SURGICAL MANAGEMENT OF PROXIMAL FEMORAL FRACTURES USING MODIFIED DYNAMIC HIP SCREW PLATE WITH CANNULATED LAG SCREW IN DOGS

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The study was conducted in six clinical cases to standardize the technique of using modified dynamic hip screw (DHS) plate with a lag screw for the treatment of proximal femoral fractures in dogs. The available DHS plate was modified by considering dog femur anatomy. The technique provided satisfactory stability, anatomical reduction and adequate inter fragmentary compression to the fracture site. Immediate post-operative radiographs showed proper reduction and good alignment of the fractured fragments. By 60th post-operative day patients were showing satisfactory radiographical union and complete weight bearing.

Keywords: Lag screw, Modified dynamic hip screw, Proximal femoral fractures.

Obstructive gastro intestinal disorder in dog may be as a result of an ingested foreign body due to their indiscriminate feeding habits, tumour, intussception, torsion, stricture of sphincter, dehydrated faecal contents (Ellison,1990). The most common cause is foreign body ingestion and rarely stricture in ileo-colic sphincter. There are very few case reports of intestinal obstruction due to ileo-colic sphincter stricter. Irrespective of the causes the main symptoms of obstructive gastrointestinal disorder are dehydration, distended abdomen, absence of defecation partially or completely, vomition. Based on the clinical symptoms the pin point diagnosis of ileo colic sphincter stricter is not possible and even normal radiography may not reveal the actual site and etiology of obstruction which need to be strengthen or précised by USG, contrast radiography. If the condition can be confirmed laparo-enterotomy is indicated for removal of neoplasia, correction of intussception, dilation of ileo colic sphincter (Aronsohn, 1993). This case report describes the clinical findings and surgical management of ileo colic sphincter stricter in dog.

Case History and Observations

A 2 years 4month old Labrador dog weighing 23.5 kg was presented to the Clinics with a history of intermittent vomition, anorexia, dullness, absence of defecation for 10 days. The animal was initially treated with unsuccessful attempts to control the vomition and even after enema and laxative the dog did not pass stool. The clinical examination of the animal showed severe dehydration, sunken eyeballs with subnormal body temperature (99°F), tachycardia (132 beats per minute) and tachypnea (32 breaths per minute). The animal was subjected to right lateral abdominal radiography which demonstrated distended loops of small intestine indicating an obstruction. To locate the site of obstruction USG (whole abdomen) and Barium meal radiographs in sequence of 0 min 30 min,1hour, 2 hour 6hours,12 hours and 24 hours were done (Fig. 1 and 2). The result of barium meal study confirmed an obstruction at the level of ileo-caeco- colic junction and was decided for laparo-enterotomy to remove the accumulated

Part of M.V.Sc. Thesis

ingesta and corrective surgery of ileo-caeco-colic junction.

Fig.1: Insertion of K-wire at 145^{0} into the femoral neck for the temporary stabilization of fracture fragments using fixed angle guide

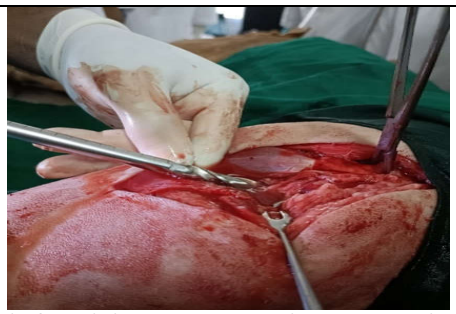

Fig.2: Drilling through pre-inserted K-wire using 7mm or 8mm cannulated drill bit for the placement of barrel of DHS Plate

Fig.3: Placement of DHS plate barrel through pre-inserted K-wire

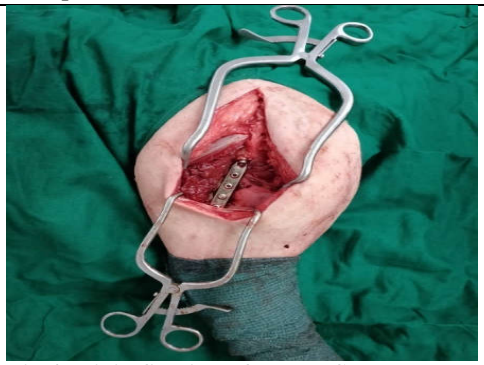

Fig.4: Rigid fixation of the DHS plate and a lag screw

Lacerated or incised joint capsule, partially transacted tendinous insertionsof gluteal muscles and vastus lateralis muscles were apposed using Polyglactin-910.

Transacted tendinous insertions (deep gluteus and vastus lateralis)were apposed using Polyglactin-910 in simple interrupted suture pattern.Subcutaneous skin incision wereapposed using Post-operative Tab. Cephalexin (at 20 mg per kg body weight, BID, PO) for 7 days and Carprofen (at 4 mg per kg body weight, SID, PO) 3 days.

Post-operatively haematological and serum biochemical parameters were recorded on immediately after the surgery and on 7th, 14th, 28th, 45th and 60th post-operative day to assess any changes in the respective dog by the surgical procedure and implants. All the dogs were subjected toradiographic examination of AP and ML view of operated limb immediately after surgery, on 7th, 14th, 28th, 45th and 60th post-operative day, to assess the fracture reduction, implant stability and fracture healing. Implant was removed after 60th post-operative day, after confirming complete fracture healing.

Results and Discussion

Post-operative evaluation:

The Mean ± SE serum creatinine and serum alanine aminotransferase, varied post-operatively from 1.05±0.19 to 0.94±0.09 and 23.94±3.49 to 27.55±5.09 respectively. It suggests that, the anaesthetic protocol, antibiotic schedule and surgical procedure employed did not affect the normal kidney and liver function.

Mean ± SE value of serum alkaline phosphatase increased significantly from 170.83±16.09to 289.62±43.55. during the initial post-operative days and peak level was noticed on 28th post-operative day. The elevation may be due to proliferation of osteogenic cells and increased osteoblastic

activity at the fracture site during bone healing as also observed by Jain *et al.* 2018, Chaurasia *et al.* 2019 and Kumar 2019.

The Mean ± SE value of serum calcium varied from 9.68±0.51 to 10.13±0.63. Initial slight decrease was noticed and the peak concentration was noticed on 28th post-operative day. The initial low concentration had been caused by increased utilization of the serum calcium at the fracture site. Later, slight gradual increase was due to stimulation of secretory hormones related to calcium metabolism in body.

The Mean ± SE value of serum phosphorus varied from 4.93±0.61 to 5.25±0.83 and the highest concentration was observed on the 7th post-operative day, which was attributed to increased serum alkaline phosphatase activity which contributes in increasing the local inorganic phosphorus level.

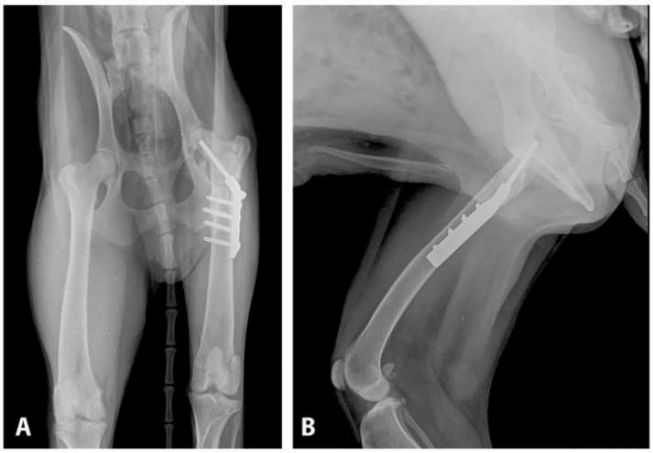

Fig.5: Post-operative radiograph of VD view of hip joint of the affected limb on 60th day.

Radiographic examination:

On the seventh following surgery fracture gap was evident with no appreciable callus formation. This might be described by the initial callus at the fracture site's fibro cartilaginous composition.

On 28th post-operative day presence of mild bridging callus filling the fracture gap and faint disappearance of the fracture line was evident, indicating good fracture healing. On the 45th post-operative day, radiographs revealed evident callus filling the fracture gap with barely appreciable fracture line was noticed.

The post-operative radiograph taken on 60th day confirmed clear evident minimal dense callus bridging the fracture gap was noticed with imperceptible fracture line (Fig.5). It suggested stable rigid internal fixation of the fracture fragments aided in minimal callus formation and early remodelling, resulting in clear and evident bone healing as also reported by Papakostidis *et al*., 2015; and DeCamp *et al.*, 2016.

Pain score:

Pain score ranged from 2.67±0.21 to 0.33±0.33during the study period. The highest pain score was recorded on preoperative days and immediately after the surgery. Later significant gradual decrease in the pain score was recorded till 60th post-operative day. Preoperatively trauma, instability of the fracture site, internal damage to the surrounding tissues and post-operatively due to the surgical procedure and extensive tissue handling were the major cause of pain.

Weight bearing:

Weight bearing pattern was assessed and graded from Grade-I to Grade-V. By 28th post-operative day all cases showed normal usage of affected limb with grade II lameness.

Complete weight bearing with grade I lameness was noticed in five cases by 60th post-operative day. This may be attributed to satisfactory stabilisation of the fracture fragments by the implants and active limb usage by the patient post-operatively, indicating proper stabilization and no damage to the sciatic nerve during surgical procedure.

Implant evaluation:

In the current study, applied modified DHS and lag screw was found to be rigid, strong and stable throughout the study period. The implant provided adequate stability to the fracture site during the study period. The applied lag screw provided satisfactory axial compression between the fracture fragments. The acceptance of the implant by patients were graded as satisfactory.

Post-operative complications and its management:

No potential surgical wound complications were noticed in all the patients as pet owners were informed to Elizabethan collar to avoid self-mutilation.

Conclusions

In conclusion, modified DHS plate and lag screw technique was found to be satisfactory for the management of proximal femoral fractures in dogs *viz*. subcapital, transcervical, basicervical, intertrochanteric and subtrochanteric fractures. The technique was found inappropriate for the physeal fracture of the femoral head and in cases where the fracture fragment was too small for the lag screw to hold and compress.

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