

Surgicotherapeutic management of perio-endodontic pathologies in dogs

Gurmeet Singh¹, Mahendra Tanwar^{2*}, Sakar Palecha², K. Kachwaha³ and P. Bishnoi⁴

Rajasthan University of Veterinary and Animal Sciences, Bikaner-334 001 (Rajasthan)

¹MVSc Scholar, ²Assistant Professor, ³Instructor, ⁴Professor & Head, Department of Veterinary Surgery and Radiology, College of Veterinary and Animal Science, Bikaner

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The present study was conducted on five dogs, comprising four males and one female, to evaluate the clinical presentation, diagnostic modalities, and therapeutic management of perio-endodontic affections. All dogs were presented with a history of anorexia and halitosis. Clinical examination consistently revealed halitosis, gingivitis, dental calculus, and hypersalivation. Tooth discolouration was observed in three dogs, whereas two dogs exhibited complicated crown fractures of the canine teeth associated with pulp exposure, infection, and necrosis. Intraoral radiographic assessment using digital radiovisography demonstrated widened pulp cavities and periapical radiolucencies in the affected teeth. Periodontal management was achieved through dental scaling in all cases. Root canal therapy was selectively performed in two dogs with fractured canine teeth and pulpal involvement. All dogs showed favourable clinical recovery without postoperative complications. The findings of this study highlight the significance of early diagnosis and comprehensive dental management in achieving successful outcomes in dogs affected with perio-endodontic lesions.

Keywords: Dental scaling, Endodontics, Periodontal disease, Pulp cavity, Root canal therapy

Periodontal-endodontic lesions are common in both humans and dogs and involve pulpal necrosis with concurrent periodontal attachment loss extending to the apex or lateral canals (Marretta *et al.*, 1992). Oral malodor associated with gingivitis and periodontitis primarily results from Gram-negative anaerobic bacterial activity (Morita and Wang, 2001). Fractures of the canine teeth are frequently observed in dogs and may lead to pulpitis, pulp necrosis, periapical abscessation, and infraorbital fistula formation if untreated (Le Brech *et al.*, 1997; Camargo *et al.*, 2010). Tooth discolouration due to trauma or infection is also common and requires clinical and radiographic evaluation (Hale, 2001). Root canal therapy is widely used in veterinary dentistry to preserve strategically important teeth affected by pulpal injury (Gorrel and Robinson, 1995). Owing to the clinical importance of these conditions, the present study was undertaken to evaluate the diagnosis and management of perio-endodontic affections in dogs.

Five adult dogs diagnosed with perio-endodontic affections were included in the study. The cases included four males and one female; three dogs were

aged 4-8 yr, while the remaining two were between 8 and 12 yr. A similar age-related predisposition for periodontal disease has been widely reported, with increased incidence observed in older dogs (Harvey *et al.*, 1994; Niemiec, 2008). Diagnosis was done based on case history, clinical examination, and radiographic evaluation. Two dogs were presented with complicated crown fractures of the mandibular canine teeth, one involving the left canine and the other the right. Fractures of functionally important teeth, particularly canine teeth, are commonly encountered in dogs and are frequently associated with pulp exposure, infection, and subsequent endodontic disease (Le Brech *et al.*, 1997; Soukup *et al.*, 2015).

Three dogs exhibited tooth discolouration, characterised by a dull yellow to greyish hue of the crown with absence of light transmission on transillumination. The affected teeth included the maxillary left third incisor and maxillary left canine in the first case, the maxillary right canine in the second case, and the maxillary left canine in the third case (Fig. 1). Such intrinsic discolouration is commonly associated with pulp necrosis or previous trauma and has been well documented in veterinary dental literature (Hale, 2001; Verstraete, 2005).

All dogs exhibited varying degrees of periodontal disease and presented with a history of anorexia and halitosis. Clinical examination revealed gingivitis, dental calculus accumulation, and congestion of the gingival mucosa. Excessive salivation was also observed. These findings are consistent with previous reports identifying calculus deposition, gingival inflammation, and oral tissue changes as common clinical features of periodontal disease (Wiggs and Lobprise, 1997; Harvey, 1998; Niemiec, 2008). Halitosis, present in all cases, is strongly associated with periodontal pathology and results from bacterial putrefaction within the oral cavity (Culham and Rawlings, 1998).

All five cases were evaluated radiographically for endodontic pathology. Endodontic lesions, characterised by widening of the pulp cavity associated with infection and necrosis (Fig. 2), were identified using intraoral radiography with a radiovisography (RVG) system. Radiographic findings such as pulp chamber enlargement and periapical radiolucency are considered reliable

*Corresponding author; E-mail: gurmeetsingh008190@gmail.com



Fig. 1: Discolouration of the maxillary left canine tooth (black arrow) with concurrent calculus deposition on the maxillary left last premolar (red arrow) in a female Labrador Retriever.



Fig. 3: Crown fracture of tooth 304 with exposure of necrotic pulp tissue; **Fig. 4:** Access preparation through the fractured crown (red arrow) using a No. 4 carbide bur to reach the root canal system.



Fig. 2: Preoperative intraoral radiograph of the left mandibular canine tooth obtained using digital radiovisiography (RVG), showing a widened pulp cavity due to pulp infection and necrosis (red arrow), complicated crown fracture (black arrow), and periapical radiolucency indicating apical infection (blue arrow).

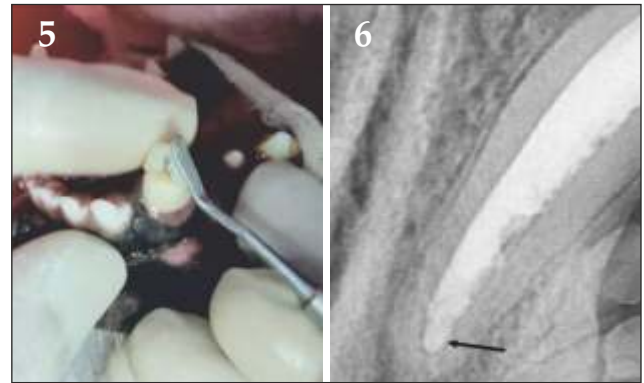


Fig. 5: Final restoration of the tooth crown to its original shape and size using composite restorative material; **Fig. 6:** Postoperative intraoral radiograph showing the root canal filled with gutta-percha material extending to the apex (arrow).

indicators of pulpal disease (Verstraete and Lommer, 2012; Niemiec, 2013).

Perio-endodontic affections were managed using dental scaling and root canal therapy under general anaesthesia. Pre-anaesthetic medication consisted of atropine (0.02 mg/kg) and xylazine (1.0 mg/kg), administered intramuscularly 10 min prior to induction. Anaesthesia was induced with ketamine (5.0 mg/kg, i.m.) and maintained using isoflurane inhalation. All animals were fasted for 12 hr for food and 6 hr for water prior to the procedures.

In both cases of complicated canine tooth fractures (Fig. 3), treatment commenced with dental scaling to remove calculus. Ultrasonic scaling is widely recognised as an effective method for plaque and calculus removal and for improving periodontal health (Wiggs and Lobprise, 1997; Niemiec, 2008). Conventional root canal therapy was subsequently performed, beginning with coronal access to the pulp chamber using a No. 4 carbide bur (Fig. 4). This was followed by canal debridement and shaping using a barbed broach, EDTA gel, a master K-file, sodium

hypochlorite solution, and normal saline irrigation. The canal was then dried and obturated using zinc oxide eugenol (ZOE) and gutta-percha. Coronal restoration was completed using phosphoric acid etching gel and a stainless-steel pin. These steps are consistent with standard endodontic protocols in veterinary dentistry (Bellows, 2004; Holmstrom *et al.*, 2007; Niemiec, 2013).

Following root canal therapy, glass ionomer cement was applied to the restoration or fracture site. A layer of hybrid bonding agent was then applied, followed by a thin layer of composite resin (Fig. 5) to restore the anatomical contour of the fractured canine crown. Postoperative radiographic evaluation using RVG confirmed complete obturation of the root canal up to the apex with gutta-percha (Fig. 6). Successful outcomes of root canal therapy in dogs have been well documented, supporting its role in the preservation of strategically important teeth (DuPont, 2001; Pavlica *et al.*, 2001; Kuntsi-Vaattovaara *et al.*, 2002).

After treatment, the owners were advised to feed the dogs a semi-liquid diet for three days. Postop-

erative care included an analgesic syrup containing meloxicam, a vitamin B-complex syrup, and a broad-spectrum antibiotic (ceftriaxone with tazobactam) administered intramuscularly (25 mg/kg) once daily. Treatment outcomes were assessed by comparing pre- and post-operative radiographs, along with clinical and radiographic findings during follow-up. All cases were monitored for three months postoperatively, during which no complications were observed. The absence of postoperative complications and satisfactory healing indicate the effectiveness of the combined therapeutic approach.

In three cases of discoloured teeth, only dental scaling was performed to remove calculus deposits. No further surgical intervention was undertaken due to the absence of significant clinical signs and owner reluctance. Conservative management in such cases is considered acceptable when the condition is asymptomatic and does not compromise function (Niemiec, 2008).

The present study demonstrates that a combined therapeutic approach involving dental scaling and root canal therapy is effective in the management of perio-endodontic lesions in dogs, enabling resolution of infection and preservation of functionally important teeth. These findings underscore the clinical value of conservative dental procedures as viable alternatives to extraction in appropriately selected cases. Early diagnosis, timely intervention, and careful case selection remain critical determinants of successful outcomes and long-term prognosis in canine perio-endodontic disorders.

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