges of root canal treatment are to eliminate infection and secure healing of the bone lesion and thus to conserve the tooth. There have been few case reports on Garrè's osteomyelitis managed with endodontic treatment (Mattison *et al.* 1981, McWalter & Schaberg 1984, Jacobson *et al.* 2002). In those case reports, patients ranged from 6 to 13 years old.

In the following case, Garrè's osteomyelitis of an adult was managed by endodontic treatment. The treatment was prolonged for 5 months because of suppuration from the periapical lesion.

In endodontics, dental radiography is one of the most accurate aids for diagnosis, treatment planning, and monitoring success during follow-up. However, conventional films have limitations because of their two-dimensional nature. Therefore, in this case report, computed tomography (CT) was used for diagnosis and treatment planning. Based on the CT findings, root canal treatment was the treatment of choice, which resulted in resolution of the bony lesion.

Report

In June 1995, a 30-year-old female was referred to the Department of Endodontics, Tokyo Medical and Dental University Hospital. She had a severe bone-hard swelling on the right side of her mandible (Fig. 1). Over the past 6 months, she had noticed a swelling of the gingiva in the mandibular right quadrant, but no treatment had been performed. She did not complain paraesthesia. Her medical history revealed nothing abnormal. Radiographic examination revealed a radiolucency associated with the mandibular second molar that had been inadequately root filled (Fig. 2Ia,Ib). Periodontal probing around the tooth revealed no deep pocketing. There was a functional opposing tooth.

The provisional treatment plan included root canal treatment, with possible endodontic surgery at a later stage, if necessary. The root canal treatment was performed using hand K files. The canals were irrigated with 6% sodium hypochlorite, dried, and calcium hydroxide was used for intracanal medication. However, at each appointment, suppuration from the distal root canal was still evident (Fig. 3). As a great deal of suppuration is not observed in normal endodontic therapy, more information and a considered decision were necessary as to whether the root canal treatment should be continued.

Figure 1 Photograph taken at the first visit. Severe submandibular exostosis (→) is observed.

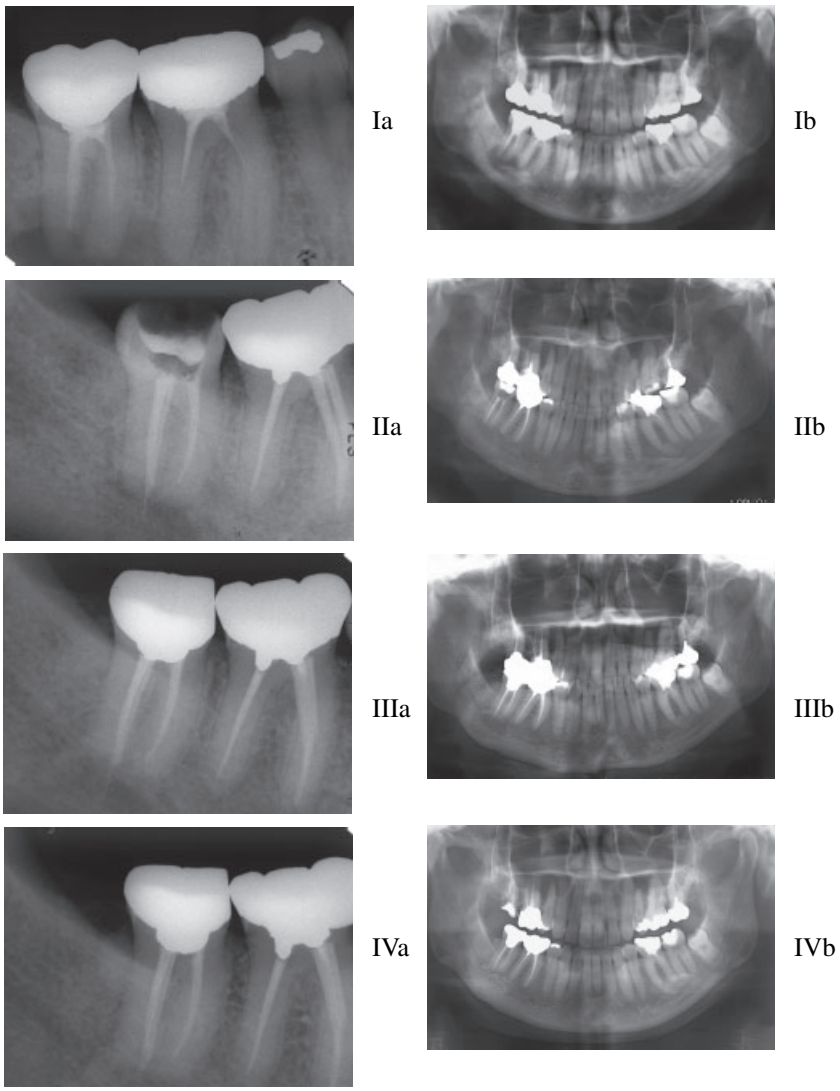

Figure 2 (a) periapical and (b) dental panoramic tomograms. I: at the first visit, II: immediately after root canal obturation (10 months later), III: 1-year follow-up, IV: 5 years follow-up.

At the patient's first visit, Lenampicillin hydrochloride (LAPC) (500 mg, oral, 8 hourly for 5 days) was prescribed by the Department of Oral Surgery, Tokyo Medical and Dental University Hospital. LAPC was selected because it is indicated for the management of osteomyelitis. Bacterial culture for sensitivity testing from suppression was performed at the Department of Oral Surgery, and *Streptococcuss* sp. and *Neisseria* sp. were detected. After that, the patient was referred to the Department of Endodontics. In an outpatient clinic, more LAPC (250 mg orally every 8 h for 3 days) was prescribed on three occasions when the patient had acute inflammation. As persistent suppuration from the root canal was observed, the treatment plan was discussed with an oral surgeon, and it was decided to take CT images to gain detailed information of the disease.

After 4 months, CT images of the periapical lesion were obtained using the new generation multi-slice scanner. Images obtained in the axial plane (Fig. 4a) underwent 3D reconstruction to give a 3D image format (Fig. 4b). The three-dimensional images

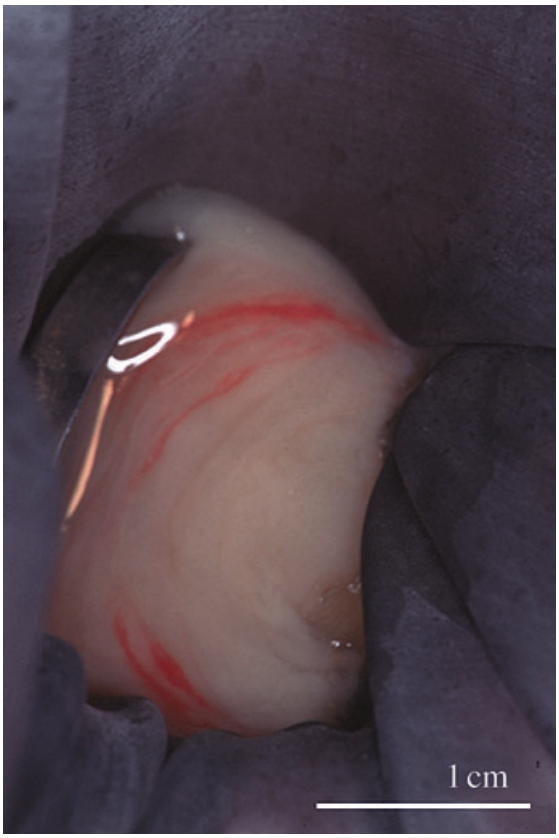

Figure 3 A great deal of pus came out after removing temporary filling material.

constructed from CT images (Fig. 4) revealed that there was severe bone resorption and proliferation of subperiosteal bone in the region of interest. The bony lesion included the apex of the mandibular second molar, and contained liquid. The bony lesion had the following dimensions: a mesio-distal length of 33 mm, a coronal-apical length of 25 mm, and a buccal-lingual length of 15 mm. From these findings, an oral radiologist at the Department of Dental Radiology, Tokyo Medical and Dental University Hospital diagnosed the periapical lesion as Garrè's osteomyelitis originating from the periapical lesion at the mandibular second molar.

The uncertain prognosis of the tooth was explained to the patient, and this included consideration of tooth extraction. The decision was made to continue root canal treatment in an attempt to conserve the tooth. After 5 months from the commencement of root canal treatment, suppuration from the root canal ceased, and the patient reported no symptoms. Bacterial culture from the root canal was again performed, and no bacteria were detected. Calcium hydroxide was placed into the root canals for further 5 months, and the tooth was kept under observation. Ten months after the first visit, the root canals were obturated using the lateral condensation method (Fig. 2IIa,IIb).

After the root canal treatment was completed, a metal post and core was placed and the crown restored with a full coverage restoration. The tooth was kept again under observation (Fig. 2IIIa,IIIb). At 1-year post-treatment, CT was again employed to evaluate the healing of the periapical lesion (Fig. 5). Remodelling of the submandibular bone was apparent (Fig. 5). The oral radiologist reported the healing of osteomyelitis. Five years after

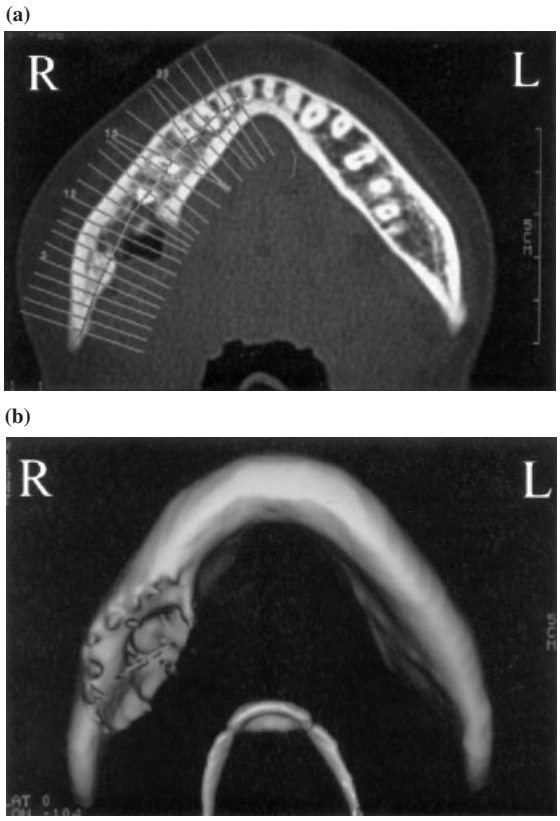

Figure 4 CT images taken 4 months after the beginning of root canal treatment. (a) Defect inside the mandibular cortical bone is seen. (b) 3D constructed images. Outgrowth and resorption of submandibular bone are observed. L: left, R: right. The 3D images are viewed from the inferior aspect.

treatment, the periapical tissue appeared healthy both clinically and radiographically and the tooth was functioning well (Fig. 2IVa,IVb).

Discussion

In endodontics, radiography is used for diagnosis, measuring root canal length, evaluating root canal filling and determining outcome. Regrettably, the resultant images taken in the bucco-lingual direction have limitations, caused most notably by superimposed structures. In the present case, an extensive radiolucency was observed periapical to the diseased tooth, and it was suspected that a large amount of cortical bone destruction existed in the area (van der Stelt 1985).

Consequently, CT was used to investigate the lesion in more detail. CT has made it possible to observe the human body in slices of a few millimetres thickness, and three-dimensional images can be constructed from those slices. Therefore, CT has already been used widely for diagnosis of maxillofacial diseases (Yoshiura *et al.* 1997).

The use of CT in endodontics has been reported, and also its limitations discussed (Tachibana & Matsumoto 1990). However, the use of CT for observing a periapical lesion has not been considered. Eberhardt *et al.* (1992) used CT to measure distances between the maxillary sinus floor and the apices of the maxillary posterior teeth, whilst Cotti *et al.* (1999) used CT for differential diagnosis of a lesion in the anterior region of the maxillary bone. Although the limited accessibility of CT imaging and large radiation dose are major

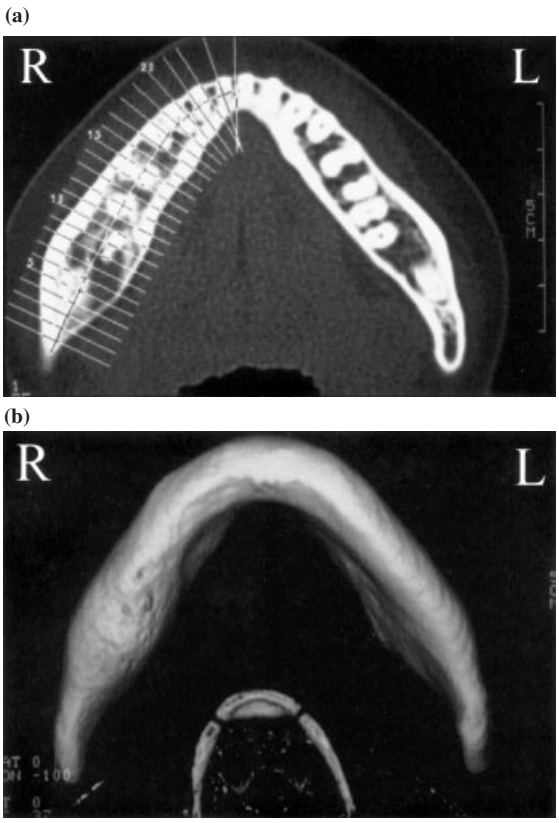

Figure 5 CT images taken at 1-year follow-up. (a) Submandibular cortical bone had been regenerated. (b) 3D constructed images. Regenerated cortical bone is observed. L: left, R: right. The 3D images are viewed from the inferior aspect.

disadvantages for routine use, CT was advantageous in both diagnosis and monitoring of this unusual case.

In the current case, the periapical lesion was diagnosed as Garrè's osteomyelitis using CT. Garrè's osteomyelitis is known as chronic osteomyelitis with proliferative periostitis and was first described by Carle Garrè in 1893. Its treatment is directed towards removing identifiable sources of inflammation. Usually, removal of the infected tooth and curettage of its socket are required to cure the lesion. In some cases, however, endodontic treatment has been reported as a successful means of treating odontogenic causes of proliferative periostitis (Mattison *et al.* 1981, McWalter & Schaberg 1984, Jacobson *et al.* 2002). When endodontic treatment is performed, long-term follow-up should be performed, as biopsy is indicated if the lesion continues to increase in size after apparently successful treatment.

In this case report, the patient initially visited the Department of Oral Surgery, Tokyo Medical and Dental University Hospital for extraction, but was referred to our Department for endodontic treatment to save the tooth. Prior to root canal treatment, it was made clear to the patient that the prognosis of the tooth was poor, and that extraction may be indicated in the future. It took 10 months to complete root canal treatment due to continuous suppuration from the lesion. After commencing root canal treatment, and because of the continuous suppuration from the distal root canal at each appointment, discussions with the oral surgeon that referred the patient occurred regularly. The oral surgeon supported the continuation of root canal treatment. Finally, it was decided to take

a CT image to allow more detailed observation of the lesion. The oral radiologist diagnosed the periapical lesion as Garrè's osteomyelitis.

Several courses of antibiotics were also administered. It is possible that more antibiotics should have been given to the patient. However, as the patient was involved in breast-feeding during treatment, minimal use of antibiotics was requested. Jacobson *et al.* (2002) reported endodontic treatment of proliferative periostitis of Garrè without antibiotic therapy during the whole course of treatment. In the present case, a large periapical lesion was successfully treated. However, if the disease process progressed unchecked, immediate termination of endodontics and recourse to extraction and socket debridement would have been contemplated. One year post-treatment, CT images revealed signs of mandibular bone regeneration (Fig. 5). Long-term follow-up by periapical and dental panoramic radiography also demonstrated the resolution of periapical radiolucency.

Conclusion

- Garrè's osteomyelitis in an adult can be managed by root canal treatment in selected cases.
- CT scanning may play an important role in diagnosis and monitoring.

Disclaimer

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