Salter Harris Type 1 fracture in a German shepherd dog: a Case Report.

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ABSTRACT:

A 1 year old German shepherd bitch was presented to the University of Nairobi, Small Animal Clinic following a limb injury which occurred during training. The left hind limb was swollen at the hock joint and palpation of the joint elicited pain. Lateral and anterior posterior radiographic views of the left hind limb were taken. The lateral view showed a distal tibial physis fracture. The patient was admitted for surgical fracture fixation using intramedullary pins. An intramedullary pin was advanced directly from the medial side of the tibia to engage the distal physis of the tibia. Follow-up radiographs showed the pin to engage the distal physis of the tibia.

INTRODUCTION

Physeal fractures are a common occurrence in all immature animals due to the weakness of the physis prior to fusion (Johnson and Durbin, 2012). Physeal fractures are classified into two categories, one based on the nature of the fracture line and involvement of the adjacent structures (Salter Harris Classification) and the second based on the initial trauma mechanism (Carothers Crenshaw Classification) (Carothers and Crenshaw, 1955). Classification of physeal fractures into the Salter Harris classification system (I-V) describes the location of the fracture relative to the physis and joint (Salter and Harris, 1963) (Tillson et al, 1995). Salter Harris type I involve the complete separation of the physis. Salter Harris type II involve the entire physis and a part of the metaphysic. Salter Harris type III fractures involve the articular surface and extend through the physis. Salter Harris type IV include fractures through the epiphysis, across the physis and through the metaphysic; usually involving the articular surfaces. Salter Harris type V are
compressional fractures involving the physis. Diagnosis of fractures is based on the history of trauma, clinical signs of swelling, pain and lameness and confirmation on the nature of the fracture by use of imaging modalities such as radiography, computed tomography (CT) and magnetic resonance imaging (MRI).

**CASE HISTORY AND MANAGEMENT**

A 1 year old German shepherd bitch was presented to the University of Nairobi, Small Animal Clinic with an injured left hind limb following a training accident. Physical evaluation of the patient showed normal hydration and normal parameters. The bitch weighed 23kg. The affected limb was swollen at the hock joint and when palpated the patient elicited pain. The patient was referred for radiology and two radiographic views; lateral and anterior posterior views of the limbs were taken. The lateral view showed a physeal separation and slight displacement of the physis of the distal tibia. The patient was scheduled for surgery. The patient was sedated with Xylazine Hydrochloride 2% at a dose rate of 1.1mg per kilogram body weight (1.1ml) which was administered via intramuscular injection. The patient was thereafter prepared for aseptic surgery. Induction was achieved 10 minutes after the sedative by using 2.5% thiopental sodium given at a dose rate of 10mg per kilogram body weight given to effect (total dose administered was 5ml). Maintenance of anesthesia was done using isoflurane gas via an endotracheal tube. An incision was made on the medial aspect of the proximal tibia and skin flaps displaced laterally to allow for visualization of the tibia. The medial aspect of the proximal tibia was located and an intra-medullary pin advanced from the medial aspect of the tibia up to the level of the distal tibia. Post-operative radiographs were taken and showed the intra-medullary pin to engage the distal
physis of the tibia. Skin closure was done routinely by the apposition of the skin using simple interrupted suture pattern with nylon 2/0.

Postoperative care provided included; amoxicillin trihydrate 300mg given by intramuscular injection, dexamethasone 6mg given by intramuscular injection. A Robert Jones bandage was put in place for 24hours and thereafter changed every 48hours. Postoperative pain management was achieved by use of Caprofen 75mg (Rimady®) given orally at a dose rate of 4.4mg/kg every 24hours for 10 days. Antibiotic treatment was to be repeated every 48hours for 10 days. Daily temperature reviews were undertaken to evaluate post-operative infection.

24 hours after surgery the Robert Jones bandage was removed and the surgical wound was moist. The dog used the limb for ambulation with light pressure on the ground. The Robert Jones bandage was replaced with the dog under light sedation using 0.5ml (1mg) of xylazine hydrochloride 2% via an intramuscular injection. Nylon sutures were removed 17 days post operatively following healing of the wound and a Plaster of Paris cast bandage applied. The plaster of Paris cast bandage broke 4 days later due to excessive movement of the dog and was replaced. Difficulty in confinement of the dog and the hyperactive demeanor led to replacement of the plaster of Paris (POP) bandage weekly. 28 days post-operatively radiographs were taken to evaluate healing. Lateral views of the physis showed the pin to be in place and the deposition of callus tissue around the fracture site. Confinement of the patient continued for 2 more weeks to facilitate further callus formation and stabilization. The patient was discharged thereafter with a review in 6 weeks to remove the intra-medullary pin. The patient did not return for pin removal due to high costs.
DISCUSSION

The higher incidences of joint trauma in all immature animals are due to weak physis compared to the supporting bones ligaments and joint capsule (Johnson and Durbin, 2012), (Podeszwa and Mubarak, 2012) (Tillson et al, 1995). Injuries to all the physis are the second most common growth plate injuries following those of the distal radius (Peterson and Peterson, 1972). The
The objective of joint fracture treatment is to achieve a stable anatomic reconstruction to maintain joint congruency and joint and limb functions. Treatment of physeal fractures can be operative by use of fixation devices and implants or conservative and non-operative. Conservative non-operative treatment is the preferred treatment management for non-displaced physeal fractures of the tibia and fibula (Podeszwa and Mubarak, 2012), (Kraus and Kaiser, 2008). Fixation is achieved by use of pins, wires and screws. The proximity of the physis to the joint capsule should be considered during the selection of a fixation technique. Interference of the joint mobility by fixation devices will affect the mobility of the joint and cause further trauma to the joint. The selection of the use of an intra medullary pin for the German Shepherd dog in this case report was arrived due to the nature of the fracture. A Salter Harris type I fracture with minimal lateral displacement would respond to an intra-medullary pin which would engage the distal physis and stabilize it. The use of screws at the physis would have compromised healing if the screws are inserted directly into the growing physis and lead to the further separation of the physis. Intramedullary pins offer a more stable engagement of the fractures physis with minimal manipulation of the fracture site. At least 50% engagement is recommended to facilitate fusion; this was achieved in this case. Displaced fractures should undergo a gentle reduction with appropriate anesthesia with multiple reduction attempts avoided (Podeszwa and Mubarak, 2012). Adequate reduction will facilitate fracture healing. Post operative management should aim at restricting movement to allow for callus tissue to deposit and stabilize the fracture site. A plaster of Paris cast bandage added to the patient facilitated immobilizing joint movement for the patient.
Fixation device removal is dependent on the age of the animal and the type of device used. Young animals should have implants removed to prevent the formation of osteosarcomas. Older animals can retain implants if they are not infected.

REFERENCES


Johnson D. L and Durbin T.C. 2012. Physeal-sparing tibial eminence fracture fixation with a headless compression screw. *Orthopedics* 35(7); 604-608


Thrall D.E. Textbook of Veterinary Diagnostic Radiology 5th edition Saunders, St. Louis