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A Case Report of A Hybrid External Fixator for Fracture Repair in a 3-Month-Old Boer Goat (Capra hircus)

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ABSTRACT

A 3-month-old male intact crossbred Boer Anglo Nubian caprine kid weighing 20.5Kg, presented to the School of Veterinary Medicine (SVM) with a history of acute onset lameness of the left hind limb. Initial examination at a private veterinary clinic revealed a fracture of the left tibia. The patient was referred to the SVM for treatment. Physical and radiographic examination of the animal revealed a closed, complete, short oblique fracture of the distal metaphysis of the left tibia with moderate cranio-proximal displacement of the distal segment. The limb was temporarily immobilized using a pre-made bivalve cast until the surgery. Surgical intervention involved using a hybrid external fixator best described as a maximal bilateral uniplanar (Type II) fixator frame with a distal fabricated aluminum ring. The post-operative regimen included antibiotics, non-steroidal anti-inflammatories, frequent cleaning of the pin-skin interface and apparatus bandage changes. The animal was also confined to pen rest initially with gradual increase in exercise. Since surgery, the patient has progressively increased weight bearing on the affected limb and was fully weight bearing upon external fixator removal, 6-weeks post operatively. This method of external fixation has not been commonly used for repair of fractured limbs in goats, however in this scenario it proved economical and highly effective in providing the stability required for fracture repair. Veterinarians with limited resources and financially conservative clients should consider this method for repairing similar type fractures in small ruminant animal species.

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SIGNALMENT

A 3-month old, male, intact, caprine, Boer x Anglo Nubian weighing 20.5Kg.

HISTORY

- The patient was referred by a private clinic to the Farm Animal section of the Veterinary Teaching hospital at the Eric Williams Medical Sciences Complex (EWMSC).
- The patient was reported to have gotten his left hindlimb stuck in his enclosure the previous night.
- The accompanying mediolateral radiograph of the left hock depicted a closed complete short oblique fracture of the left tibia with moderate cranio-proximal displacement of the distal segment. (*Figure 1*)
- Patient currently standing but non- weight bearing lame on left hind limb, eating and drinking well.

PHYSICAL EXAM ANOMALIES

- Moderate soft tissue swelling of the hock region of the left hindlimb.
- Obvious complete discontinuity of the distal tibia with crepitus.
- Superficial pain of the distal left hind limb intact.

PLAN

- Flunixin @ 2.2mg/Kg SID, IV x3/7.
- Multivit, 3ml IM, SID, indefinitely.
- Vitamin ADE 0.4ml IM SID x1/7.
- Apply bivalve cast with extra cotton padding spanning above the stifle to below the hock until external fixator placement.
- Confine patient and reduce excessive activity to prevent further soft tissue trauma.
- Blood was taken via the Jugular vein for Pre-operative complete blood count and serum biochemistry testing. (*Table 1*)
- Schedule External fixator application for 08/07/19.
- Biologic fracture assessment score: 7/10[1]
- Clinical fracture assessment score: 7/10[1]

Figure 1. Presenting radiograph Mediolateral L hock.

Figure 2. Post-op radiograph Caudocranial L hock.

DIAGNOSTICS

Parameter	Result	Range	Interpretation
CK	564	0-100u/L	Significantly elevated
GGT	52	0-30U/L	Significantly elevated
Glucose	9.9	2.4-4.0mmol/L	Significantly elevated
Phosphate	2.6	1.0-2.4mmol/L	Mildly elevated
Albumin	25	29-43g/L	Mildly decreased

Table 1. Blood Abnormalities.

TREATMENT & NAME OF SURGICAL PROCEDURE

- Closed reduction and external fixation using a hybrid external fixator.
- Maximal Type II Hybrid external fixator with a distal ring implantation.

PRE-OPERATIVE

- The patient was pre-medicated using 2% Xylazine @ 0.05mg/Kg Intramuscularly.
- The patient was then induced using Ketamine @ 6mg/Kg and Lidocaine at 1mg/Kg, both intravenously.
- The patient was maintained on a Constant Rate Infusion (CRI) of Xylazine, Ketamine and Lidocaine @ 0.66µg/Kg/min, 66µg/Kg/min and 20µg/Kg/min respectively.
- A lumbosacral epidural was performed using 1ml of 2% lidocaine and 1ml of 0.5% buvipicaine.

Figure 3. Post op ex fix implantation.

Figure 5. Post ex fix removal mediolateral.

Figure 6. Post ex fix removal caudocranial

Figure 4. Post op weight bearing 3 weeks

INTRA-OPERATIVE

- Closed manual reduction.
- Two 3.2mm mediolateral smooth trocar pointed IM pins placed proximally & distally in the proximal segment connected to 2 mediolateral connecting rods. They were loosely bolted onto a fabricated aluminum ring just distal to the fracture site.
- Two 2.6mm smooth, trocared IM pins were placed in the distal tibial metaphysis of the distal segment. One mediolaterally and onecraniocaudally secured to the ring using 2 cannulated wire fixation bolts on either side.

Post-OPERATIVE

- The apparatus was to be monitored and the skin pin interface cleaned twice daily with 0.05% chlorhexidine, silver sulphurdiazine applied and silver bandage aerosol used followed by an elastic gauze bandage change. This process was continued for about 2 weeks until scarring of the skin pin interface occurred significantly reducing the likelihood of infection. The frequency of cleanings were then reduced to once a day followed by bandage changes as necessary.
- The apparatus was to be check daily for shifting, loose bolts and nuts and to secure them as necessary.
- It was ensured that the patient's surroundings did not allow for damage to the apparatus.
- The patient's activity was pen restricted until about 7 days post operatively. It was then gradually increased to haltered 5 minute walks once a day for 3 days. This was increased to twice a day for 3 days. The duration of the walks was increased by 5 minutes daily until the patient's 3rd week post operatively when he was allowed monitored small pasture activity for about 6 hrs daily.

DISCUSSION

- Fracture incidence seems to be highest for small farms in developing countries.
- The total cost of the surgery including drugs and equipment (which is re-usable) was approximately $250USD (ESF $215).
- With proper post-op management using chlorhexidine & silver sulphurdiazine the occurrence of infection is low.[2][3]

CONCLUSIONS

For clinical cases where external co-aptation is not applicable, external fixation with proper post-op care is an economic method of regaining almost full functionality and thus productivity from small ruminant fracture patients.

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