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Surgical management of humerus fracture by intramedullary pinning and external skeletal fixation tie: In configuration in a buffalo calf

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Abstract

A 3 days old cross bred Murrah buffalo calf with a history of lateral recumbency following birth after dystocia was presented to the department of veterinary surgery and radiology, VCC, RIVER, Puducherry. On examination of the right fore limb, crepitus was felt at the distal end of humerus. A complete oblique fracture of the distal diaphysis of the humerus was confirmed on radiography. Under sedation surgically by tie-in configuration fracture was treated. Tie-in configuration frame was protected with application of POP cast. Inj. Streptopenicillin @ 10 mg/kg B.W. administered I/M for 5 days. Inj. Meloxicam @ 0.4mg/kg B.W I/M for 3 days were administered postoperatively. On 45th post-operative day clinical union of fracture was confirmed with callus formation on radiograph. Tie-in configuration was removed and on 60th day weight bearing was noticed. Animal made an uneventful recovery.

Keywords: Humerus fracture, tie-in configuration, buffalo calf

1. Introduction

Fracture of long bones caused by high-energy trauma resulting from fall can occur in bovine patients as the result of careless mutational practices of relieving dystocia. In all most fracture cases due to high energy trauma or accident, the degree of comminution (size and number of fragments) results in a complicated fracture configuration. Fractures fragments may become non-reconstructable when the bone fragments cannot feasibly be reduced anatomically to form stability for healing. Low-stiffness Kirschner-Ehmer (KE) ESF, including Type IA ESF construct and an IM pin, has proved successful in the management of fractures (Gemmill *et al.*, 2004) [7]. External Skeletal Fixator is attached to an intra-medullary pin by a clamp or resin the result is termed as 'tied-in' construct (Radke *et al.* 2006) [2]. Acrylic external skeletal fixators uses a polymerised mouldable material as either a clamp or as a combined clamp/ bar, instead of using a traditional solid bars or metal clamps (Yamagishi *et al.* 2014) [3]. Different acrylic materials have been described for the use of ESFs in veterinary patients, including epoxy putty, poly-methyl methacrylate (PMMA) and automotive body filler (Worth, 2007) [4]. The present case report describes the technique of lightweight ESF/tied-in IM pin construct and results of the clinical use of the construct for the treatment of fracture of the long bone in a buffalo calf. Fracture stabilization in the acute trauma cases is necessary for fracture reduction, prevent soft tissue injury, joint stability and pain control.

2. Case history

A cross bred Murrah buffalo calf calved three days back with a history of dystocia reported with lateral recumbency since birth was presented to the Department of Veterinary Surgery and Radiology, VCC, RIVER, Puducherr. On performing the mutational practice of forced extraction during dystocia, the calf had undergone a sudden fall from the birth canal as reported by the owner and the calf hasn't been able to stand since then. On clinical examination the animal appeared to be active and alert with normal clinical parameters of rectal temperature: 102.3°F, conjunctival mucous membrane appeared pink, all the lymph nodes were palpable, Heart rate was 76 bpm and the feeding and voiding habits detected no

abnormality. Clinical examination revealed crepitus at the distal end of right humerus. Radiography confirmed the presence of distal oblique diaphyseal fracture of the right humerus (Fig 1). Haematological parameters were all in the normal range. Surgery was opted to fix the fracture by the method of tie-in configuration.



Fig 1: Distal oblique diaphyseal fracture of the right humerus



Fig 2: Incision and exposing of fracture fragments



Fig 3: Intra medullary pin insertion

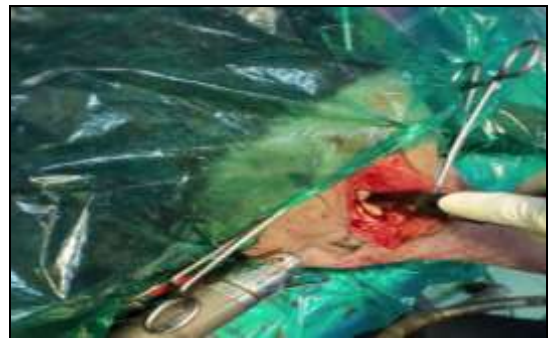


Fig 4: External skeletal pin insertion

3. Anaesthetic protocol and surgical procedure

The calf was sedated with Inj. Xylazine @ 0.05mg/kg B.W. I/V and local analgesia was achieved by infiltration of inj. lignocaine hydrochloride 2% solution infiltrated at the surgical site. The surgical site was prepared aseptically. Skin and muscles were incised on the lateral aspect of the humerus at the fracture site to expose the fracture fragments (Fig.2). Retrograde placement of the intramedullary pin (Steinmann pin 3mm) was attempted in this procedure (Fig.3). The surgical wound was left open until placement of the ESF pin at distal fracture fragment as to visualise the long axis of the bone. A single Steinmann pin of 3mm was inserted into the distal fragment as full-pin using a powered drill at low-speed - with sterile sleeve and chuck (Fig.4). Orthopaedic wire of 22gauge was used as full cerclage wiring for stabilizing the oblique fracture. The muscular layer was closed with chromic cutgut size 0 by simple continuous suture pattern and skin by cross mattress suture pattern using braided silk size 0. The IM pin and the ESF pin was connected externally by orthopaedic clamps to form the tie-in configuration (Fig.5). The corners of the pins were protected with povidone iodine impregnated sterile gauze and soft cotton padding followed by bandaging was done. The tie-in configuration was protected externally by application of plaster of paris and PVC (Polyvinyl chloride) splint cast (Fig.6). Inj. streptopenicillin @ 10 mg/kg B.W. administered I/M for 5 days. Inj. meloxicam @ 0.4mg/kg B.W administered I/M for 3 days were post-operatively. Oral multivitamin and calcium supplementation was advised. On 14th postoperative care the plaster of Paris cast was removed and the skin sutures were removed. Bandaging with PVC splint was continued.



Fig 5: Final external skeletal framework



Fig 6: Tie configuration protected by Plaster of Paris

4. Result and Discussion

On 45th post-operative day, radio graphical examination revealed clinical union of fracture fragments with callus formation. Tie-in configuration was removed and on 60th day weight bearing was noticed. Animal made an uneventful recovery. In the present case, IM pin was left protruding through the skin was tied-in with ESF using conventional Orthopaedic clamps and provided stabilizing the frame (Fernando *et al.* 2021) ^[5]. The tied-in frame was rigid and stable which provided rotational stability (Radke *et al.* 2006) ^[2]. The tie in configuration for the stabilization of the humerus fracture showed satisfactory clinical union of the fracture fragments (Rao *et al.*, 2017) ^[6]. The buffalo café showed weight bearing from the 60th postoperative day after complete removal of the tie in configuration.

5. Conclusion

In the present case the surgical management of the humerus fracture with IM pin and ESF tie-in configuration provided stability against bending, shearing, compression and rotational forces. Complete healing of the fracture fragments was achieved without any complications.

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