POST-OPERATIVE COMPLICATIONS OF DCP, LCP AND IILN USED FOR FEMUR FRACTURE TREATMENT AND THEIR MANAGEMENT IN DOGS

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A study was conducted in 24 clinical cases of femoral fracture in dogs. Post-operative oedema was the common post-operative complication seen in all the techniques. The other post-operative complications seen with DCP were peroneal nerve injury, exudate oozing from site, automutilation and plate loosening. In LCP, plate loosening and displacement of fragments, refractured and plate bending and plate elevation were seen. In IILN, dog bite wound and oedema at dog bite wound after operation, protrusion of nail migration and automutilation were observed. These complications were managed effectively either with medicinal therapy or surgery.
Keywords: Dogs, Femur fracture, Post-operative complications.

Femur is one of the most commonly fractured bones in dogs and cats (Maala and Celo, 1975 and Aithal *et al.,* 1999). The incidence of diaphyseal fracture is almost 20 to 25 per cent in most veterinary practice and this rate is higher than any other long bone fractures in the body (Piermattei and Greeley, 1993). The majority of femur fractures were due to automobile accidents (56%), followed by fall (34%), abuse (9%) and crushing (1%) (Raghunath *et al*., 2007).

Internal fixation is necessary for most femoral fractures either with bone plates (Dynamic compression plating or Locking compression plating) or intra medullary interlocking nailing (IILN) techniques which resist the axial loading, bending and torsional forces acting on fractured bones. However, bone plates are susceptible to repeated bending stresses because of the plate's eccentric location in relation to the long axis of the bone. Implant failure occurs when the opposite cortex is not reconstructed and fails to bridge with bone early enough to protect the plate. Even intra medullary interlocking nailing (IILN) technique had complications like errors in nail position that was very close to the fracture site and missing of holes while bolting, that leads to delayed union, non-union, production of a new fracture at the distal end of the nail and screw loosening (Duhautois, 2003). Hence, the present study reports different post-operative complications recorded with Dynamic Compression Plating (DCP), Locking Compression Plating (LCP) and Intramedullary interlocking nailing (IILN) techniques and their timely management for femoral fractures in dogs.

Materials and Methods

Twenty four dogs of 2 months to 3 years of age with femoral fractures were presented to Department of Surgery and Radiology, Veterinary College, Bidar constituted the subject of the study. Clinical symptoms like non-weight bearing, swelling on thigh region, evinced crepitating sound, pain on palpation and limping were recorded. Out of 24 dogs, 5 had transverse, 4 had comminuted, 3 had transverse dentate, 3 had short oblique, 3 had short oblique dentate, 2 had spiral, 2 had spiral dentate, 1 had long oblique and 1 had oblique splintered type of fractures respectively. Twenty four dogs were divided into groups I, II and III consisting of eight dogs and were treated with dynamic compression plating, locking compression plating and intramedullary interlocking nailing respectively based on type of fracture.

Clinical evaluation of dogs was done immediately after operation, 30th, 60th and 90th post-operative day for weight bearing (Functional outcome and Lameness grade)

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and the functional outcome was assessed and categorized as: excellent-weight bearing without lameness, good- slight lameness principally after exercise, fair-slight to moderate lameness, however, consistently weight bearing, poor-intermittent or consistent weight bearing lameness.

Clinical lameness grading (0-5) was as follows: 0 - No observable lameness, 1 - Intermittent, mild weight – bearing lameness with little if any change in gait, 2 - Consistent, mild weight – bearing lameness with little change in gait, 3 - Moderate weight - bearing lameness, obvious lameness with noticeable "head bob'' and change in gait, 4- Severe weight- bearing lameness- "toe-touching'' only and 5- Non- weight bearing lameness.

Radiographs were taken in lateral and cranio-caudal views before surgical treatment, immediately after operation, 30th, 60th and 90th day after operation to assess implant position, union of fragments, callus formation and fracture healing. Lameness was graded while progression of animals.

Results and Discussion

One out of eight animals (12.50%) in group I showed knuckling of fetlock joint, dragging its toes of operated limb on 6th post-operative day indicating peroneal nerve paralysis due to faulty I/M injection by a para-vet. The animal was bandaged with PVC splints every week for 6 times and oral supplementation of steroids and nervine tonics were administered. On 90th day, it showed partial weight-bearing.

However, osteolysis around fracture fragments indicating osteomyelits and non-union was observed on 120th post-operative day (Fig.1). This was in agreement with the findings of Hunt (1980) who reported osteomyelitis, non-union and other complications. The parenteral antibiotic was of little help in controlling osteomyelitis as the effective concentration of antibiotic could not be achieved in the bone due to limited blood supply through nutrient artery and periosteal blood vessels.

Three out of eight animals (37.50%) in group I had oedema on 3rd post-operative day which gradually reduced by 8th post-operative day. Oedema has also been reported by earlier workers (Hulse and Johnson, 1997). Three out of eight animals (37.50%) in group I had exudate oozing from site on 3rd post-operative day which gradually reduced by 8-10th post-operative day. Two out of eight animals (25%) in group I automutilated few sutures at distal end on 4th post-operative day. In these animals, wounds were resutured.

One out of eight animals (12.50%) in group I, DCPs plate loosening was observed on 4th post-operative day. Similar observation was reported by Ganesh *et al.* (2004) where they used 8 hole, 3.5 mm DCP for transverse mid shaft fracture of femur. At the end of 3rd week, they found that bending of plate at the level of fracture line resulted in angular deformity of the femur. Das *et al.* (2012) also observed seroma, self-mutilated wound, plate bending and exposed distal screw for treatment of unstable diaphyseal tibial fracture in dog with conventional dynamic compression plate. This animal was re-operated with 8 hole 3.5 LCP and it was fixed up to distal metaphysis and had showed consistent mild weight bearing lameness by the end of 90th post-operative day. Similarly, Uhl *et al.* (2013) reported that LCP enhanced the mechanical stability when compared to non-locking plates.

In two out of eight animals (25%) in group II had post-operative oedema on 3rd post-operative day which gradually reduced by 8th post-operative day. One out of eight animals (12.50%) in group II LCPs plate loosening and displacement of fragments was observed on 45th post-operative day. This animal had showed intermittent mild weight bearing lameness by the end of 90th post-operative day. However, implants remained in situ. In one out of eight animals (12.50%) in group II got refractured on 4th post-operative day at distal metaphysis of femur. This animal was re-operated with intramedullary pinning, full cerclage stainless steel wiring and anchored with nylon mesh. Animal attained complete weight bearing by the end of 90th post-operative day. In one out of eight animals (12.50%) in group II LCPs plate bending and plate elevation was

observed on 7th post-operative day. The animal walked freely with lateral deviation of paw by the end of 90th post-operative day. Implants were removed after the study period.

In one out of eight animals (12.50%) in group III got fracture of femur due to dog bite led to swelling of thigh region, which was treated with magnesium sulphate and glycerine paste on alternate days for 3 times. The animal was operated with IILN and nylon mesh was applied. However, seroma was seen at dog bite wound after operation and therefore, magnesium sulphate and glycerine paste was applied which reduced by 8th post-operative day. In one out of eight animals (12.50%) in group III nail migration and protrusion occurred due to loosening of distal screw near fracture site, ulcerating wound on lateral surface at distal aspect of thigh region with limping on 40th post-operative day (Fig.2), which resulted in delayed union. The animal showed consistent mild weight bearing lameness by the end of 90th post-operative day. Implants were removed after the study period. These findings were in agreement with the findings of Duhautois (2003) and Wheeler *et al.* (2004) who reported angulations of the bone, sclerosis at the tip of the nail, loosening of screws, delayed union, malunion or non-union, implant failure and locking mistakes. Ikem *et al.* (2007) also reported that loosening of screw was due to severe osteoporosis of bone, delayed union and superficial wound infection.

Fig.1. Radiograph showing osteomyelitis on 120th day

Fig.3. Nail migration (arrow) with ulcerating wound on 40th day

In two out of eight animals (25%) in group III few sutures at proximal and distal end was automutilated on 4th post-operative day. In these animals, wounds were resutured. Three out of eight animals (37.50%) in group III had oedema at operative site and trochanteric fossa on 3rd post-operative day. The oedema at operative site gradually reduced on 8th and at trochanteric fossa reduced on 15th post-operative day.

In the present study, out of 8 animals in each group, 4 animals (50%), 3 animals (37.50%) and 3 animals (37.50%) shown post-operative complications with DCP, LCP and IILN techniques respectively. This might be due to dynamic compression plates produce greater damage to bone tissue and therefore delay in consolidation after fractures due to local osteoporosis under the compression plate. However, in LCP, the screw head locks into the plate hole, allowing the plate and screws to act mechanically as a single unit and has advantage of preserving vasularity. Intramedullary interlocking nailing provided good control of rotational, bending and axial forces in femoral fractures and allowed load sharing between the bone and implant, early weight bearing of the animal and hence less post-operative complications.

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