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Case Report

Osteomyelitis of the mandible after endodontic treatment with arsenic trioxide in a paediatric patient

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ABSTRACT

Although several case reports have described the local and systemic hazards associated with the use of arsenic trioxide, and despite the availability of vital pulp extirpation method, some dentists in certain areas of the world continue to use arsenic trioxide. Aim of this case report was to present the occurrence of osteomyelitis with Arsenic Trioxide use in the jaws of children. Root canal therapy was initiated in an 8-year old girl with the application of arsenic trioxide paste and her tooth to be extracted lately. Alveolar bone surrounding the extraction site and attached gingiva were infected. The sequestrum and the germ of the mandibular right second permanent molar was also extracted during the procedure. At the 6-month follow-up visit, the mandibular right second premolar was decided for extraction due to a poor prognosis. We believe that practitioners who continue to use arsenic trioxide, especially in paediatric patients, should abandon its use.

1. Introduction

Arsenic trioxide has a strong anaesthetic action on nerve fibres and toxic effects on vascular beds.[1] Spooner introduced the use of arsenic trioxide in 1836, before the development of anaesthesia, to devitalise inflamed pulp.[2] Later, arsenic leakage was found to cause severe damage and destruction of periodontal tissues. As early as 1853, Harris noted that arsenic was extremely toxic and carcinogenic when it came into contact with hard and soft tissues, and in 1865 White spoke out strongly against its use in the treatment of sensitive teeth.[3]

Although several case reports have described the local and systemic hazards associated with the use of arsenic trioxide, and despite the availability of a vital pulp extirpation method, some dentists in certain areas of the world continue to use arsenic trioxide. The management of arsenic trioxide–related bone necrosis, which commonly results in tooth loss, masticatory dysfunction, and aesthetic problems, is challenging.[4]

This article reports the occurrence and treatment of arsenic trioxide leakage after endodontic treatment in an 8-year-old girl with mixed dentition. This complication presents a greater challenge in paediatric patients, given the relationship of necrotised areas to permanent tooth germs and bone growth centres.

2. Case report

An 8-year-old girl visited a dentist 4 weeks before presenting at our department with severe pain in the mandibular right first permanent molar. The dentist had initiated root canal

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therapy with the application of arsenic trioxide paste, and the patient experienced throbbing pain and severe mobility of the affected tooth within a short time of application. The dentist had extracted the tooth, but the patient's complaints of persistent pain and an unhealed wound led her and the dentist to consult our department.

The patient was free of any systemic disease. Alveolar bone surrounding the extraction site was exposed and appeared grey; this bone and attached gingiva were infected (Fig. 1). A medication regimen of amoxicillin + clavulanic acid (625 mg) and paracetamol (500 mg) twice per day was started to eliminate the current infection and pain until sequestration.

Panoramic radiographic examination revealed a radiolucent area in the alveolus of the mandibular right first permanent molar that lacked a well-defined border and was associated with the germs of the permanent second molar and second premolar (Fig. 2). Sagittal, coronal, and axial computed tomographic (CT) scans were performed to obtain a detailed view of the localised necrotised site and its relationship to the neighbouring tooth germs (Fig. 3).

A buccal mucoperiosteal flap was raised between the mandibular right first deciduous molar and the ascending ramus of the mandible. Clinical observation revealed that the localised necrotised site transitioned to a sequestrum (Fig. 4). The sequestrum was removed easily with an elevator and separated from the healthy alveolar bone. The germ of the mandibular right second permanent molar was associated with the infected site; this germ and the mandibular right second deciduous molar were extracted during the procedure (Fig. 5). We decided to monitor the germ of the mandibular right second premolar during follow-up and act according to its prognosis. The remaining defect was curetted, burred, and irrigated with saline until all affected alveolar bone had been removed. The surgical site was sutured primarily and proper postoperative medication was prescribed.

The patient returned for follow-up evaluation on days 1, 3, 7 and 14, and months 1, 3 and 6 after the procedure. Successful wound healing was achieved and the patient's clinical complaints disappeared. At the 6-month follow-up visit, we decided to extract the mandibular right second premolar due to a poor prognosis; the germ was erupting independent of the alveolar bone (Figs. 6 and 7).

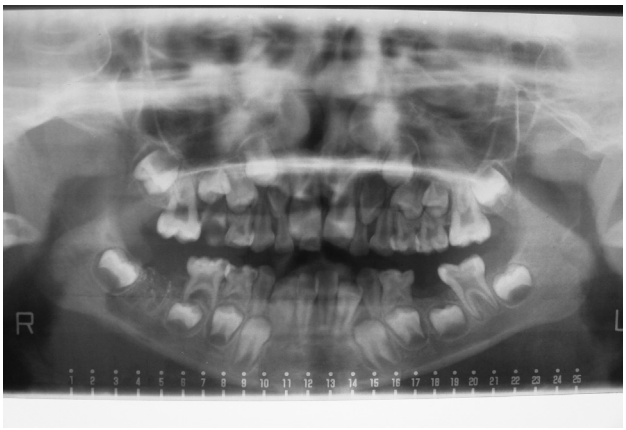

Fig. 2 – Preoperative panoramic radiograph.

Because of the patient's youth, stage of tooth eruption, and developmental potential of the jaws, prosthetic treatment was postponed until after a long-term follow-up period.

3. Discussion

Arsenic is a protoplasmic poison that is extremely toxic and carcinogenic when it comes into contact with tissues.[5] The diffusion of such an agent out of the cavity can readily cause widespread necrosis of the gingiva and bone, which can lead to osteomyelitis of the jaw.[6]

The exact mechanism of action of arsenic is not known, but several hypotheses have been proposed. At a biochemical level, inorganic arsenic in the pentavalent state may replace phosphate in several reactions. In the trivalent state, inorganic and organic arsenic may react with critical thiols in proteins and inhibit their activity. Potential carcinogenic mechanisms include genotoxicity, altered DNA methylation, oxidative stress, altered cell proliferation, co-carcinogenesis, and tumour promotion.[4]

The dental application of arsenic can cause the development of haemorrhagic lesions in the pulp in a stepping-stone-like manner along blood vessels. Therefore, although the

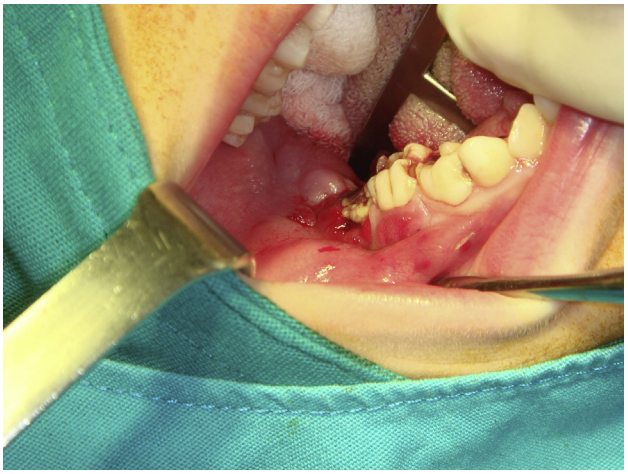

Fig. 1 – Preoperative intraoral clinical view.

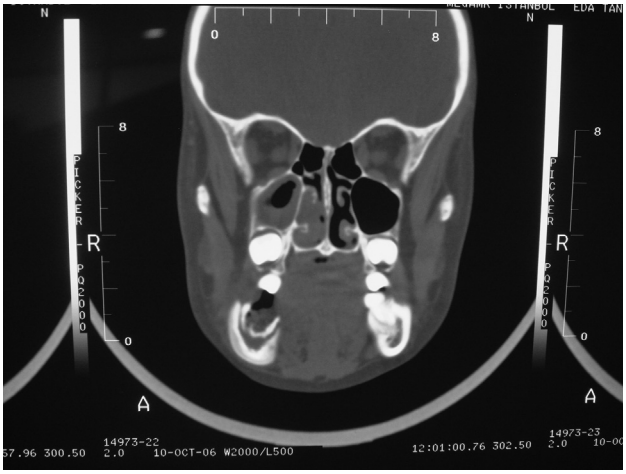

Fig. 3 – Coronal computed tomographic image.