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CLINICAL EXPERIENCE ON SURGICAL MANAGEMENT OF LONG BONE FRACTURES

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SUMMARY

Long bone fractures is a common surgical problem in small animal practice. This work was done on 24 dogs presented to Surgery Department, Faculty of vet. Medicine, Cairo University with different types of long bone fracture to assess the different direct internal fixation methods adopted for them. These method includes intramedullary bone pinning (single or multiple) and Dynamic Compression Plate. it was found that pinning was found to be the cheapest and the best method in stablizing fractures while plating, cerclage wire and / or lag screw were found to be effective in dealing with comminuted fractures.

INTRODUCTION

Long bones in small animals are exposed to fracture due to either physical causes as violent accident, slipping or physiological causes as muscular traction associated with physical activity, so their fractures represent 40 % of all fractures (Leonard 1971, De angelis, 1975, Ahmed & Soliman 1982, and Hulse and Hyman 1993) . However, the return of the fractured long bone to noraml anatomical form is the most important goal (DeYoung and Probst, 1993).

In the last two decades, there were many trials to overcome the possible complications related to conservative treatment of long bone fractures using different internal fixation methods as screws, plating and wiring instead of casting which interferes with joint motion and weight bearing (Brinker 1974 and Brinker et al. 1975, 1984). A successful method of internal fixation of fracture is based on type, and location of fracture, size, age, and weight, of the animal number of bone affected, concurrent soft tissue involved, housing, behaviour of the animal and owner cooperation (Brinker et al. 1990 and DeYoung et al. 1993).

The aim of this work is to assess the different

direct internal fixation methods adopted for different clinical long bone fractures. The end result of different treatment trials succeeded. There was no post operative complications as infection or swelling.

MATERIAL AND METHODS

Twenty - four dogs were presented to Surgery Department, Faculty of Vet. Medicine, Cairo University suffering from different types of long bone fractures. These dogs were subjected to clinical and radiological examination. These cases were demonstratod in Table 1. These fractures were immobilized by internal fixation using intramedullary bone pinning, lag screws, cerclage wire and / or plating. The animals were prepared for aseptic surgical operation. The used anaesthetic regime was after Short (1987) and included i. m. injection of a mixture of atropine sulphate 0.05 mg/kg b. w t, diazipam 0.5 mg/kg b. w t as preanaesthetic. Induction was performed via the use of mixture of xylazine Hcl 1.1 mg / kg b. w. t and Ketamine Hcl 5 mg / kg b. w. t. Maintenance was by thiopentone sodium at a dose of 20 - 30 mg kg. bwt. (dose to effect) administered i. v.

The surgical lateral approach to the humeral, radius and ulnar, femoral and tibial fractures was after Piermattei et al (1997).

Intramedullary (IM) bone pinning was either single or multiple using retrograde technique with or without cerclage wire and lag screws 3.5 mm Dynamic Compression Plating (DCP) with or without cerclage wire and lag screws and involving hole drilling, depth gauge measurment , taping and introduction of 3.5 mm ø screws was after . The different types of treatment fractures was demonstrated in table 1.

All fracture cases were to be confined to complete rest given preoperative intravenous 0.5 gm cephalo sporin, local intraoperative lavage and post operative cephalosporin of 10 - 15 mg / kg b.w.t injection every 6 hr I/M for 7 days. In case of radial and tibial fractures, light compression bandage was applied after removal of the plate (4 months after operation).

Radiographic follow up of the fracture healing was considered just postoperative , after 2 weeks and after complete healing (3-4 months).

RESULTS

In all cases, clinically, the surgical wound healed within one weak. Evaluation of the gait showed that, in single intramedullary bone pinning, success to touch the ground in the third day which extend to a week in case of oblique diaphyseal fracture of the femur (Figure A. B. C. F1, 2, 3). In case of mutiple intramedullary bone pinning, the dogs succed to toch the ground in the first three days (Figure D. F4, 5). In case of bone plating, the weight bearing was seen after the first day post operatively (Figure F). Radiographically, the fracture line was noticed in the first 2 weeks, after that it started to disappear gradually till 3-4 month, Complete healing was noticed (Figures A, B, C, D, F and F).

Table 1: The cases of fractures and its type of treatment.

Fractured	No, of cases	Type of Fracture	Type of intrame-
humerus	1	- Oblique diaphyseal fracture (1 case).	- Single I. M.bone pinning (Figure A)
Radius and ulna	4	- Oblique diaphyseal fracture (1 case) .	- Single I. M for radius bone pinning with cerclage wire (Figure B).
		- Spiral diaphyseal fracture (1 case).	- Single I M. bone pinning with lag screws.
		- Transverse diaphyseal fracture (2 cases) .	1- Single IM bone pinning with cercelage wire (Figure C 1 & 2). 2- Multiple intramedullary bone pinning (Figure C 3 &4).
Femur	17	- Oblique diaphyseal fracture (9 cases) .	1- Single I. M. bone pinning. 2-Multipl I. M. bone pinning (3 pins). D1, 2, 3, 4.
		- Comminuted diaphyseal fracture (1 case).	- DCP with cerclage wire and lagscrews (Figure E).
		- Spiral diaphyseal fracture (1 case).	- DCP with lag screws
		- Impact diaphyseal fracture (2 cases).	- Single I M bone pinning.
Tibia and fibula.	2	- Oblique diaphyseal fracture (4cases).	- Single IM bone pinning.
		- Oblique diaphyseal fracture (1 case).	- Single IM. bone Pinning (Figure F 1, 2& 3).
		- Transverse diaphyseal fracture (1 case).	- Multiple IM bone pinning (2 pins) (Figure F 4 & 5).

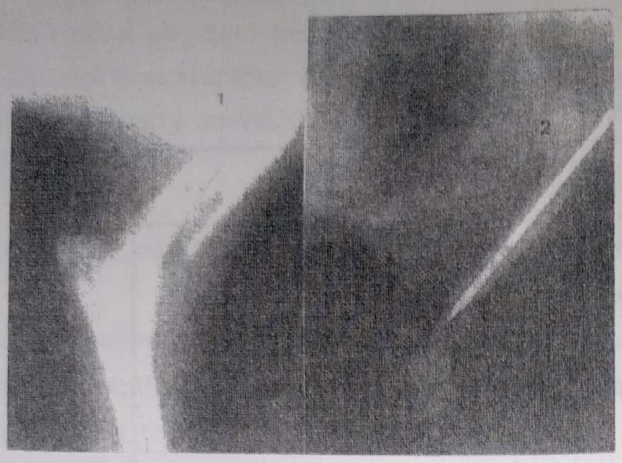
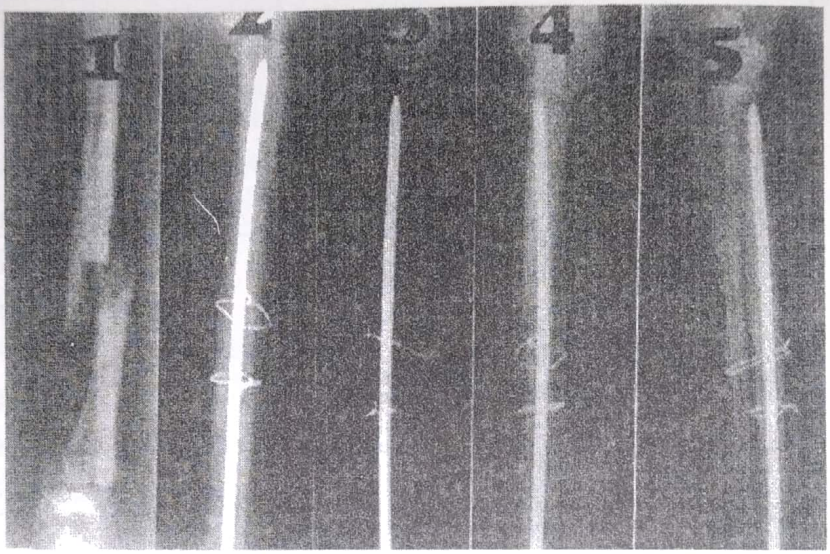


Figure (A)

Figure (B)



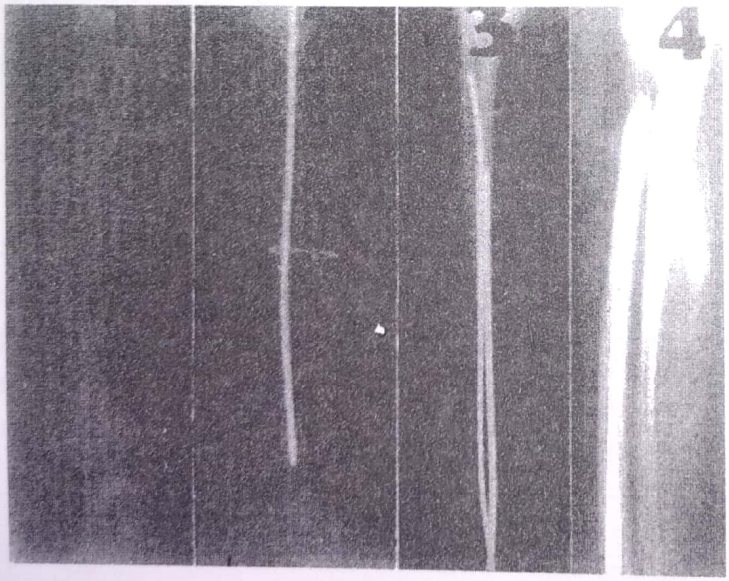


Figure (C)

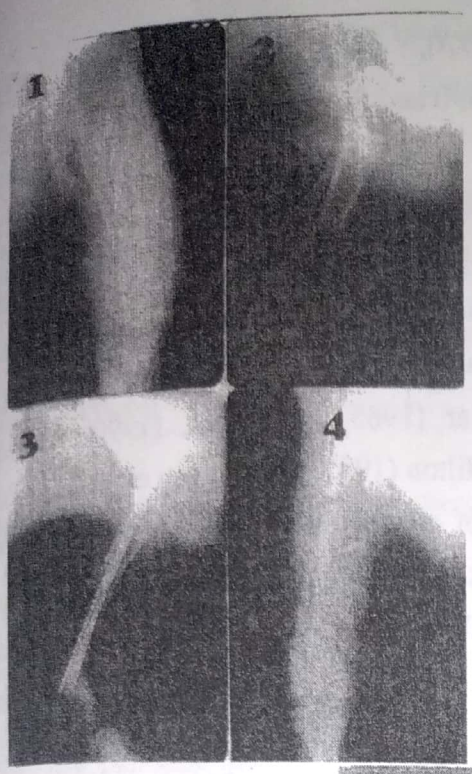


Figure (D)

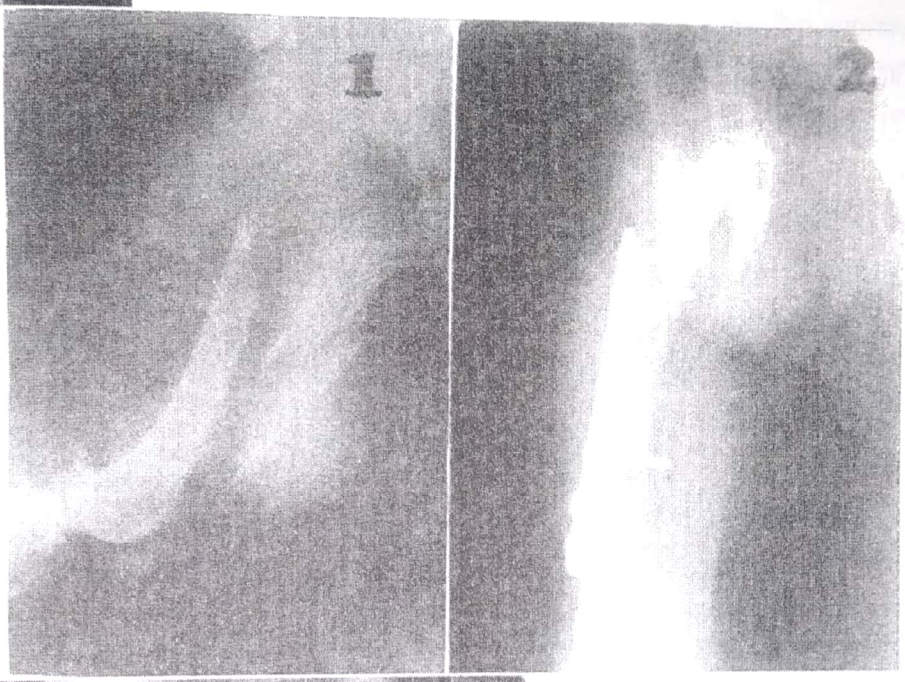


Figure (E)

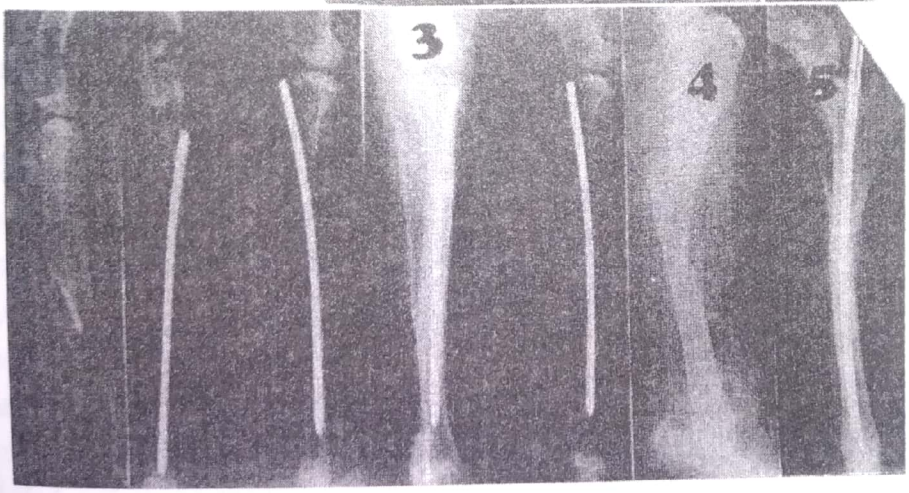


Figure (F)

DISCUSSION

Long bone fracture is a common surgical problem in small animal practice. Internal fixation of long bone fractures assures proper stability and positioning of bone fragments and achieves accurate anatomical reduction and interfragmentary compression. Bone platting using DC plate is superior to other methods. This was reported by McLain and Brown (1982) and Piermattei et al. (1997). Selecting the best suitable internal fixation method and the thorough anatomical knowledge are very important to minimize time consumption thus decreasing trauma of involved tissue that has a serious infleunce in the healing process Walter et al, (1986). Nunamaker et al., (1976) Brinker et al (1984 and 1990), Muller et al (1990) and Wilson (1991) added that the lag screws and cerclage wire were effective in achieving fragment apposition and stability that were necessary for proper healing.

It was also noticed that the use of DCP insured fracture stability as it resulted in axial compersion that helped in fixation and excellent rotational stability and it occured only in single (I. M) bone pinning thus induced excellent healing without callus formation so it give chance for early return to full function of fractured bone and early weight bearing (Alexander et al., 1973, Woo et al., 1976, Hulse 1980, Brinker et al., 1984, Smith 1985, Schwartz, 1991 and DeYoung et al., 1993).

In cases of comminuted fracture, cerclage wire with lag screws together with bone plating provided effective means for stability of fracture fixation with immediate weight bearing (Sumner - Smith 1970, Brinker 1978, Alexander 1985, Probst 1990 and Piermattei et al. (1997).

Intramedullary bone pinning proved to be satisfactory in reconstructing humeral, tibial and femoral mid shaft stable fractures of young and small breed dogs. A result that agred with that of Nunamaker (1985), Galinmor, (1990), Howard (1991); Milton (1993) and Braden et al., (1995).
The use of cerclage wire and / or lag screws together with stack pinning in case of oblique fractures resulted in good fixation as they counteract the rotational bending and prevent undetectable movement. This results met with that of Chaffe (1977), Kagen (1983), Rhinelander (1985), Church and Schrader (1990), Dalman et al., (1990), Schwartz (1991), wilson (1991) and DeYoung et al,. (1993).

The multiple pinning technique could be 3 times effective as single pin this aggreed with Dalman et al., (1990).

A postoperative light compression bandage menimized postoperative oedema in cases of radial and tibial fractures probably due to the mechanical causes (De Young and Probst, 1993).

The use of intra operative and post-operative antibiotic lavage causes reduction and control of the post operative infection (Fogelbereg et al., 1970, Bowers et et al. 1973, Brinker 1974. Maclean 1975, Holmberg 1978, Brinker et al. 1984 and Numamaker 1985).

It can be can concluded that internal fixation allow early return to normal function of the frac-

tured bone and rapid return of animal to normal function. Pinning was found to be the cheepest, short time consuming and the best method to stable fractures. Plating, cerclage wire and / or lag screw was found to be effective in dealing with comminuted fractures.

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