

# EXTERNAL SKELETAL FIXATION IN COMBINATION WITH INTRAMEDULLARY PINNING AND CERCLAGE WIRING FOR THE MANAGEMENT OF COMMINUTED FRACTURE OF HUMERUS IN A DOG

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One effective method for immobilizing the fracture of humerus is plate osteosynthesis, which requires extensive exposure of fracture fragments and requires removal of plates after adequate bone remodeling, owing to the lack of callus formation. Moreover bone plates are very expensive and require extensive instrumentation. Marti and Miller (1994) reported the treatment of fracture of humerus with external fixation in combination with intramedullary pinning and found to be technically easier and considerably less expensive than plating. Most commonly used method of immobilization of humerus is intramedullary pinning. Although intramedullary pin resists the bending force, it is very poor in countering the rotational force. This leads to fracture instability and failure in fracture repair. The rotational force could be effectively immobilized, if external skeletal fixation is used adjunct to intramedullary pin. Hence a case of comminuted fracture of humerus in a dog has

been placed on record which was successfully managed with external skeletal fixation in combination with intramedullary pinning and cerclage wiring.

A four year old male German Shepherd Dog was presented with the history of automobile accident, sustaining injuries on the left fore limb leading to nonweight bearing lameness. The animal was not bearing full weight on the affected limb and physical examination revealed that it had pain, swelling and crepitus on manipulating the left humerus. Also the animal manifested the symptoms of radial nerve paralysis like dropped elbow and dragging of the left forelimb. Radiographically it was confirmed as a case of comminuted fracture of distal humerus. Hence, it was decided to immobilize the fracture surgically with Type IA external skeletal fixation with intramedullary pinning.



Fig.1: Patient before surgery



Fig. 2: Open reduction and external skeletal fixation

Anaesthesia was induced with Ketamine hydrochloride (5mg/kg i.m) after premedicating with atropine sulphate (0.045 mg/kg i.m) and xylazine hydrochloride (2mg/kg) given intramuscular. The anaesthesia was maintained

with xylazine-ketamine mixture and diazepam (0.25 mg/kg i.v) 'to effect'.

A skin incision of six centimeters length was made on the craniolateral aspect of the distal humerus to expose the fracture fragments. The

fragments were reduced and held with bone holding forceps. Steinmann pin of 4.5 mm diameter which occupied 70% of bone diameter was inserted into the medullary cavity in a retrograde fashion. Cerclage wiring was done at two sites to include the butterfly fragment in order to achieve better stability. Steinmann pins of 3.5 mm diameter which occupied 20% of the bone diameter were used as the fixation pins with three pins in the proximal fragment and one pin in the distal fragment. The surgical wound was closed in the standard pattern and a soft bandage was applied over the area.

Postoperatively the animal was given



**Fig.3: Second day after surgery**

As suggested by Ozsoy and Altunatmaz (2003) implants were removed on eighth week based on the radiographic union and the animal showed steady improvement in the gait thereafter. Langley-Hobbs *et al.* (1997) recommended the insertion of pins avoiding the region of radial nerve and was done accordingly in the present study. But preoperatively the animal was presented with paralysis of radial nerve and showed good improvement in functional limb usage after the implant removal. Anderson and Aron (1998) reported that intramedullary pins and wires should be used to augment ESF and not vice-versa. They found that the combination technique of intramedullary pin with ESF has effectively stabilized the humeral or femoral fracture. In the present study also the combination was found to be effective in immobilizing the humerus fracture with good functional limb usage. Radke *et al.* (2006) found that addition of intramedullary pin enhanced the

antibiotic coverage with cephalexin. Regular cleaning of the suture line and pin-skin interface was avoided to allow scab formation and done only when discharge was noticed. Skin sutures were removed on 10<sup>th</sup> postoperative day.

Immediate postoperative radiograph confirmed proper alignment of fracture fragments with slight distal migration of intramedullary pin. Loosening of cerclage wire could be appreciated in the radiograph taken at the end of second postoperative week. In spite of this, there was good weight bearing from the first postoperative week itself and the fracture healed clinically by the end of eighth week.



**Fig.4: Three months after surgery**

unilateral construct in the treatment of femoral or humeral fractures in dogs.

#### Reference

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