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## Interfragmentary and interdental wirings for bilateral mandibular fracture in a Dog

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### Abstract

A three years old male Chippiparai dog was referred with a complaint of oral bleeding and unable to close its mouth after an accidental kick by a cow before 2 hours of presentation. Clinical and radiological examinations confirmed the case as complete bilateral mandibular fractures between 1<sup>st</sup> and 2<sup>nd</sup> premolar teeth in left mandible and 2<sup>nd</sup> and 3<sup>rd</sup> premolar teeth in right mandible. The fracture was reduced and fixation of the bilateral mandibular fractures were carried out successfully using Interfragmentary and interdental wiring techniques under general anaesthesia.

**Keywords:** dogs, bilateral, mandibular fractures, interfragmentary, interdental wiring

### Introduction

Mandibular fractures in dogs represent 1.5 to 2.5% of all fractures (Harasen, 2008) [6] which normally happen due to trauma (Boudrieau, 2012) [4]. Mandibular fractures in between the premolar 1 and molar 2 is the most common location in dogs (Harasen, 2008) [6] and associated with damage to the oral mucosa (Boudrieau, 2012) [4]. Mandibular fractures were corrected by various techniques like muzzle tapes, circumferential wiring, intraoral splinting, interdental wiring, intraosseous wiring, plating technique and external skeletal fixation technique. A surgical method or combination of methods is used based on the fracture site, duration of presentation for the treatment and associated damage with fractures (Boudrieau, 2005 and Boudrieau, 2012) [3, 4]. The most common fixation technique used for correction of mandibular fractures is interdental wiring (Siddiqui *et al.*, 2012, Rastabi *et al.*, 2017) [8, 7]. Reports on combination technique of interfragmentary and interdental wiring are rare for the treatment of mandibular fracture in dogs. The successful surgical management of bilateral mandibular fractures by interfragmentary and interdental wirings in a dog is recorded in the present report.

### Case Observations and Treatment

A three years old male Chippiparai dog was referred with the complaint of oral bleeding, and unable to close the open mouth after an accidental kick by a cow before 2 hours of presentation. On clinical examination, blood mixed ptialism, edema, laceration in the left cheek, severe pain on jaw manipulation, tongue protrusion and laceration, drooping of mandibles, malalignment of the lower jaw, soft tissue injury in the oral cavity, and complete bilateral mandibular fractures between 1<sup>st</sup> and 2<sup>nd</sup> premolar teeth in left mandible and 2<sup>nd</sup> and 3<sup>rd</sup> premolar teeth in right mandible were observed (Fig. 1 and 2).



**Fig 1:** Bilateral mandibular fracture in a dog



**Fig 2:** Soft tissue injury in the buccal cavity associated with bilateral mandibular fracture

One broken incisor and one first premolar in the left side of the mandible also observed. There were no other injuries in other parts of the body. Animal was anaesthetized to take radiographs with proper positioning. The dog was premedicated with Inj. Atropine sulphate @ 0.04 mg/kg body weight subcutaneously and Inj. Xylazine @ 1 mg/kg body weight intramuscularly. General anaesthesia was induced with Ketamine hydrochloride @ 5 mg/kg body weight intravenously. Radiological examination confirmed the clinical diagnosis of complete bilateral mandibular fractures (Fig. 3). All the blood, biochemical and physiological parameters were within the normal limits. History, clinical and radiological observations confirmed the case as complete bilateral mandibular fractures. Surgical correction was decided upon under general anesthesia as the fractures were unstable and the animal was prepared for surgical correction.



**Fig 3:** Pre-operative radiograph of bilateral mandibular fracture

### Treatment and Discussion

Inj. Amoxicillin sodium and Sulbactam sodium combination @ 10 mg/kg body weight was administered before the surgical procedures as preoperative antibiotic. General anaesthesia was maintained with Ketamine hydrochloride @ 5 mg/kg body weight intravenously. The dog was placed in sternal recumbency on a surgical table and the head was positioned high for easy manipulation. The oral cavity was wide opened using muzzle tapes in the upper and lower jaw. The oral cavity was washed with diluted Povidine Iodine solution in normal saline to remove the blood clots, debris and the fractured ends of the mandibles were debrided. Steady traction was applied on lower jaw for the reduction of fractured mandibles and the proper alignment was maintained. For placing interfragmentary wire, two holes were created using an electrical drill on both the sides of the fracture line with proper distance by taking care of dental roots. A 20 G orthopaedic wire was passed into the two holes, twisted, tightened and the twist was bent at the outer side of the mandible. First molar was used as an anchor tooth for interdental wiring. Using the electrical drill the holes were drilled in the furcation of first molar of the mandible for the wire placement with proper care to the roots of teeth. A 20 G Orthopaedic wire was inserted through the created holes and placed encircling the anchor teeth. Then the wire was twisted and positioned bridging the fracture line. The Orthopaedic wire was tightened using twist knot method for better control and the twist was bent over away from the gingival margin

(Fig. 4). The same techniques were adopted to correct the mandibular fracture in the opposite side. The broken incisor and premolar teeth were removed to prevent the infection through the broken teeth. The injuries of the soft tissue in the oral cavity and the tongue lacerations were sutured with absorbable suture material 1-0 PGA. Simple interrupted sutures were placed with silk 1-0 for the cutaneous laceration in the left cheek. After surgical corrections, the buccal cavity was lavaged with normal saline solution to remove debris. The post-operative radiographic examination revealed proper reduction of the fractured mandibular fractures, anatomical alignment of the mandibles without any instability of the fractured fragments and tooth malocclusion (Fig. 5).



**Fig 4:** Post-operative clinical appearance of interfragmentary and interdental wiring for bilateral mandibular fracture



**Fig 5:** Post-operative radiograph



**Fig 6:** 7<sup>th</sup> post-operative day clinical appearance

Post-operatively the dog was given the same antibiotic intramuscularly twice daily for 5 days and Inj. meloxicam @ 0.1-0.2 mg/kg body weight intramuscularly once a day for 3 days. Flushing of oral cavity was done once daily for 7 days using Chlorhexidine mouth rinse solution. The animal was gradually allowed to take diet from liquid to solid for 2 weeks period. The dog did not experience any difficulty in eating and drinking and had no visible abnormality in gross appearance (Fig. 6). On 60<sup>th</sup> day, after complete clinical and radio graphical union the interdental wires were removed under xylazine sedation, without disturbing the interfragmentary wires as they were deep set within the oral mucosa. Animal recovered fully without any complications and did not experience any discomfort during the post-operative period.

Trauma by automobile accidents due to free and wandering habit of dogs is the main reason for mandibular fractures. But in the present case kick by a cow was the cause of bilateral mandibular fractures. Most of the mandibular fractures are open as the mandibles are covered with small amount of soft tissue. The traumatic injuries associated with mandible, maxilla, or skull after accidents may also be associated to the injury of other body regions and hence the clinical examination and treatment for other injuries along with correction of mandibular fracture are also needed. In the present case, skin laceration, tear in the buccal mucosa and laceration in the tongue were also surgically corrected along with surgical correction of mandibular fractures. As mandibular fracture withstand different forces than other bones, veterinarians need to overcome many challenges while surgical correction of mandibular fractures (Harasen, 2008)<sup>[6]</sup>. Healing of mandibular fractures is possible with the presence of small fracture gap and little mobility if the infection prevented, revascularization encouraged and vascularity protected. Unstable and bilateral mandibular fractures require surgical correction. Surgical methods like interdental wiring, ESF, intraoral splints, intraosseous wire, inter fragmentary wiring, interarcade wiring, and bone plating used alone or in combination for the correction of mandibular fractures.

A technique or combination of techniques is used based on the fracture site, duration of the presentation and associated damage (Rastabi *et al.*, 2017)<sup>[7]</sup>. The surgical correction is aimed to achieve normal or near normal anatomic alignment by proper reduction and immobilization of fractured fragments of mandible for comfortable prehension (Fubini and Ducharme, 2017)<sup>[5]</sup>. As the present case was unstable and bilateral, a combination of inter fragmentary and interdental wiring techniques was carried out for proper reduction and immobilization. Interdental wiring technique is implied on the basis of tension-band principle and is an inexpensive, and simple technique (Ahmed, 2011)<sup>[1]</sup>. Avoidance of iatrogenic trauma to the nerves and blood vessels of the mandible, and dental roots, maintenance of blood supply to the fracture fragments, and early return to function are the major advantages of interdental wiring. Small size of the wire permits the possible versatility for the wire location on the biomechanically advantageous alveolar surface of the bone by avoiding the tooth roots (Smith, 2004). In the present study inter fragmentary wiring and interdental wiring with 20 G Orthopaedic wire and were strong enough to maintain the stability and to provide adequate immobilization of the mandibular fracture. Infection of the buccal cavity, wire loosening, mucosal ulceration, osteomyelitis, malalignment,

and submandibular abscess were reported as common post-operative complications of mandibular fractures (Basith *et al.*, 2017, Rastabi *et al.*, 2017)<sup>[2,7]</sup> and no such complication was observed in the present case. It is concluded from the observations that the combination of inter fragmentary wiring, and interdental wiring is less invasive technique, ensures early return to function without any post-operative complication and can be effectively used for the treatment of bilateral mandibular fractures.

### Conclusion

Surgical correction of complete bilateral mandibular fractures in a three year old Chippiparai dog using composite surgical techniques of inter fragmentary wiring, and interdental wiring is reported.

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