CHAPTER-I

Introduction

Fracture is a loss of bone continuity and balance caused by damage to bone tissue. A fracture can be caused by external trauma, in which case it is known as a trauma fracture, or by a disease, in which case it is known as a pathological fracture. Femur fractures in cats are typically induced by a variety of traumas. The metaphyseal, diaphyseal, and or epiphyseal parts of long bones may be affected (Tercanlioglu and Sarierler, 2009; Shiju et al., 2010).

Many developments have taken place in the field of small animal internal fracture fixation, including improved fixing procedures and a wider array of implants (Tercanlioglu and Sarierler, 2009). In orthopedics, durability is defined as the degree of displacement among the pieces involved in a fracture, while stiffness is defined as the implant's ability to resist deformation (Wagner and Frigg, 2006). Femur fractures are rarely treatable with conservative methods, necessitating internal fixation (Beale, 2004). Intramedullary pinning is an internal splint of the long bone's medullary canal that shares loading and keeps the bones in axial alignment.

The basic principle of fracture treatment is to return two fracture fragments to their anatomical positions using closed fixation or open fixation via surgery. Intramedullary pins, plates, screws, and wires are popular internal fixation devices used in fracture treatment (Mafi et al., 2014; Mwangi and Mande, 2012). The majority of femoral fractures happen as closed fractures because of the thickness of the surrounding muscle (Beal 2004). There are several aspects to consider when treating a fracture as 1) the blood supply to bones and bone fragments must always be protected from surgery trauma, 2) accurate restoration of the shape of the bones, particularly around joints, 3) mechanical repositioning and fixation tools must be stable, 4) trauma caused by techniques used must be kept to a minimum, and 5) good rehabilitation must begin as soon as definitive therapy is given (Stiffler, 2004; Tercanlioglu and Sarierler, 2009). Correct surgical approach, limiting tissue injury, proper stabilization, selecting implant material and its implementation (fixation), and post-surgery care are all things to keep in mind during fracture therapy, according to Mwangi and Mande (2012). In Bangladesh, getting veterinary implant material for use as a fixation implant in animal fracture treatment is quite challenging. We attempted to treat a femoral fracture using an intramedullary pin and wire.

The objective of this study is to fix the fragmented bones in a perfect alignment and secure in its position for a complete fracture management in a long bone.

CHAPTER – II

Materials and Methods

2.1. Case history

A one-year two month old indigenous female cat weighing 4.10 kg with an accident history was brought to the Teaching and Training Pet Hospital and Research Center (TTPHRC) in Dhaka. Clinical examination revealed several lacerated wounds on the back of the body, as well as a lack of weight bearing capacity in the right hind leg. Then, Physical (lameness, pain sensation, crepitating sound on femoral palpation) and radiological examinations confirmed the complete mid diaphyseal femoral fracture.

2.2. Control and anaesthesia

Following physical and radiographic examinations, it was decided to treat fractures with open reduction and internal fixation in cases who their owners accept treatment options. Food was withdraw for 8 hours before surgery and the cat was allowed to take water up to 2 hours prior to surgery. Animal was premedicated with I/M injection of 1 mg / Kg body weight xylazine hydrochloride. General anesthesia was conducted with intravenous (I/V) injection of ketamine hydrochloride 8mg/kg body weight until the main reflexes were disappeared. Fluid was administered as 5ml/kg/min during surgery.

2.3. Surgical procedure

After restraining the animal, the skin was clipped, shaved, and povidone iodine was applied to the skin in preparation for aseptic surgery. In Operation Theater, the cat was placed on the table. A draper was draped over the surgical site. The incision line was mopped with povidone iodine before incision, and an incision was made along the skin of the affected area and separated from the subcutaneous layer. The femoral bone was covered and protected by two primary muscles, the vastus lateralis and biceps femoris. After that, the muscle was incised, taking care not to cut any major blood vessels. The muscle layer was incised and then guided a cut by a finger placed under the bone fracture after it was separated by blunt dissection. The fragmented bone was then partially removed using a bone curette and bone cutting forceps. Hohman retractor bone retaining forceps were used to return the bone to its original position. Then, the fracture was reduced and the proximal and distal bone fragments are aligned and pin was then inserted within the distal fragmented.

The bone was next drilled with a bone drilling machine and a fixation splint was applied to the bone, pinned, and screwed. Based on the radiograph and size of the dog an intramedullary pin (2.4mm) was selected. The muscle was then sutured with a simple continuous catgut (no. 1) suture. The skin was apposed using silk by cross mattress stitch and the subcutaneous tissue was apposed using catgut (no. 1) in a simple continuous pattern. Povidone iodine was used to clean the suture line.

Table-1: Routine examination of blood and serum

Parameters	Pre and Post operative value				Normal Value
	Pre operative	Post operative Day-7	Post operative Day-14	Post operative Day-28	
Total RBC	5.7	5.3	5.4	5.5	5.5-8.5million/cum
Total WBC	12.5	13.2	9.7	10.5	6-17 thousand/cum
Hb	9.8	10.2	10.5	10.8	12-18 gm%
PCV	32.5	33	33.6	29	37-55%
Total protein	46.2	45.6	55	62.3	54-71 mg/dl
Alkaline Phosphatase	179.5	450	465.3	220.5	1-114U/L
Calcium	11.85	9.58	11.6	10.2	9.1-11.3 mg/dl
Phosphorus	6.5	7.6	9	8.2	2.6-6.2 mg/dl

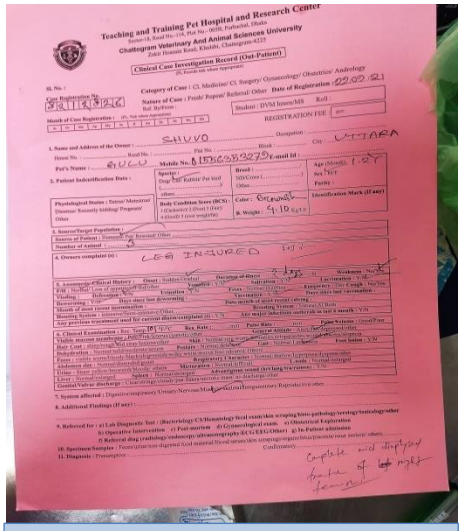
2.4. Post- operative care

Antibiotics and analgesics were given for seven days, and the wound was washed daily with an antiseptic solution. At the 8th to 10th post-operative day, the skin sutures were removed. After complete fracture healing was demonstrated by clinical and radiographic examination, the intramedullary pin was withdrawn. During the trial, the cat was clinically monitored every day to report any surgical problems. The cats who were treated with intramedullary pinning progressively recovered consciousness and function.

2.5. Recommendation

Internal fixation of a femoral fracture on a cat can be managed using an intramedullary pin or a combination of intramedullary pin and wire, which successfully stabilizes the fractures.

2.6. Pictures:

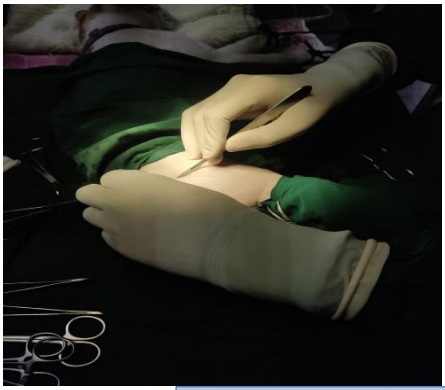


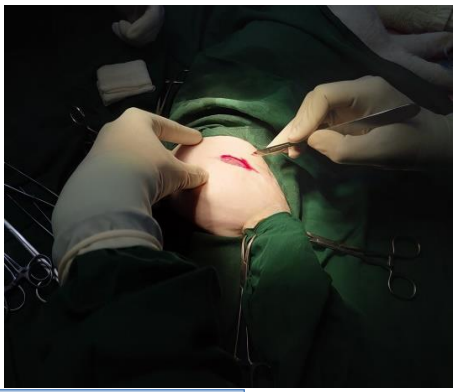
Case Sheet

Radiological examination of complete mid diaphyseal femoral fracture.

Shaving and antiseptic preparation of surgical site

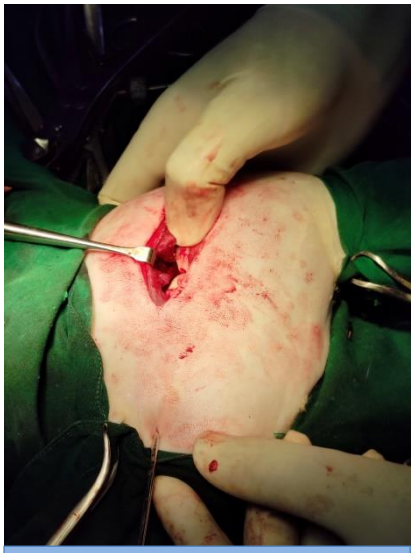
Preparing for surgery





Make incision

Separation of muscle



Locating fracture of bone

Positioning of bone

Cutting sharp end of broken bone

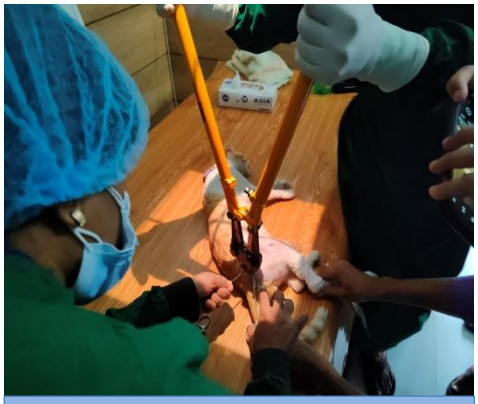
Intramedullary pining

Suture of muscle

Suture of skin

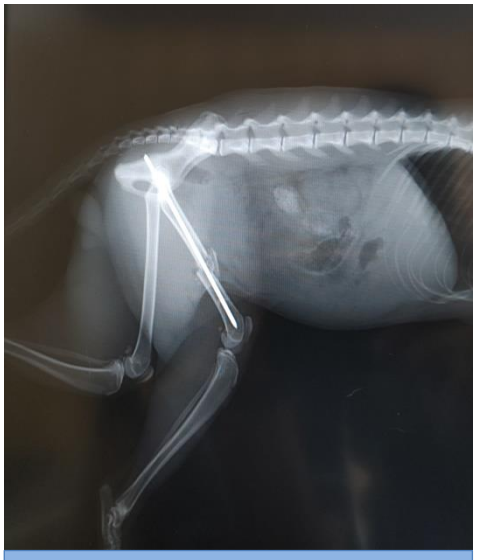
Complete suturing

Radiograph

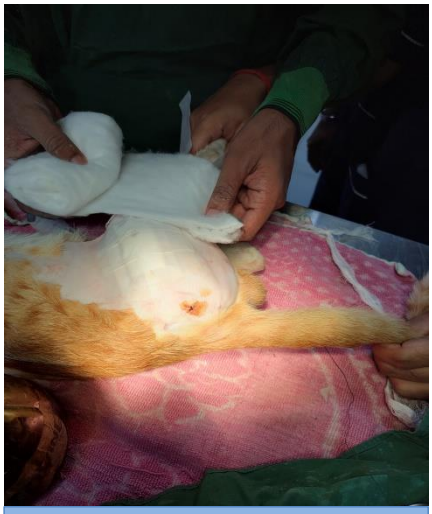


Cutting the extra pin

After cutting the pin



Radiograph



Bandaging the suture

After complete surgery

CHAPTER-IV

Discussion and Result

Femoral fracture is the most common type of fracture in cats (Beale, 2004), and it occurs more frequently on the left foot than the right (Braden et al., 1994). If there is no space between two fragmented fragments, bone regeneration is accelerated, and an implant is no longer required after recovery. Once the bone has healed, the implant material should be degraded by the body (Ozkan et al., 2015). Internal fixation with intramedullary pins, wires, screws, and plates is a traditional fracture treatment approach that can stabilize two fracture fragments (Mafi et al., 2014; Stiffler, 2004). The choice of internal fixing material is influenced not only by the pattern of the fracture, but also by mechanical and biological factors as well as the patient's clinical condition. Internal fracture fixation is also determined by implant material availability. An intramedullary pin is a readily available internal fixing material that is frequently used in fracture therapy (Saglam and Kaya, 2004; Tercanlioglu and Sarierler, 2009).

The intramedullary pin, which is inserted into the fractured femur, provides excellent support between the two fragmented fragments. The diameter of the intramedullary pin must be the same as the animal's body weight in order to support the animal's weight. The use of a large-diameter intramedullary pin may reduce the risk of complications, as well as deflection and low bending (McClure et al., 1994; Saglam and Kaya, 2004). In comparison to intramedullary pins with 30-40 percent of the femoral canalis medullaris diameter, intramedullary pins with 70-80 percent of the femoral canalis medullaris diameter showed better recovery (Saglam and Kaya, 2004; Syafruffin et al., 200).

Since day 3-5 after surgery, the patient has been able to walk by placing his foot on the ground, and on days 15-29 after surgery, the patient has been able to move most of its foot. The fibroblast proliferation of periosteum and endosteum cells precedes the recovery of a femur fracture. Intercellular matrix, made up of collagen and polysaccharide, is produced by osteoblast cells and combines with calcium ions to form immature bones or young calluses. Formed young callus undergoes further maturation cause by osteoblast activity and turned into mature bones as lamellas were formed. Callus formation begins on day 20 after surgery. On day 40 after surgery, an X-ray revealed increased callus resorption and a decrease in periosteal response in the formation of new bones. This phase happened 4 weeks after the fracture, but it may occur sooner in young animals (Joshi et al., 2010; Mwangi and Mande, 2012).

CHAPTER-V

Limitation

The patient was not in hospital to observe its gradual improvement. Furthermore, because the dog was not properly rested, the pin shifted significantly away from the bone's predicted location. However, problems of the procedure include the creation of a false joint and the pin's slight migration. However, after a few days, the dog returned to normal, and after 25 days, it was able to fully carry its weight.

CHAPTER – VI

Conclusions

The study found that intramedullary pinning for femoral fractures is a cost-effective and efficient treatment that gives adequate stability with little problems. The intramedullary pinning provides the fragmented bone with excellent alignment and strong fixation. Appropriate surgical technique, adequate reduction and stabilization, appropriate fixation method selection, soft tissue preservation, and correct postoperative care are all important factors to take into consideration for fracture management. Finally, we came to the conclusion that using intramedullary pins was a safe, cost-effective fracture management method for a complete femoral fracture of a cat.

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BIOGRAPHY

I am **Md. Nayeem**, son of **Md. Didarul Alam** and **Saheda Parvin**. I passed my Secondary School Certificate (SSC) examination from Kattali Nurul Hoque Chowdhury High School, Chattogram in 2013 and Higher Secondary Certificate (HSC) examination from Govt. City College, Chattogram in 2015. I enrolled for Doctor of Veterinary Medicine (DVM) degree in Chattogram Veterinary and Animal Sciences University, (CVASU), Chattogram, Bangladesh in 2015-16 session. At present I am doing my internship program which is compulsory for awarding my degree of DVM from CVASU. In the near future, I would like to work and have massive interest in pet animal medicine.