SHORT COMMUNICATION

Treatment Outcomes of Mandibular Fractures in Dogs: A Retrospective Study of 24 Cases

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Abstract

Mandibular fractures present unique surgical challenges due to their anatomical complexity. This retrospective study of 24 dogs examines fracture patterns, management strategies, and outcomes. Road traffic accidents were the predominant etiology (n=13), followed by dog bites (n=7), falls (n=3), and horse kicks (n=1). Patients were presented with signs of oral bleeding, jaw mal-alignment, swelling, and reluctance to eat. A high incidence occurred in dogs under one year (n=12) and Indian Pariah breed (n=20), with males predominating (n=16). Bilateral fractures occurred in 13 cases, while 8 had multiple fractures. Fracture distribution was: canine-premolar region (n=10), symphyseal separation (n=6), third-fourth molar region (n=4), last molar-ramus (n=4), incisor-canine (n=3), first-second molar (n=3), with one concurrent maxillofacial fracture. Stabilization techniques employed were circumferential wiring, K-wires, plates (cuttable, SOP), and external fixation. Postoperative care included soft diet, antibiotics, analgesia, and antiseptic rinses.

Key words: Dog, Fracture, Mandible, Road traffic accident.

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Introduction

Mandibular fractures account for approximately 1.5% to 16.0% of all fractures diagnosed in dogs (Shamir *et al*., 2002), frequently resulting from road traffic accidents. The anatomical location and configuration of these fractures are critical determinants for selecting appropriate treatment methods and predicting outcomes (Glyde and Lidbetter, 2003). Unlike long bones, the mandibles of dogs and cats lack a medullary canal; their cortical bone instead encloses cancellous bone and the mandibular canal, which houses the inferior alveolar neurovascular structures, but contains no haematopoietic cells (Lopes *et al*., 2005). Various stabilization techniques have been described for mandibular body fractures, including tape muzzles, intramedullary pinning, transfixation pinning, intraoral splints, intraosseous wiring, interdental wiring, interarcade wiring, plate and screw fixation, miniplate fixation, and external skeletal fixation using Kirschner-Ehmer splints (Castejon-Gonzalez *et al*., 2022). Complication rates associated with mandibular fracture repair in dogs can reach upto 34% (Harasen, 2008). This report documents a retrospective study of 24 mandibular fractures in dogs and its treatment outcomes.

Materials and Methods

Twenty-four dogs presented with mandibular instability to the Madras Veterinary College Orthopaedic Unit between January 2021 and August 2023 were included in the study. Clinical signs encompassed oral bleeding, regional swelling, jaw mal-alignment, and reluctance to eat. All patients underwent comprehensive physical, oral, and orthopaedic examinations to identify concurrent injuries. Recorded data included sex, age, breed, and fracture aetiology. Radiographic evaluation of the skull and mandibles (dorsoventral, lateral, and lateral oblique views) determined fracture location, conformation, and unilateral or bilateral involvement. The fixation technique employed for each fracture was documented. Clinical outcomes and complications were assessed via follow-up physical examinations and radiographic evaluations.

Following initial stabilization and management of concurrent injuries, all dogs received intravenous butorphanol (0.2 mg/kg) and were maintained on intravenous fluids due to impaired prehension and mastication. A tape muzzle was applied preoperatively to minimize discomfort and fragment mobility caused by mandibular movement. Detailed oral examination and radiography were performed under sedation to plan fixation. Patients were fasted for 12 h preoperatively. Intramuscular amoxicillin-sulbactam (12 mg/

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kg) was administered 12 h and again 1 h prior to anaesthetic induction, to prevent secondary bacterial infection.

General anaesthesia was induced for all cases: premedication with intravenous butorphanol (0.2 mg/kg) and diazepam (0.25 mg/kg), induction with intravenous propofol (4 mg/kg), and maintenance with 1.5% isoflurane in 100% oxygen. A gauze pack was placed caudal to the endotracheal tube, and the oral cavity was flushed with chlorhexidine solution. Surgical objectives were restoration of normal dental occlusion (scissor bite), improved comfort, facial aesthetics, and early functional recovery. Techniques employed included: circumferential wiring for symphyseal fractures; and interfragmentary wiring, K-wires, plates (veterinary cuttable plates, string of pearls plates), or external skeletal fixators for mandibular body fractures (Fig. 1).

Symphyseal fractures were stabilized by drilling holes medial to the mandibular canine teeth bilaterally, parallel to the symphysis, followed by circumferential orthopaedic wire tightening (Fig. 2). For mandibular body fractures, a ventral approach was made by incising along the ventral border and separating the platysma (laterally) and mylohyoid (medially) muscles. Plates were applied laterally to the mandible, with screw placement avoiding tooth roots (Fig. 3). Closure involved apposition of muscle layers followed by subcutaneous tissue and skin. In select cases utilizing an open ventral approach, interrupted inter-fragmentary wires were placed perpendicular to the fracture line after fragment drilling (using K-wires or a 2-mm drill bit) (Fig. 4).

Results and Discussion

Out of 24 dogs with mandibular fractures included, 16 were male and 8 were female. Breeds represented were Indian Pariah dog (n=20), Great Dane (n=1), Labrador Retriever (n=1), Chippiparai (n=1), and Miniature Pinscher (n=1). Male dogs and Indian Pariah breed were disproportionately affected, likely reflecting both their higher population density and increased roaming behaviour near roadways. This demographic predisposition correlated with findings by Lopes *et al*. (2005), who similarly documented greater fracture incidence in males. Conservative management of mandibular body fractures without stabilization yielded inconsistent outcomes in our cohort.

Age distribution was less than one year (n=12), one to two years (n=5), two to five years (n=5), and greater than five years (n=2). A significant occurrence of mandibular fractures was observed in dogs under one year of age. This finding aligned with reports by Castejon-Gonzalez *et al*. (2022) and Kitshoff *et al*. (2013), suggesting that the playful behaviour of young animals increases susceptibility to injury. Younger dogs may also be predisposed due to lower bone mineral density compared to mature individuals, rendering their bones more prone to fracture (Lorinson *et al*., 2008). In contrast, Lopes *et al*. (2005) reported a higher incidence in older dogs, indicating potential age-related risk variations across populations.

Reported aetiologies were road traffic accidents (n=13), dog bites (n=7), falls from height (n=3), and kick by a horse (n=1). Road traffic accidents constituted the primary etiology, consistent with reports by Copcu *et al*. (2004) and Castejon-Gonzalez *et al*. (2022). Most mandibular fractures in dogs are open (~81%), yet demonstrate notable resistance to infection. Human and veterinary studies report lower osteomyelitis rates in mandibular fractures compared to other skeletal sites, attributed to the region's rich vascularization (Glyde and Lidbetter, 2003). No osteomyelitis cases occurred in this series.

Bilateral mandibular fractures were present in 13 cases, while 8 cases had multiple fractures. Fracture locations were predominantly between the canine and premolar teeth (n=10) (Fig.5), followed by symphyseal separation (n=6) (Fig. 6), between the third and fourth molars (n=4), between the last molar and ramus (n=4), between incisors and canine teeth (n=3), between the first and second molars (n=3), and one case involved a concurrent mandibular and maxillary fracture. Fractures occurred most frequently between the canine and premolar teeth, often with concurrent symphyseal separation. This pattern reflects the inherent weakness of the synchondrosis intermandibularis - a fibrocartilaginous junction (Verstraete, 2003). Fibrous proliferation at this site often provides stability without bony union, facilitating shorter healing times. Transverse symphyseal fractures and short

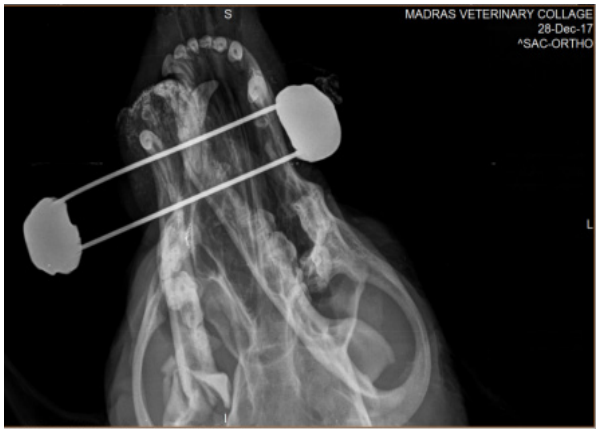

Fig. 1: fracture fixation using external fixator

Fig. 2: Symphyseal fracture fixation by cerclage wiring

Fig. 3: Fracture fixation by inter-fragmentary wiring technique

Fig. 4: Fracture fixation using String of pearls plate

Fig. 5: Bilateral rostral mandibular fracture between canine premolar teeth

Fig. 6: symphyseal fracture

oblique fractures in the premolar region further support this biomechanical vulnerability (De La Puerta *et al*., 2008). The protective effect of caudal masticatory muscles likely explains the lower ramus fracture incidence (Kitshoff *et al*., 2013).

Postoperatively, all dogs were prescribed a soft gruel diet, oral amoxicillin-clavulanate tablets (12.5 mg/kg BID for 5 days), oral carprofen tablets (2.2 mg/kg BID for 4 days), and a chlorhexidine-based mouthwash for rinsing after feeding.

Potential complications such as pin migration, malocclusion, and delayed bone union were predominantly observed in cases where intramedullary fixation using K-wires was employed. These complications are likely attributable to the inherent limitations of K-wire fixation, including inadequate stabilization, lack of rotational control, and possible disruption of normal bone healing dynamics. Fractures stabilized using the plating technique, as well as rostral mandibular fractures managed with interdental wiring and symphyseal fractures, healed without complications. Fractures located rostral to the molar region of the mandible generally exhibit faster healing compared to those positioned caudally. As the mandibular symphysis is a synarthrosis, it often stabilizes through fibrous tissue proliferation rather than complete bony union, resulting in a comparatively shorter healing period (Guzu and Hennet, 2017).

This case series in general confirms that mandibular fractures in dogs predominantly affect young, male dogs, with road traffic accidents being the primary etiology. Fractures frequently occur in the canine-premolar region and symphysis, requiring tailored stabilization (wiring, plates, or external fixation). With proper treatment and postoperative care, the prognosis is usually good, provided complications like infection or malocclusion are minimized. Early intervention focusing on anatomical reduction and occlusion restoration remains critical for optimal functional recovery.

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Announcement - III, Fellow Award: SVSBT-2025

Applications in the prescribed formats are invited from the **Senior Life Members** of the Society for the **Fellow Awards of SVSBT-2025**. The awards will be honoured to the deserving candidates during the inaugural ceremony of ***XII Annual Convention and International Conference of SVSBT on "Bridging Science and Society: Biotechnology for Sustainable One Health"*** to be held **during December 3-5, 2025** at College of Veterinary Science, LUVAS, **Hisar-125 004**, Haryana, India.

The application format can be had on request from the President, SVSBT by e-mail at ajdhami59@gmail.com or whatsapp No. 9898262498. The application must be submitted as **soft copy in single pdf** at ajdhami59@gmail.com **along with one hard copy** on or before **1st October, 2025** in person or by speed post/courier **to the President, SVSBT, Dr. A. J. Dhami**, 48, Mangal Nagar, Vidya Dairy Road, Near Borsal Crossing, **Anand-388 001**, Gujarat. It is mandatory that the **applicant must be a life member of the Society, or else he/she should become life member by due date of application** through paying prescribed fees online in the UCO Bank A/C as detailed below. Incomplete applications and those received after the due date will not be entertained.

Eligibility Criteria & Rules for SVSBT Fellow Award (Scorecard on website: svsbt.com)

- The applicant must be a life member of the SVSBT, If not, must register before due date of application.
- Applicant must have a minimum experience of 25 years in the field of teaching research and extension, and should be above 50 years of age, as on the last date of application.
- He/She should be Indian national, who is working in the field of Vety Science & Animal Biotechnology & its Allied/ Corporate sector in India.
- Awardees may also be nominated by the executive committee from the corporate/ entrepreneurs, on the basis of distinguished contribution in scientific arena of Veterinary Science & Animal Biotechnology towards development of animal sciences.
- Application must include Full name, Present Post/Designation, Address: Correspondence & office with E-mail Id and contact No., Date of birth and other details as per the format that can be had from the President SVSBT on request.
- Processing fee of Rs. 2000/- is to be paid by the applicant on or before last date of application.
- Applicant must provide evidence of each claim he/she is making in this application.
- Selected candidate shall pay Rs. 7000/- online within 15 days of intimation of results.
- SVSBT reserves the rights for the final selection of the awardees.

Bank Details for Processing Fee: Online Payment **in favour of** Society for Veterinary Science and Biotechnology, **payable at UCO Bank, Anand Branch, Account No. 18400110008843, IFSC code: UCBA0000082**.