



## RESEARCH ARTICLE

### COMPLICATIONS IN FRACTURE HEALING USING EXTERNAL SKELETAL FIXATION IN GOATS

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#### ABSTRACT

External skeletal fixation has numerous advantages over other technique for the fracture management in animals. The unique advantages in its application popularized its use in animals. It can be used in any type of fractures like open, closed, simple or comminuted with least invasiveness and much stability to fracture by preventing the fracture forces. It can be used in conjunction with internal fixation and its configuration can be altered even after application or during the bone healing process. It has wider application in cases like limb or bone lengthening, treatment of infected bony conditions etc. its adaptability helps in widely using it in veterinary practice. The technique have certain disadvantages too, which is studied in the present study. The complications noticed in the present study were pin tract drainage, pin loosening and angular deformity. The remedy for the complications is also discussed.

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#### INTRODUCTION

Fracture of long bones is a more common orthopedic condition in goats due to their behavioural pattern. Among the different techniques for fracture management, external skeletal fixation is unique with many advantages like effective in treating closed and open fractures, limb deformities, nonunions, stabilization of joints during healing of luxation or arthrodesis and adjustability after surgery (Piermattei and Flo, 2006). The present study was conducted to evaluate the complications of external skeletal fixation in the case of fracture management in goats. The records about the complications of external skeletal fixation in goats are scanty.

Denny and Butterworth (2000) stated the advantages of ESF like minimal instrumentations, minimal soft tissue damage during application, adaptability, staged load transferring capacity to the healing bone, suitability to use in open wounds, avoidance of implants at the fracture site, relatively cheap.

According to Hulse (2002) the most important considerations in managing infected / open contaminated bone were fracture stability and the presence of implants. Butterworth and Denny stated that infected open fractures were best managed using external skeletal fixator (ESF).

The added advantages were ease of application, usefulness in treating fractures reduced by either open or closed methods, fixation pins that can usually be inserted some distance from an open wound, only approach were wound dressing of an open wound along with its immobilization possible, its compatibility for use in conjunction with other internal fixation devices, tolerance by both dogs and cats, removal without placing the animal under general anesthesia and reasonable cost (Piermattei and Flo, 2006).

Seguin *et al* (1997) reported complications like pin loosening, pin tract infections, delayed union, non-union, fracture disease (atrophy of bone, soft tissues and cartilage), osteomyelitis and pin breakage. Bone fracture and sequestration were rare. Fractures were due to placement of pins in bone fissures, osteopenic or cortical bone, excessive pin size (pin diameter more than 20 per cent of the bone diameter), premature loosening of pins and inadequate patient restriction after surgery. Excessive heat built-up and subsequent thermal necrosis following intracortical placement of a pin weakened the bone, making it more susceptible to fracture.

#### MATERIALS AND METHODS

The study was conducted in six clinical cases of complete fracture of long bones in goats presented to the Surgery unit of University Veterinary Hospital, Mannuthy and Kokkalai during the period of December 2011 to February 2013. Those goats presented with lameness were subjected to clinical examination and fracture of long bones was confirmed by radiography. The goats selected for the study were subjected to detailed clinical and radiological investigation followed by hematological and serum biochemical evaluation. All the goats were subjected to treatment with External Skeletal Fixation with Stainless Steel connecting bar in Type IA and Type II patterns depending on the bones affected. Case No I,II,III,IV,V and VI were femoral, metacarpal, metatarsal, metatarsal, tibial and radius-ulna respectively. Unilateral external skeletal fixation assembly in Case No I and bilateral external skeletal fixation assembly in rest of the cases were applied. Periodic clinical, radiological, hematological and serum biochemical evaluations were conducted preoperatively, immediately after the surgery and the follow up was done upto two months at two weeks interval. Clinical evaluation was conducted during second, fourth, sixth and eighth postoperative week, till the clinical healing of fracture was evident.

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## RESULTS AND DISCUSSION

Commonly observed complications in the present study were pin tract drainage, pin loosening and angular deformity. Ross and Matthiesen(1993) observed that the complications observed under external skeletal fixation ranged from pin tract drainage, pin loosening, osteomyelitis, nonunion, delayed union, angular deformities, osteolysis. Harari (1992) reported wire tract infection characterized by periosteal reaction around the wire insertion point, cortical lysis and in some cases increased medullary density around the wires.

Fracture of bones and sequestration, fractures due to placement of pins in bone fissures, osteopenic or cortical bone and excessive pin size was reported by (Seguin *et al.*,1997), and in the present study, a transfixation pin passed directly thorough the fracture site in Case No IV, without causing any delay in fracture healing.

Premature loosening of pins due to inadequate patient restriction after surgery was reported as an important complication (Seguin *et al.*, 1997). In the present study, pin loosening noticed on Case No I (fig 1,2 ) where Type 1A fixator alone was used for femoral fracture, the pin loosening noticed by third week and implant fell down by fourth week (fig.3). Unilateral frames on the femur and humerus were especially weak in resisting bending, because the connecting rod was relatively far away from the neutral axis of the bone. This was contemplated as the reason for implant failure. Pin loosening in the present case didn't cause any difficulty to the animal since it started bearing weight by second week, resumed normal gait and by fourth week the implant was removed.

In Case No V, slight angular deformity was noticed on immediate postoperative radiograph, but got corrected during subsequent period of study due to excessive muscular pull by the growing animal. Johnson *et al.* (1989) reported angular deformities as one of the complication of this technique.



Fig.1 &2 Case No I- Loosening of construct and limb carriage at the third week



Fig.3 Broken down implant

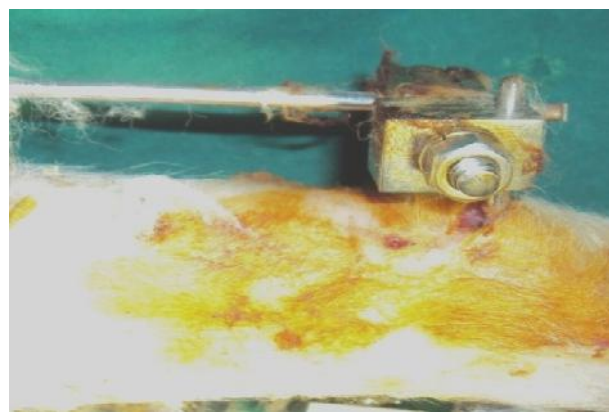


fig.4 Pin tract drainage

Pin tract drainage noticed (fig.4) in Case No I and VI from the proximal pin tract; got subsided by the dressing with Tr. Iodine and infusing povidone iodine into the pin tract to avoid chance of further infection. Julie (2005) reported the effectiveness of dressing with Tr. iodine in controlling the pin tract infection in the case of external skeletal fixation in dogs.

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