

Article

Internal fixation of fracture of femur of dog using intramedullary pinning

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Abstract: The study was conducted at S A Quadery Teaching Veterinary Hospital (SAQTVH) in Chittagong Veterinary and Animal Sciences University (CVASU), Bangladesh from January, 2014 to June 2014 to conduct about the surgical management of internal fixation of fracture of femur of local dog using intramedullary pinning. A total number of 10 dogs of different ages were used for surgical management based on history and presenting clinical signs. Fractures of femur commonly occur in dogs following different kind of trauma, road accident and jumping from top place. In the small animal internal fracture fixation, many improvements have been developed, including improved fixation techniques and a more diverse selection of implants. To treat this fractures intramedullary pin are used for internal surgical fixation with clinical and radiological procedure established. After successful surgical repair bone healing was occurred without any complications and the dog discharged one month after surgery bearing weight on the limb.

Keywords: fracture; femur; dog; surgical management

1. Introduction

Femoral fractures normally arise in puppies following one-of-a-kind form of trauma. Traffic coincidence is the major cause of femoral fractures in Canines (Tercanlioglu and Sarierler, 2009). While metaphyseal and diaphyseal fractures were more common in mature dogs, proximal or distal physeal fractures were more common in young dogs (Simon *et al.*, 2011). Maximum femur fractures are determined as closed fractures due to the heavy overlying muscle (Beale, 2004). The aim of fracture repair is to establish best alignment and firm fixation of the bone to allow both well timed and maximized return to function of the affected area. Within the small animal internal fracture fixation, many enhancements had been advanced, consisting of progressed fixation techniques and more diverse selection of implants (Tercanlioglu and Sarierler, 2009). Stability in orthopedics is described as the degree of displacement among the fragments concerned in a fracture and stiffness as the capacity of the implant to oppose deformation (Wagner and Frigg, 2006). Femur fractures are generally no longer amenable to conservative repair, and a few form of internal fixation is generally required (Beale, 2004). Intramedullary pinning acts usually as internal splint of medullary canal of long bone that shares

loading with bones keep axial alignment of the fracture and resists bending forces in all directions applied to the bone (Beale, 2004). Critical factors taken into consideration in repair of femur fracture include suitable surgical technique, preservation of regional soft tissues and their attachments to bone fragments, either anatomic or indirect reduction, adequate stabilization, appropriate preference and application of implant device and proper postoperative care (Stiffler, 2004). The rationale of this report is to explain the medical and radiographic examination of femoral fracture in a dog in addition to a successful reduction of the fracture intermedullary pinning.

2. Materials and Methods

2.1. Case history

The study was conducted at S A Quadery Teaching Veterinary Hospital (SAQTVH) in Chittagong Veterinary and Animal Sciences University (CVASU), Bangladesh from January, 2014 to June 2014 to conduct about the surgical management of internal fixation of fracture of femur of local dog using intramedullary pinning. A total number of 10 dogs of different ages were used for surgical management based on history and presenting clinical signs.

2.2. Control and anaesthesia

Animal was positioned in lateral recumbency with the affected limb up and general anaesthesia was administered after proper premedication. The femoral area was prepared for aseptic surgery.

2.3. Surgical management

The femoral bone was covered and supported by the two major muscles, vastus lateralis and biceps femoris. The superficial fascia and the tensor fascia lata covers these two muscles. The femoral diaphysis and metaphysis was approached via a craniolateral pores and skin incision made at the lateral thigh, extending from barely caudal to the more trochanter to the lateral condyle of the femur. The subcutaneous tissue and superficial fascia are incised without delay below the skin incision. Fascia later was incised to the entire duration of the pores and skin incision along the cranial border of the biceps femoris muscle aponeurosis. Biceps femoris and vastus lateralis are pondered caudally and cranially respectively after excising the inter-muscular septum between those muscular tissues to reveal the shaft of femur. After finding the site of fracture, the proximal bone fragment was accelerated and an intramedullary pin which almost fills the diameter of the medullary canal was inserted into the proximal fragment and the pin was withdrawn thru the pores and skin after making stab incision at the trochanteric fossa. The fracture was decreased and the proximal and distal bone fragments are aligned and the pin was then inserted within the distal fragment and anchored at the distal extremity thus immobilizing the fracture. After conducting the open reduction, the muscle tissues were apposed and the fascia later was sutured and eventually the skin was sutured in habitual way. The pores and skin around the sticking out pin at trochanteric fossa was depressed and the pin was reduced as short as viable to bury subcutaneously. An easy interrupted suture was carried out on the pores and skin to close the hollow (Figure 1). Osteosynthesis was performed under general anesthesia effect, allowed good muscle relaxation and a satisfied analgesia throughout the procedure. The average time for setting up an intramedullary pinning fixation was 1hour and 15 minutes. In dog the sequence of intervention revealed no complications, and the awakening took place quietly.

2.4. Post-operative care

A course of antibiotics and analgesics were administered for 7 days, the wound was cleaned daily by antiseptic solution. Skin sutures had been removed at 8-10th post-operative day. Intra-medullary pin was removed after complete fracture healing as evidenced by clinical and radiographic evaluation. Dog was clinically observed daily during the study period for recording any postoperative complications. Recovery of consciousness and return to function of dogs treated with intramedullary pinning took place gradually.

2.5. Radiographic examination

A radiograph was made room immediately after surgery to enjoy a good quality of osteotomy, the correct position of the implants and the absence of intraoperative fractures. Exercise limited for 3-4 weeks period and limb was immobilized. Careful clinical and radiographic evaluation of fracture healing process has done.

3. Results and Discussion

Out of 10 surgical cases of dog, the injury was occurred frequently caused by trauma (50%), road accident (40%), and jumping from top places (10%). So this study was revealed that trauma was the most common cause

of fracture in femur of dog that shown in Table 1. The dog up to 1 year of age was shown higher percentage (70%) of fracture in femur than other ages (30%) which was shown in Table 2. This result revealed that fracture of femur was most common in young dog than adult. Fractured femur repaired by intramedullary pinning dog showed gradual dense periosteal reaction at the 2nd week. At the 5th week, the periosteal reactions were getting denser in dog with the beginning of periosteal callus bridging formation from the third week, of full training callus generally after one month follow up. These study was indicated the usefulness with purposeful augmentation, multiplied consolidation ratio and mechanical solidarity in the use of intramedullary pinning. In a research by (Inas *et al.*, 2012) argue that the intramedullary pinning offers high-quality balance for long bones, so it offers an great biomechanical surroundings for fracture recovery. Intramedullary pinning favors charging member, and permits by law of Wolff accelerate callus strength and impede muscle atrophy and joint ankylosis (Mills and Jackson, 2003). The migration of the pin before complete consolidation confirmed an angulations of the bone within the dog. This problem was the crucial illness of intramedullary pinning recorded at some point of our take a look at in line with (Fossum, 2007), micro motion of the pin , because of inequality among the diameter of the pin and the medullary canal, are liable for the migration of a pin . The damage to the periosteal blood supply was considerable and often restricts the formation of periosteal callus (Baron, 2010). Unlike the installation of the plate, the insertion of intramedullary pinning does not harm the periosteal blood operating time was reduced by half of (Daglar *et al.*, 2007). Most complications recorded in the presence of infection, this results in a diffused readability on the radiography, causing migration of the pin. It has been mentioned that intramedullary pins are supreme for shaft fractures of the femur in small dogs and cats (Phillips, 1979). As Boyd was said, an intramedullary pinning was justified simplest in situations whilst its mechanical advantages from the stand factor of the stress involved outweigh the biological negative aspects and when rotation can be managed. From a biomechanical point of view, the callus decreases the lever arm which tends to stretch the fracture, that's why the callus might be even larger than the house was unstable (Piermattei, 2006). Implants failure from fatigue fracture isn't common with intramedullary pinning due to the fact the area of an intramedullary pin within the centre of the shaft has a tendency to spare some of the bending forces responsible for fatigue failure and the effect of the law of wolf which could be very favorable by way of the intramedullary pinning.

Table 1. Causes of fracture of femur in dog.

Causes of fracture of femur	Number of injured dog	Percentage of occurrence (%)
Trauma	5	50
Road Accident	4	40
Jumping from Top Level	1	10

Table 2. Age of occurrence of fracture of femur in dog.

Age of occurrence in dog	Number of injured dog	Percentage of occurrence (%)
Up to 1 Year	7	70
Above 1 Year	3	30

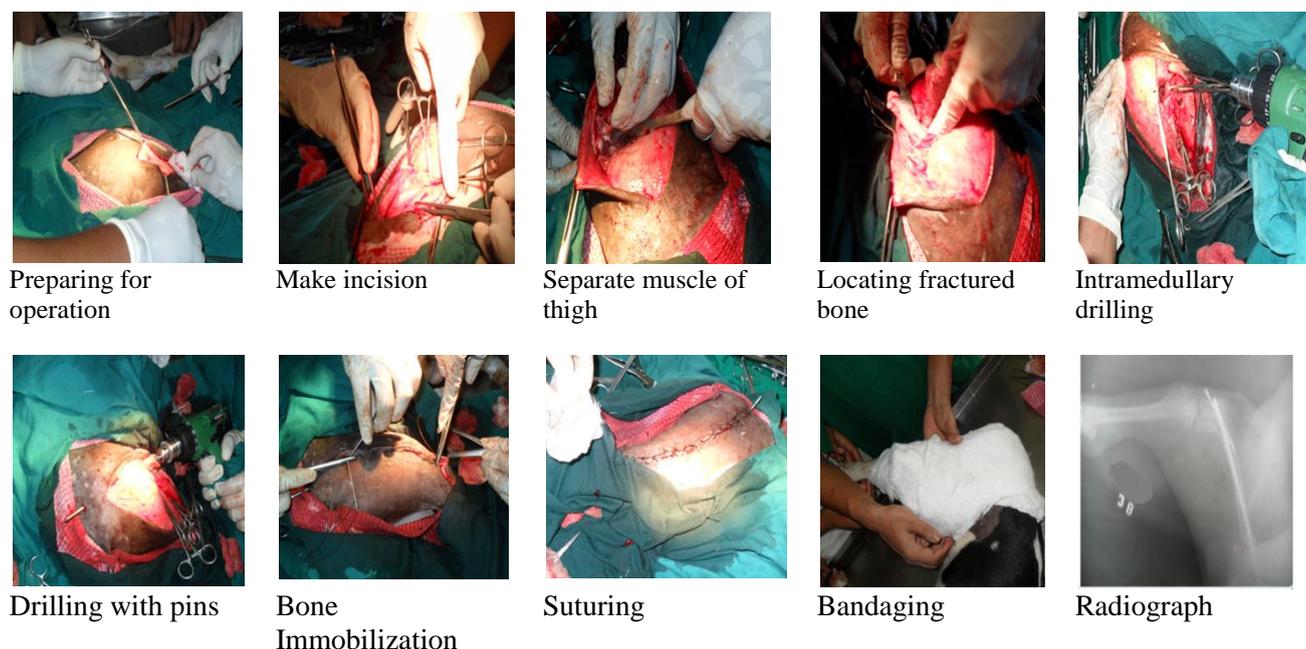


Figure 1. Showing the technique of surgical management of femur in dog.

4. Conclusions

The study reveal that the fixation of femoral fractures with intramedullary pinning was an economical and efficient method and provides good stability with minimal complications. The intramedullary pinning offers a perfect alignment and rigid fixation of the fractured bone. Finally, we had concluded that applications of intramedullary pins were safe, economical and successful treatment method if basic principles of repair were used.

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Conflict of interest

None to declare.

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