CASE REPORT

Gingival necrosis following the use of a paraformaldehyde-containing paste: a case report

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Abstract

Özgöz M, Yağız H, Çiçek Y, Tezel A. Gingival necrosis following the use of a paraformaldehyde-containing paste: a case report. *International Endodontic Journal,* **37**, 157–161, 2004.

Aim To report on an unusual case of gingival necrosis following the use of a paraformaldehyde-containing paste in root canal treatment.

Summary Paraformaldehyde preparations are toxic to hard and soft tissues. In an era of effective local anaesthesia, toxic devitalizing preparations have few applications. However, in a mobile world population, severe tissue injury may occasionally be encountered after the use of paraformaldehyde or other toxic agents in some parts of the world. Dentists should avoid such preparations and be alert of the features and management of local toxicity if they encounter it in practice.

Key learning points

- Paraformaldehyde-containing pastes have no application in contemporary dentistry.
- Dentists should avoid toxic preparations for pulp devitalization.
- Dentists should be aware of the features and management of tissue necrosis resulting from the use of toxic dressing materials.

Keywords: endodontics, necrosis, paraformaldehyde-containing paste.

Received 2 April 2003; accepted 15 October 2003

Introduction

Chemotherapeutic agents containing formaldehyde were once commonly used in endodontic treatment (Cambruzzi & Greenfeld 1983). Toxic devitalizing agents such as arsenic trioxide (As_2O_3), a water-soluble compound, forming arsenious acid (H_3AsO_4), and paraformaldehyde were commonly used in the past to devitalize inflamed pulps when effective anaesthesia could not be obtained (Ozmeric 2002). Despite some clinical benefits, formaldehyde compounds are not always confined to the pulp, resulting in local soft- and hard-tissue necrosis, paraesthesia, as a result of nerve damage and allergic responses (Ehrmann

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1963, Rappaport *et al*. 1964, Barker & Lockett 1972, Stabholz & Blush 1983, Di Felice & Lombardi 1998).

Formocresol is advocated as an intracanal medicament because of its antibacterial and tissue-fixative properties (Wesley *et al*. 1970, Powell *et al*. 1973). Liquid formaldehyde compounds, such as formocresol (Powell *et al*. 1973), may be expressed through patent apical, lateral and accessory canals, and they cause soft tissue and bony injury within the periodontium (Cambruzzi & Greenfeld 1983, Jakhi *et al*. 1983, Yakata *et al*. 1985). Since the advent of effective methods of securing anaesthesia, the use of paraformaldehyde or other toxic preparations for pulp devitalization has declined (Bataineh *et al*. 1997). However, contrary to the trends within modern endodontics, it has yet to disappear from clinical practice, being advocated in vital primary endodontics and sporadically associated with severe tissue breakdown in adults (Martinez Sarda 1968, Grossman 1976, Cruse & Bellizzi 1980, Smart & Barnes 1991). The aim of this paper is to remind colleagues of the toxic effects of paraformaldehyde on soft and hard tissues when used needlessly for pulp devitalization.

Case report

A 20-year-old female presented to her dentist complaining of pain in the maxillary right quadrant. The practitioner elected to devitalize tooth 16, which had shown signs of pulpitis, with a paraformaldehyde-containing paste as local anaesthesia had been ineffective. Shortly after the placement of the paste, the patient experienced increasing pain and noticed that there was blackening of the gingiva (Fig. 1). She was referred to Ataturk University, Department of Periodontology, for advice regarding gingival necrosis associated with the distal interproximal area of tooth 16.

Clinical examination revealed inflamed gingiva with probing depths not exceeding 3 mm on the distal aspect of tooth 16. There was no measurable tooth mobility. Radiographic examination demonstrated expansion of the periodontal ligament and loss of lamina dura distal to tooth 16 (Fig. 2).

A decision was made to attempt to preserve the tooth by root canal treatment. Oral hygiene procedures were instituted and the necrotic tissues were removed from the area. The operative area was irrigated with saline. Root canal treatment was completed and the patient discharged for 1 week. One week later, there was no distal gingival papilla at tooth 16, and interproximal bone was exposed to a height of approximately 2–3 mm (Fig. 3). At this stage, a flap procedure was planned in order to remove more necrotic tissue and to

Figure 1 Appearance of affected area following the use of paraformaldehyde-containing paste.

Figure 2 Radiographic appearance of the affected area.

Figure 3 Appearance of the affected area after 1 week.

cover the root surface. A sulcular incision was performed initially and then a vertical incision was made between distal aspect of teeth 17 and 15. Exposed necrotic bone was removed with a curette and water-cooled bur. To protect the exposed bone and expedite healing, the affected area was covered by coronally repositioning the flap. The patient was reviewed to check healing. After 1 week, the sutures were removed and the operative area was irrigated with saline. At 1-year recall, the patient reported that the tooth was functional without any problem. Clinical examination revealed nothing abnormal – no symptoms, no detectable mobility, no periodontal pocketing. The tooth was in functional occlusion.

Discussion

Various chemicals used in medicating root canals are capable of creating adverse tissue reactions (Powell *et al*. 1973). This fact, combined with the knowledge that the pulp and periodontal ligament are interconnected via accessory canals, dentinal tubules and iatrogenic communications, suggests that overzealous use of intracanal medicaments can lead to deleterious effects to the host tissue with resultant postoperative discomfort (Marshall *et al*. 1960, Taylor *et al*. 1976). In the past, effective anaesthesia was either unavailable or rudimentary (Ozmeric 2002). Today, there are methods of anaesthesia and reliable anaesthetic agents able to control most pulpal pain for treatment. Therefore, it is unnecessary to

use chemicals for devitalizing pulps. However, they are still in use, and dental complications continue to be reported, even in developed countries (Stabholz & Blush 1983, Yakata *et al*. 1985, Smart & Barnes 1991). Paraformaldehyde has well-recognized toxic effects, which predictably occur on direct contact with gingiva and bone. The recovery of paraformaldehyde from a sequestrum is an indication of the local distribution of this toxic material in the tissues (Bataineh *et al*. 1997). In the present case, toxic effects of paraformaldehyde were seen on periodontal tissues, and the tooth was preserved by a combination of periodontal, endodontic and maintenance therapy.

Conclusion

As there is no longer any indication or need to utilize devitalizing preparations in dental practice, its continued and unjustified use must be condemned and should be prohibited. However, in a mobile world population, dentists should be aware of such materials and their adverse consequences, and be prepared to recognize and manage the tissue injuries that may result from their use.

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