



Supracutaneous locking compression plating for the management of humerus fracture in a dog

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Abstract

A dog was presented to the University Veterinary Hospital, Kokkalai with a history of non-weight bearing lameness on left forelimb and was diagnosed as humerus fracture. Supracutaneous locking compression plating was carried out after open reduction under general anaesthesia. Periodic clinical and radiographic evaluations were conducted at two weeks interval for a period of six weeks until the plate removal. Physiological and haematological parameters were within the normal range. The serum alkaline phosphatase level was high at the time of presentation and decreased progressively. The dog returned to sound gait, normal weight bearing and satisfactory functional limb usage by sixth post operative week. The fracture healed with periosteal and endosteal callus. The implant was intact and patient acceptance was satisfactory throughout the observation period.

Key words: Supracutaneous plating, locking compression plate, humerus fracture

Humerus fracture in dogs is one of the most common orthopaedic ailments encountered in small animal practice. Open reduction and internal fixation ensure proper reduction and immobilisation of fracture fragments, so that early ambulation is attained. Locking compression plating (LCP) is a widely accepted internal fixation technique that provides better angular stability and improved pull-out strength. It can also be applied supracutaneously as a unilateral low profile external fixator (Kloen, 2009). Use of supracutaneous locking compression plating has been reported with high rate of union and low rate of complication (Siddaram *et al.*, 2018) for the treatment of fractures in human patients. The present paper describes management of humerus fracture in a dog with supracutaneous locking compression plating (SpC-LCP).

A one-year-old non-descript female dog weighing 14 kg was presented to the University Veterinary Hospital, Kokkalai with the complaint of non weight bearing lameness on left forelimb

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following road traffic accident. Clinical examination revealed fracture of humerus and the diagnosis was confirmed using radiography. It was a transverse diaphyseal fracture at the distal third of the humerus. The dog was clinically normal and physiological parameters were within normal range. Open reduction of the fracture was performed under general anaesthesia and the fracture fragments were stabilised using supracutaneous locking compression plating (SpC-LCP). General anaesthesia was induced by ketamine hydrochloride at the dose rate of 5.0 mg per kg body weight and midazolam at the dose rate of 0.1 mg per kg intramuscularly after premedication with intramuscular injections of atropine sulphate at the dose rate of 0.045 mg per kg body weight and xylazine hydrochloride at the dose rate of 1.0 mg per kg body weight. General anaesthesia was maintained with 1.5 to 2.0 per cent isoflurane in 100 per cent oxygen using Bain's circuit.

Fracture reduction was achieved after the complete surgical exposure of the humerus through craniolateral approach. Fractured fragments were stabilised using 2.7 mm LCP plate made of 316L stainless steel and self-tapping screws with a length of 40 mm (Nicetto and Longo, 2019). The screws were selected based on the thickness of bone and height of the plate away from the bone surface. After reduction of fracture fragments, the LCP plate was positioned supracutaneously on the aligned proximal and distal fragments using K wire at an elevated level of 20 to 25 mm from the underlying bone using a spacer (Xiao *et al.*, 2016). Screws were then inserted perpendicularly in the drilled hole and tightened to engage in the threads of screw holes. Muscle layers were apposed by simple continuous pattern using 1-0 polyglactin 910 and skin wound was apposed by horizontal mattress pattern using nylon (Fig. 1). Ceftriaxone sodium injection at the dose rate of 30 mg per kg body weight and meloxicam injection at the dose rate of 0.2 mg per kg body weight were given intramuscularly immediately after surgery. Antibiotic therapy was continued with cephalexin tablets at the dose rate of 30 mg per kg body weight orally for seven days. Carprofen tablets were given at the dose rate of 2 mg per kg body weight twice daily orally for three days. Skin sutures were removed on the second postoperative week.



Fig. 1. Implant in position after surgery

Haematological parameters were within normal physiological limits during the entire observation period of eight weeks. The serum alkaline phosphatase level was higher on the day of presentation (283 IU/L) and decreased on postoperative assessment period compared to preoperative value (Patil *et al.*, 2017; Sharat *et al.*, 2022). On preoperative lameness evaluation, the dog was unable to place the affected limb on the ground and was not able to bear weight on the fractured limb at rest and during walking. Second postoperative week onwards the dog started bearing weight on the affected limb and normal weight bearing and sound gait were regained by sixth postoperative week. The findings on weight bearing were in accordance with Bansal *et al.* (2020) in human patients.

On radiographic evaluation, good apposition and alignment were noticed throughout the postoperative assessment period. Bone healing was observed with periosteal and endosteal callus formation (Fig. 2). These findings were in accordance with reports of Zhou *et al.* (2015) and Siddaram *et al.* (2018) in human patients using supracutaneous locking compression plating. The implant was intact throughout the observation period and patient acceptance was satisfactory. Implant was removed on eighth postoperative week under sedation using butorphanol injection at the dose rate of 0.1 mg per kg body weight followed by xylazine hydrochloride injection at the dose rate of 1.0 mg per kg body weight intramuscularly (Sriram *et al.*, 2021). The functional outcome of limb was excellent on the day of plate removal. Supracutaneous locking compression plating using 2.7 mm LCP plate

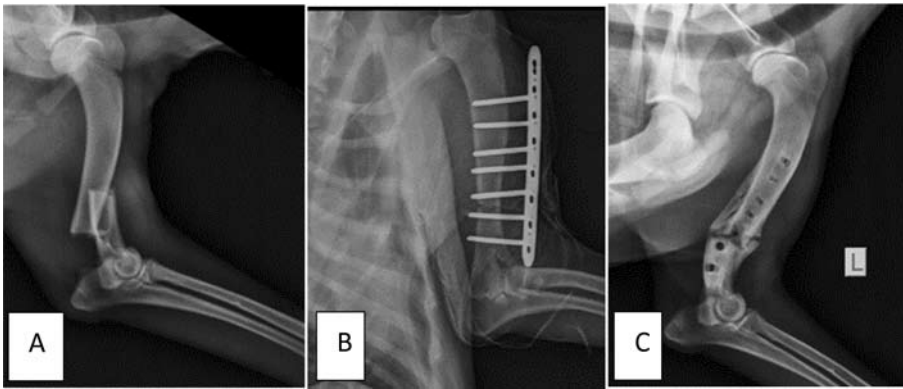


Fig. 2. (A) Preoperative radiograph (B) Immediate postoperative radiograph (C) Radiograph after implant removal

was found to be an effective method for treating long bone diaphyseal fractures in dogs weighing less than 15 kg, since the technique provided a high rate of bone healing, joint mobility, early functional limb usage and weight bearing.

Summary

Supracutaneous locking compression plating was found to be technically feasible and effective in the treatment of humerus fracture in terms of early weight bearing and functional outcome.

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