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Apicoectomy and Root Canal Therapy of Canine Teeth in the Dog

by
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Summary
When the root canal of the canine tooth of a dog is exposed due to wear or fracture, the result may be abscessation, bone resorption and evulsion of the alveolus. The tooth must be extracted or endodontic therapy may be performed to restore the root canal. Techniques are described to stabilize both maxillary and mandibular canine teeth through root canal restoration and apicoectomy to seal the apex of the root and prevent future infection and abscessation.

Introduction
When the canine tooth of the dog becomes worn or is fractured the pulp canal is often exposed making the tooth very sensitive to pain. The dog may have altered eating habits and loss of weight. The dog may show pain by holding his head to one side, pawing at his mouth and salivating excessively. As the pulp canal becomes progressively exposed microorganisms from the oral cavity may enter the root canal and cause necrosis of the pulp material. The eventual result could be abscessation, bone resorption and evulsion of the alveolus. The alternative treatments are extraction of the canine tooth or endodontic therapy to restore the root canal. The loss of a canine tooth would be detrimental to military working dogs or to hunting dogs. Root canal restoration would be an economical and reliable method of preserving the tooth.

The post-operative care is minimal and the animal may resume normal mastication and work as soon as the anesthetic has worn off.

Anatomy
The upper and lower canine teeth are large and the root consists of nearly two-thirds of their length. The apex of the upper canine tooth is directly above the first premolar in a convexity caused by the tooth. The apex of the lower canine tooth is approximately 6 mm lateral to the posterior limit of the mandibular symphysis (Fig. 1).

The pulp cavity follows the contour of the tooth and gradually tapers to constriction at the apex. The cavity consists of the pulp chamber and root canal. The dental pulp is a highly vascular, connective tissue organ enclosed by dentin which doesn’t allow for swelling. The loose structure of the material allows microorganisms to enter and inflammatory exudates to accumulate. The pulp is made up of gelatinous ground substance, collagenous and argyrophilic fibers, terminal blood vessels, lymphatics, and nerves.

Materials
The equipment used included a handheld dental drill with a bone burr and assorted inverted cone bits, a suction device, endotracheal tube, and an inhalation anesthetic machine. The surgical pack would include the following:
1. Root canal files, 30 mm diameter
2. No. 10 surgical blade with handle
3. mosquito forceps
4. needle holders

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Surgical Procedures

The operation consists of two different procedures, the apicoectomy and the repair of the root canal. The atropinized patient is anesthetized with sodium thiamylal and a surgical plane is maintained with halothane. The apicoectomy is performed by making an incision in the gingiva from the level of the lateral incisor to the fourth premolar (Fig. 1). The incision line may be infiltrated with epinephrine to reduce bleeding. The apex of the canine tooth is made accessible through an opening in the maxillary bone with the hand drill and a bone burr. The apicoectomy will expose any abscesses in the periodontal tissue which may be easily removed.

The root canal is cleaned by inserting dental root canal files through the opening left by the fracture. Black necrotic material is often removed. Another opening is made into the root canal with the hand drill and dental burr approximately 5 mm below the gingival line on the anterior side of the canine tooth (Fig. 1). Dental files are inserted into the opening trying to remove as much of the necrotic, infective material as possible. Absorbent cotton points are applied into the root canal until they come out clean in an effort to remove as much of the root canal material as possible.

Gutta percha points are dipped in chloroform or ether and inserted into the root canal in the tip of the tooth until the canal is full of the material and it can be seen at the level of the second access to the root canal. It is then instilled into the second opening until it is seen coming from the apex of the tooth. Ideally the root canal will be completely filled with gutta percha material leaving no dead spaces. The enamel is enlarged with an inverted cone bit on the hand drill making a seat for the white dental resin sealing the openings in the crown, near the gingiva, and in the apex.

A broad spectrum antibiotic such as powdered tetracycline from a 250 mg capsule is put under the gingival flap and it is closed with 2-0 chromic catgut using a simple interrupted pattern.

Post-operative care is minimal and the dog can be sent home as soon as the dog recovers from the anesthetic. The dog may be put on a seven-day course of oral tetracycline. Complication may be infection or discoloration of the tooth.

Discussion

It is recommended that pre-operative radiographs be taken to determine the location of the root canal and the root apex and pathologic changes in the periapical tissue and calcification in the root canal. Radiographs will permit efficient and effective procedures with minimum trauma to the operating area. Human occlusal dental film may be used. It is large enough to cover the canine tooth from apex to crown and will accommodate the curvature of the mouth. The film is placed on the medial surface of the tooth as parallel as possible.

The root canal could be flushed with an antiseptic solution such as 2% hydrogen peroxide to reduce bacterial population and remove any extraneous material.

The canal may also be filled with a mixture of zinc oxide and eugenol paste. It is injected into the canal with a 2 ml syringe and 1½ inch, 22 gauge needle. Care must be taken to prevent the formation of air pockets with this method.

The openings into the canal including the apex have been filled with a silver amalgam seal. The problem is that amalgam is a different color than the tooth; which would be acceptable for a military dog but may not be for a civilian dog. It would also take special equipment

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*Gutta percha is a refined, coagulated milky exudate of certain trees of the Malayan Archipelago. It resembles rubber in both chemical and physical characteristics. Dental gutta percha is refined and mixed with other substances such as zinc oxides. It is pliable at room temperature, plastic at 60° C, and soluble in chloroform, ether, and xylol.

Surital, Parke-Davis Company, Detroit, Michigan.

to mix the silver amalgam and care must be taken to obtain a smooth junction with the enamel. The newer dental resins are durable and easy to work with and will match the color of the tooth.

When the mandibular canine tooth is involved the preparation of the root canal is essentially the same as for the maxillary canine tooth. It is usually done before the apicoectomy because the approach to the apex of the tooth is obtained through an incision ventrally over the mandible. The incision is centered lateral to the posterior end of the mandibular symphysis (Fig. 2). The apex is most easily located with radiographs because it varies from animal to animal. It is usually 4 to 6 mm lateral and 1 to 3 mm anterior to the posterior symphysis of the mandible. A dental bone burr is used to penetrate the mandible. The filling of the canal and sealing the exposures to the canal is the same as for upper canine teeth.8

Bibliography