MINIMALLY INVASIVE INTERLOCKING NAIL FIXATION IN A LABRADOR DOG WITH OBLIQUE TIBIAL FRACTURE

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A nine month old, entire female Labrador retriever was presented with the history of swelling on the left tibial region. On clinical and radiographic examination it was diagnosed as oblique diaphyseal fracture of the left tibia. Closed static intramedullary interlocking nailing was done in minimally invasive method using the jig. The clinical and radiographic union was good and the implant was removed by the 8th week postoperative.

The immediate goal of fracture repair is to maintain anatomical reduction and fixation until the body’s healing mechanism restores the structural continuity of the bone. Minimally invasive osteosynthesis aims to provide ‘relative stability’ rather than absolute rigidity so as to encourage indirect (secondary) bone healing by callus formation (Harasen 2002; Dejardin et al., 2012 and Moores, 2008). Intramedullary Interlocking Nail fixation (ILN) is used to stabilize diaphyseal fractures of long bones. ILN can also be applied in a minimally invasive way for comminuted fractures and thus acting in a bio buttress fashion and its superior stability ushering in biological fracture healing. (Wheeler et al., 2004 and Dejardin et al., 2012).

Case History and Observation

This article discusses the treatment of a tibial fracture in an entire female Labrador dog, aged 10 months and weighing 21 kg, brought to the University Veterinary Hospital, Mannuthy with the history of cage entrapment. There was swelling and crepitus on the left tibial region. Mediolarateral and craniocaudal radiographs of the affected limb showed simple complete oblique diaphyseal fracture of left tibia and fibula. On the day of presentation modified Robert Jones bandage was applied on the left hind limb until the day of surgery.

Surgical Procedure

Atropine Sulphate at the rate of 0.04 mg/kg body weight was administered intramuscularly as pre-anaesthetic followed by xylazine hydrochloride 10-15 minutes later at the rate of 1.0 mg/kg body weight. General anaesthesia was induced using ketamine hydrochloride at 5.0 mg/kg body weight injected intramuscularly. Shortly after induction tramadol hydrochloride at the dose rate of 3.0 mg/kg and ceftriaxone sodium at the dose rate of 30.0 mg/kg body weight were administered before and after the surgery. Anaesthesia was maintained with inhalation anaesthesia using 2.0% isoflurane in oxygen using Boyle’s apparatus. The surgical site was clipped, shaved and scrubbed using chlorhexidine solution, painted with povidone iodine and draped.

Static intramedullary interlocking nailing was done in closed approach using the aiming guide. The patient was secured at the paw with bandage cloth and was suspended from a height sufficient to exert traction by the weight of the animal. The craniocaudal view of the radiograph obtained was used to determine the length and size of the nail and screws using the CR system. With the patient in dorsal recumbency and stifle at 90° angle, the Steinmann pin (of the size similar to the 5mm, 180 mm ILN) was introduced medial to the middle patellar ligament and the pin was advanced in a caudomedial direction to enter the medullary cavity. The Steinmann pin was removed and ILN was introduced through the pilot hole in a normograde manner (Fig 1).
Positioning of the fragments and reduction were achieved by physical manipulation and the ILN was introduced into the distal fragment.

![Fig 1. ILN in place](image1)

![Fig 2. Placement of the distal interlocking screw](image2)

The distal screw (2.7 mm) was placed through a stab incision using the aiming jig, interlocking the nail with the bone (Fig 2). The fixation was checked by rotating the distal fragment which resulted in a sudden and palpable stop. A proximal screw was also placed in similar manner and the postoperative radiographs revealed good alignment and angulation.

Cephalexin sodium at the dose rate of 30 mg/kg body wt. orally thrice daily for seven days and tramadol hydrochloride tablets at the dose rate of 3.0 mg/kg twice daily for three days were prescribed postoperatively. Robert Jones bandage with povidone iodine dressing pads was retained on the operated limb and replaced every three days until suture removal on the 12th postoperative day. Owner was advised to restrict the movement of the animal for two weeks after surgery and then to allow on leash walking.

**Results and Discussion**

Preoperative and postoperative bandaging with Robert Jones bandage helped to reduce swelling and to decrease chances of additional soft tissue damage. The minimally invasive approach with relatively small surgical incision explained the minimal swelling and the minimal duration of the swelling.

The dog started weight bearing on the 1st postoperative day itself and showed complete weight bearing by the 4th postoperative day. Similar observation was made by Manjunatha et al. (2011) in a study comparing closed and open interlocking nailing techniques for simple diaphyseal femoral fracture repair in 12 dogs. They observed complete weight bearing in dogs of closed group by the third postoperative day and from seventh postoperative day in the open group animals.

In the hanging limb position, the fracture ends get distracted, the soft tissues of the limb tighten, and the bone fragments are pulled into alignment. Kraus et al. (2003) also stated that hanging the limb will help reducing the fracture, if properly performed. Immediate postoperative radiograph revealed good alignment with mild fracture gap as closed reduction was performed. There was callus formation and blurred fracture ends observed on the 15th day review and the fracture gap was found obliterated with establishment of bony continuity by the 30th day review (Fig 3). Similar observations were made by Raghunath and Singh (2008). This might be due to the minimally invasive nature of the fracture treatment adopted which preserved blood supply and helped in promoting biological osteosynthesis as also reported by Wiss et al., (1990). The implant was removed after two months following complete radiographic union.

Patel et al., (2007) and Manjunatha
and Ranganath (2012) also used C-arm image intensifier for closed interlocking nailing and placement of interlocking screws. In this case only postoperative radiographs were taken to ascertain the placement of the nail thereby reducing the need for C-arm image intensifier.

**Fig 3.** Progressive healing with minimal callus formation

The present case report shows that static intramedullary interlocking nail fixation can be successfully applied in a minimally invasive method for the treatment of diaphyseal fractures of long bone in dogs with early weight bearing and good bone healing as observed on the postoperative radiographs.

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**References**


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