Surgery Journal 1 (2-4): 69-71, 2006
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Comparative Study Between Camel and Bovine Bones as Bony Shuttle Pin Splint for Femoral Fractures in Small Animals

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Abstract: Bony shuttle pin splints were obtained from slaughtered camel metacarpal bone and bovine femoral bone and used for repair of induced femoral fractures in small animals. Clinical and radiographic comparative study between Camel and bovine bones and follow-up of these cases showed that the Bony shuttle pin splints obtained from camel metacarpal bone is effective for immobilization of the femoral fractures. Good alignment and healing were seen by radiological examination. No side effect due to application of these splints. Non of the bony pins obtained from other source (bovine) where strong enough to support the fractured femur more than a few day due to decalcification of bony pins at the fracture line.

Key words: Bovine, bony shuttle pin, camel

INTRODUCTION

Reduction of the fractures refers to the process of replacing fractured segment in approximately their original position[1]. They are modified materials that immobilize the fracture almost in the normal position and to enhance the healing. There are many materials, which are different in their use depending on the animals' species, site of fracture, size of the animal, condition of the fracture and even the age of the animal. Intramedullary (IM) fixation, with all of its attendant problems, is the most readily used system of internal fixation in small animals[2-4]. The devices used in veterinary medicine include only the Steinmann pin, Kirschner wire, Rush pin and Kuntscher nail[5]. Intramedullary pinning is the most form of the internal fixation used by veterinarians today, most of the Intramedullary pins are applied by the open reduction, but occasionally some of the Intramedullary pins may be derived by the closed reduction[2,6-8]. Permanent shuttle pin is easy to apply and efficient for proper alignment and immobilization (Shnain *et al*., 1989).

In this study, bony shuttle permanent intramedullary pin splints (camel metacarpal bone and bovine femoral bone) were used to find out the possibility of immobilization and fixation of the femoral fracture segments in small animals and to reduce the cost of the devices and operation for removal of the splint.

MATERIALS AND METHODS

Animals: Six local-breed dogs, 15-20 Kg^{-1} body weight were used. All animals were examined clinically and kept at least for two weeks before surgery in cages (1/1/1 M in size).The animals were divided in two equal groups of three animals each.

Splints (bony shuttle pins): Round pins were made from camel metacarpal bone and bovine femoral bone. The bones were cleaned properly, cut with an electric saw and were prepared into proper width slats with an electric grindstone.

Different sizes of pins were made with notch in one of its ends. Shuttle pins were wrapped in papers and autoclaved for 30 min. at 121°C. Pins of different lengths and diameters were sterilized and some of these splints re-sterilized many times and kept in a closed surgical drum ready to be used.

Surgery: Under general surgical anaesthesia (15 mg kg^{-1} B.W) Ketamine Hcl mixed with (5mg kg^{-1}.BW) Xylazine was administered intramuscularly as aesthetic agents. Half of the mixed calculated dose (Ketamine Hcl 15mg kg^{-1}, Xylzine 5 mg kg^{-1} BW) was given to make the animal lightly anesthetized in order to prepare the surgical site. Skin was incised over the diaphyseal part of the femur with in the surgical line extending from the major trochanter down to the lateral condyle of the femur, then the fascia lata was incised as close as possible to the

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anterior border of the *biceps femoris* muscle. The *Vastus lateralis* and the *biceps femoris* muscles were retracted to expose the femur. Part of the adductor muscle attached to the posterior part of the femur was separated to pass two long curved scissors under the femur, one opposite to the other and kept open to protect the underlying structures from being injured during induction of diaphyseal fracture. Which was started with wire saw and then completed with chisel and hammer to have an uneven cut fracture[10]. As the open reduction was performed, about 15-20 cm long nylon sutures was Threaded through the notch of the bony pin, pin is inserted into the proximal segment of the fractured bone, then into distal segment of the fractured bone.

Procaine penicillin powder is put into the fractured area and soft tissues as local antibiotic, then the wound closed by simple continuous suture using absorbable suture(cat gut no 2/0) to approximate the fascia lata and the skin was sutured with simple interrupted stitches using No 2/0 Surgical silk. Systemic antibiotic was used intramuscularly for five post operative days.

Fig. 1: Bovine femoral bone as bony shuttle pin splint. X-Ray immediately after the operation

RESULTS

Radiographic: Lateral view radiographs (50 Kv, 0.2 Sec) were taken to the fractured bone immediately after operation (Fig. 1 and Fig. 3), then monthly to follow-up the progress of healing and reaction to these splints (Fig. 2 and Fig. 4).

The daily clinical examinations and the follow up of the general condition of the operated animals were made to determine the recovery and bone healing.

Fig. 2: The broken bony pin X-Ray one week after the operation

- Group • (Bovine femoral bone as bony shuttle pin splint). Bony shuttle pins were applied with an additional external splint (modified Thomas splint).The bony intramedullary pins were broken one week after the operation. Dogs show swelling on the fracture area with inflammatory signs. The animals were unable to put weight on the affected leg.
- Group • (Camel metacarpal bone as bony shuttle pin splint). Bony shuttle pins were applied without any additional external splint. Clinically there were no complications. The animals stood on the operated leg between 15-20 days after operation and walked after one month.

DISCUSSION

There are many external and internal splints which are used to immobilize fractures in small animal, but only internal splints are usually suitable for femoral fractures

Fig. 3: X- Ray immediately after operation

Fig. 4: X-Ray one month after the operation

fixation, such as intramedullary pins and bone plates[6,11]. The bony intramedullary pins as bovine bony shuttle pins have been used for immobilization of the mid-diaphyseal femoral fractures in dogs, but unfortunately they were not successful. Failure of that type of bony splint could be due to the strong muscular traction of the heavy muscle coating which makes the external splint not efficient[7]. Also it may possible because of the decalcification of the bony intramedullary pin at the fracture line as a result of the inflammatory reaction that decreases in the pH at this area. According to the results of this study camel metacarpal bone as bony shuttle pin splint could be recommended for the fixation of diaphyseal femoral fractures in small animals. It is simple, easy applied, with minimal postoperative care, and no need for another operation to remove them[12]. There are no side effects as those, associated with the use of the metallic devices. They also block the callus and new bone does not develop from the vascular cortical ends[13]. Cost of the bony shuttle intramedullary splint, its availability, its preparation and the simple sterilization methods should be taken into consideration.

CONCLUSIONS

Bony shuttle pin splints were obtained from slaughtered camel metacarpal bone and bovine femoral bone and used for repair of induced femoral fractures in small animals. Clinical and radiographic comparative study between camel and bovine bones and follow-up of these cases showed that the bony shuttle pin splint obtained from camel metacarpal bone was effective for immobilization of the femoral fractures. Good alignment and healing were seen by radiological examination. No side effect due to application of these splints was observed. None of the bony pins obtained from other source (bovine) were strong enough to support the fractured femur more than a few days due to decalcification of bony pins at the fracture line.

REFERENCES

1. Brinker, W.O., 1957. Canine surgery, Fractures, pp: 29-609.
2. Ehmer, E.A., 1947. Bone pinning in fractures of small Anim. J. Am. Vet. Med. Assoc., pp: 110-14.
3. Brinker W.O., 1948. The use of intramedullary pins in small Anim. fractures. North. Am. Vet., pp: 29-292.
4. Jenny, J., 1950. Kuntscher's medullary nailing in femur fractures of the dog. J. Am. Vet. Med. Assoc., pp: 117-381.
5. Nunamaker, D.M., 1975. Methods of Internal Fixation Textbook of Small Animal Orthopaedics, Newton C.D. and Nunamaker D.M. (Eds.) Ithaca: International Veterinary Information Service, 1985. Rudy RL: Principles of intramedullary pinning. Vet. Clin. North. Am., pp: 5-209.
6. Leonard, E.P., 1971. Orthopedic Surgery of Dog and Cats, 2nd (Edn.) W.B. Saunders Company, Philadelphia, U.S.A.
7. Dingwall, J.S., 1974. Canine surgery. Fractures Chapter, pp: 24-949.
8. West, G. P., 1995. Black's veterinary dictionary,
9. Shnain, H., F.R. Khalid and N.H. Markus, 1989. Bony shuttle pin splint. The Iraqi J.Vet. Sci., pp: 307-310.
10. Leonard, E.P., 1968. Fundamentals of small animal surgery. W.B. Saunders company, U.S.A, pp: 158-162.
11. Slatter, D., 1995. Pocket companion to textbook of small animal surgery Musculoskeletal Sys., pp: 118-530.
12. Bostman, O.M., 1996. Metallic or absorbable fracture fixation devices accost minimization analysis, Clin. Orthop. and Rel. Res., 329: 233-239.
13. Anderson, L.D., 1965. Compression plate fixation and the effect of different types of internal fixation on fracture healing. J. Bone joint Surg., pp: 47-191.