# Dental follicle infection following a dog bite

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**Summary.** Animal bite wounds and their subsequent infection are relatively common. Incidence rates for dog bites are significantly higher among children aged 0–9 years, especially among boys. Although bite wounds may initially look innocuous, they frequently lead to serious infection with a potential for life-threatening complications. The microbiology of dog bite wounds is usually polymicrobial, typically including anaerobes, *Staphylococcus aureus* and *Pasteurella* species. A case is described of a 22-month-old boy who, subsequent to a dog bite over the left maxilla, suffered infection of the dental follicle of the primary maxillary canine with *Pasteurella multocida*. The infection proved difficult to treat, requiring several attempts at incision and drainage of the abscess together with systemic antibiotics, and resulted in the eventual loss of the tooth.

## Introduction

Bite wounds contaminated by animal and human oral flora are relatively common [1]. Dog bites account for 80-90% of all animal bites requiring medical care, and are also responsible for a significant number of traumatic injuries in children [2]. Incidence rates are significantly higher among children aged 0-9years, especially among boys [3]. In addition, children seen at emergency departments are more likely to be bitten on the face, neck and head than adults [2].

Although bite wounds may look innocuous initially, they frequently lead to infection that can progress to more serious complications [4,5]. These complications include cellulitis, osteomyelitis, septicaemia and death [1].

The microbiology of bite wounds is polymicrobial. Anaerobes usually account for the largest proportion and include species such as *Prevotella* and *Porphyromonas*. Many of the anaerobes isolated are beta-lactamase producers. *Pasteurella multocida* species are commonly isolated together with other microorganisms, such as *Staphylococcus aureus*, Streptococcal species and *Capnocytophaga* [6–8].

This report describes the first case of an infected dental follicle secondary to an animal bite.

### **Case report**

A healthy 22-month-old boy was referred to the Casualty clinic within the department of Child Dental Health, Glasgow Dental Hospital and School, Glasgow, UK, by his general dental practitioner. The patient presented with a swelling adjacent to the partially erupted upper left primary canine. The swelling had gradually increased in size over the previous 4 days. No other symptoms were reported at this time.

The clinical history revealed that the patient had been bitten by a dog on the left infraorbital region in the previous 6 months. Emergency management of the wound in the accident and emergency department of the local district general hospital consisted of debridement and primary closure with Steri-Strips; no antibiotics were provided at this stage. Subsequent healing was complicated by the formation of an infected granulomatous scar. This was treated by surgical revision under general anaesthesia under the care of the plastic surgeons at the local general hospital.

Extraoral examination revealed a scar present in the left infraorbital region (Fig. 1). A small, firm swelling was palpable in the left cheek. There was no associated lymphadenopathy.

Intraorally, the upper left primary canine was noted to be partially erupted, with the cusp tip visible. A discrete swelling approximately one centimetre in diameter was visible on the buccal gingivae adjacent to the tooth (Fig. 2).

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Fig. 1. Scar present in the left infraorbital region.

The lesion was yellow in colour and had a firm consistency. An infective aetiology was suspected and the differential diagnosis included:

- infection of original wound that had gravitated to appear intraorally;
- an infected eruption cyst;
- an infected follicle of upper left primary canine;
- infection of supernumerary tooth; and
- a foreign body.

An aspirate of pus from the lesion was obtained under topical anaesthetic. Culture of the specimen revealed a heavy growth of *P. multocida* species. Frequent warm salty mouthwashes were advised and no antibiotics were prescribed.

At a review 4 days later, the swelling was noted to have recurred, and further incision and drainage under topical anaesthetic was again required. On subsequent review after a further week, the area



Fig. 2. Discrete swelling approximately one centimetre in diameter visible on the buccal gingivae adjacent to the tooth. The ungloved hand is that of the patient's mother.

appeared to be improving. Examination revealed resolution of the extraoral swelling, although a small firm area persisted in the buccal sulcus adjacent to upper left primary canine.

Five months later, and 11 months after the original trauma from the dog bite, the child was referred back to the Dental Hospital by the consultant plastic surgeon, who noted that the swelling had recurred, and was concerned that this may be because of either a persistent foreign body or osteomyelitis. Incision of the swelling under topical anaesthetic was again successful in providing drainage. The patient was reviewed one week later, at which time radiographic examination revealed a radiolucency associated with the upper left primary canine. An oblique maxillary occlusal radiograph of the region showed that the permanent upper left central and lateral incisors were developing normally, although



Fig. 3. Permanent upper left central and lateral incisors, which had been developing normally. The upper left primary canine appears to be of abnormal morphology.

the upper left primary canine appeared to be of abnormal morphology (Fig. 3).

The patient was admitted to the Royal Hospital for Sick Children, Glasgow, for extraction of the canine and curettage of the socket. This was performed under perioperative antibiotic cover comprising intravenous amoxicillin at induction, followed by oral administration of 125 mg three times daily for 7 days.

The patient has since been reviewed on a 6monthly basis and is progressing well. There is no evidence of recurrence of the swelling or purulent discharge. A slightly firm area remains palpable in the buccal sulcus close to the area of infection, which is believed to correspond to the fibrous scar tissue related to a sinus tract. A radiographic examination demonstrated bone healing in the affected region.

# Discussion

*Pasteurella* species are Gram-negative coccobacilli which inhabit the oral cavity and gastrointestinal tract of many animals. They are pathogens capable of producing a variety of diseases in humans, ranging from abscesses and cellulitis to septicaemia. Most human infections are caused by the subspecies *P. multocida* and *P. septica*, the former of which being the most predominant.

Pasteurella multocida, subspecies multocida, has a worldwide distribution and is recovered from the nasopharynx and gastrointestinal tract of 50-65% of domestic dogs. The organism is usually carried asymptomatically, but can cause upper and lower respiratory tract infections in these animals. Acute localized infections in humans are characterized by oedema and polymorphonuclear infiltration, followed by abscess formation, particularly in tissues such as the lungs, meninges, joints and bone [9]. Unusually, in this case, the infection was associated with the primary dental follicle.

The usual mode of infection from Pasteurella species follows intraperitoneal or parenteral inoculation of *P. multocida*. Following inoculation, the organisms rapidly multiply, invade the bloodstream and cause microabscesses and haemorrhagic lesions [9].

At the time of the dog bite, the maxillary primary canine would have completed crown formation and root formation would be partially completed [10]. Radiographic review at age 2.3 years (11 months after the dog bite) revealed that the left maxillary primary canine was only at the very earliest of stages of root formation, suggesting that tooth formation had ceased at the time of the dog bite.

The treatment of bite wounds is twofold: (1) adequate surgical debridement and (2) appropriate antibiotic treatment where indicated. Surgical debridement is the mainstay of treatment, even for apparently superficial injuries. Close examination for puncture wounds, debris and crush injury are essential. Subsequent to thorough cleaning, there is no evidence that the infection rate after primary closure of wounds is higher, and indeed, primary closure is not contraindicated [11]. Antimicrobial prophylaxis for all bite wounds is controversial, and will depend on the extent and age of the wound and the presence of patient risk factors such as asplenism, immunosuppression and immunocompromization [11]. Having conducted a Cochrane Review, Medeiros and Saconato reported that there is evidence from one trial that prophylactic antibiotics reduce the risk of infection after human bites, but that confirmatory research is required. However, there is no evidence that the use of prophylactic antibiotics is effective for cat or dog bites [12]. If prophylaxis is provided, the first-line antimicrobial is coamoxiclay. For patients who are allergic to penicillin, options include a combination of both metronidazole and azithromycin.

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#### What this paper adds

• A dog bite can result in the infection of a dental follicle.

#### Why this paper is important for paediatric dentists

- Dog bites are common, affect the head and neck and occur mostly in children.
- Paediatric dentists may be required to provide surgical treatment for dog bite injuries.

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