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Case Report

Granuloma formation and loss of tooth vitality following the use of bone wax in third molar surgery: report of a case

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Abstract In the present case, granuloma formation and loss of tooth vitality following the use of bone wax in third molar surgery in a 16-year-old male patient were reported. Endodontic and surgical treatments were carried out on the patient. As foreign body granulomatous reaction to bone wax is not uncommon in the literature review, alternative haemostatic agents should be taken into consideration to avoid any potential complications and untoward effects of using bone wax for haemorrhage control in surgical procedures.

Keywords: Bone wax, complications, granuloma.

Introduction

Bone wax is biochemically inert and has been routinely used as a local haemostatic agent to control bleeding from injured bony surfaces in various surgeries. When bone wax is smeared across the bleeding bone, it functions like a mechanical barrier and helps to achieve local haemostasis by plugging the pores and blood channels within the bone. Bone wax is composed of white beeswax softened with isopropyl palmitate or pure paraffin wax (Low and Sim, 2002).

A number of adverse effects of bone wax following its use have been reported. Documented complications include foreign body giant cell reaction in the foot (Hill *et al*., 2013), inferior alveolar nerve damage in third molar surgery (Katre *et al*., 2010), foreign body reaction to bone wax from iliac crest donor site (Qayum and Koka, 2009), bone-wax granuloma after femoral neck osteoplasty (Lavigne *et al*., 2008), an unusual jugal abscess after third molar extraction (Brignol *et al*., 2007), retroperitoneal tumour associated with a foreign-body reaction to bone wax in iliac crest grafting (Verborgt *et al*., 2000) and adverse effects of bone wax in orbital surgery (Katz and Rootman, 1996).

Case history

The present report highlights possible complications of using bone wax in third molar surgery in a 16-year-old male patient. The patient was referred to the clinic by a general practitioner for the management of persistent gum swelling and discomfort at the lower right second molar following surgical removal of his lower right third molar one year earlier. The patient presented with a reddish seven by five mm tumour at the buccal side of the lower right second molar which was free of caries and unrestored (Fig. 1). Upon examination, he had a caries free dentition and healthy periodontium. An electric pulp test performed on the lower right second molar, has confirmed that the tooth was non-vital. Intraoral periapical radiograph has shown slight widening of the periodontal ligament space of the lower right second molar and a round radiolucent lesion distal to it (Fig. 2). Excisional biopsy and exploratory surgery were suggested to rule out any underlying cause and the surgical procedure was explained to both the patient and the patient's father. Root canal treatment of the lower right second molar was initially carried out (Fig. 3) followed by excisional biopsy and exploratory surgery.

Fig. 1 View of the tumour at buccal of lower right second molar.

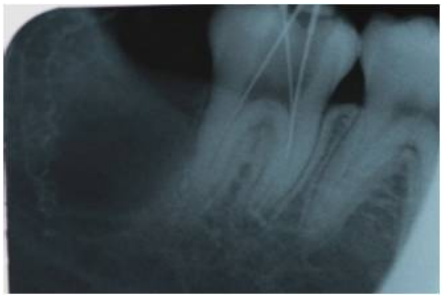

Fig. 2 Intraoral periapical radiograph showing a large round radiolucency distal to the lower right second molar.

Fig. 3 Root canal treatment carried out.

Fig. 4 Buccal tumour excised.

Fig. 5 Bone wax curetted.

Fig. 6 The large bony defect.

Fig. 7 Healing surgical site after a week.

Fig. 8 Orthopantogram from the patients previous dental records shows all four developing third molars, an impacted upper left permanent canine with a retained upper left deciduous canine and also a lower right distomolar.

Informed and written consent were taken and signed by the patient's father. Right inferior dental nerve block was administered. The tumour was excised (Fig. 4) and a full thickness mucoperiosteal buccal flap was raised,where yellowish material was visible and suspected to be the bone wax applied during the third molar surgery. Curettage of the suspected bone wax found in the large bony defect was carried out (Fig. 5). Consequently, the bony crater (Fig. 6) was then irrigated with normal saline and no haemostatic agent was applied. The flap was replaced and bleeding was arrested by suturing with polyglycolactide 4-0 suture.

Biopsy specimen and suspected pieces of bone wax curetted were sent for histopathological examination. Further follow-up visits were given to monitor the recovery. The biopsy results revealed the curetted pieces as the wax material and confirmed a foreign body granulomatous reaction to bone wax. A week after the surgery, the surgical site was examined and found to be healed (Fig. 7). The patient remained asymptomatic following surgical intervention.

We were able to contact and obtain records of the patient from his previous dentist. An orthodontist had earlier sent the patient for surgical removal of all his third molars, a mesioden and also a distomolar prior to orthodontic management of his Class III incisor relationship with a Class III skeletal profile. Orthopantogram (OPG) taken previously for orthodontic treatment planning revealed the presence of all four developing third molars, an impacted upper left permanent canine with a retained upper left deciduous canine and also a lower right distomolar (Fig. 8).

Discussion

Bone wax is a foreign body and when used in surgery for heamorrhage control, it can be associated with potential complications. Bone wax is non-resorbable (Ainfinsen *et al*., 1993) and is known to interfere with bone growth and bone healing after surgery. It increases the risk of infection because it reduces the body's ability for bacterial clearance and the wax material may act as a nidus for infection (Ogle, 2000). In the present case, it may have resulted in infection of the periapical area of the lower right second molar tooth with subsequent pulpal necrosis of the tooth and inhibition of bone healing at the third molar region. With a number of complications documented, surgeons should be aware of bone wax adverse effects and be extra careful in selection of an appropriate haemostatic agent when dealing with bleeding during surgical procedures.

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