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## C-Arm assisted olecranon fracture repair in a dog: A case report

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### Abstract

Fractures of the olecranon are typically observed in young dogs and signify separations of the olecranon apophysis. A female German Shepherd dog presented with a history of trauma with lameness and physical examination indicated crepitation and pain upon palpation of the left elbow. Fracture fixation was done by tension band wiring with the help of C arm. The animal started bearing weight after 15 days postoperative. Olecranon fractures are classified into extra-articular or intra-articular. Tension band wiring and Plate osteosynthesis are two acceptable techniques, as both are associated with excellent long-term functional outcomes. In comminuted olecranon fractures, plate osteosynthesis is preferred.

**Keywords:** Olecranon, fracture, tension band wire

### Introduction

Fractures of the olecranon are typically observed in young dogs and signify separations of the olecranon apophysis<sup>[1]</sup>. The triceps muscle's pull tends to cause distraction of olecranon fractures proximally, necessitating control of this distractive force for effective fracture healing<sup>[1]</sup>. These fractures often exhibit comminution and frequently involve the articular surface of the trochlear notch. Given the substantial tensile force exerted by the triceps brachii muscles and the common articular involvement, precise alignment and stable internal fixation of olecranon fractures are crucial to facilitate primary bone healing, reduce the risk of posttraumatic osteoarthritis, and enhance the likelihood of restoring pre-fracture limb function<sup>[2]</sup>. Tension band wiring, developed by the AO group, is a method of internal fixation aimed at neutralizing the tensile forces across the fracture site by converting them into compressive forces<sup>[1]</sup>.

### Materials and Methods

A female German Shepherd dog, approximately two and a half years old and weighing around 22.7 kilograms, was brought to the Department of Surgery and Radiology at Veterinary College, Hebbal. The dog had a history of falling from a height and exhibited lameness in the left forelimb. Physical examination indicated crepitation and pain upon palpation of the left elbow. A medio-lateral view radiograph of the left elbow showed an avulsion fracture of the olecranon (refer to Fig. 1). It was determined that tension band wiring and internal fixation were necessary for treating the fracture. The dog received pre-medication with Atropine sulphate at a dosage of 0.04 mg/kg body weight administered intramuscularly, along with Xylazine at a dosage of 1 mg/kg body weight also administered intramuscularly. Pre-operative antibiotic (Ceftriaxone at a dosage of 25 mg/kg body weight intravenously) was also given. Anesthesia induction and maintenance were achieved using 2.5% Thiopentone at a dosage of 12.5 mg/kg body weight intravenously. The olecranon fracture site was accessed by making a skin incision on the caudal aspect of the olecranon and by separating the extensor and flexor carpi ulnaris muscles from the proximal part of the ulna. Two Kirschner (K) nails, each with a diameter of 2 mm, were inserted through the olecranon into the ulna and c arm is used to check the positioning of k wire in the ulna. The protruding ends of the nails were bent caudally near the olecranon. The K pins were then cut ½ cm behind, leaving a small bent portion forming a hook, which was rotated anteriorly. This hook was utilized to secure the tension band wire on the triceps muscle insertion tendon over the olecranon.

For tension band wiring, a hole was drilled transversely distal to the fractured end of the ulna. A 22 gauge stainless steel wire was employed as a tension band, passed through the hole created in the ulna, and its free ends were brought across each other in a figure-8 fashion over the caudal aspect of the olecranon. The wire ends were then secured over the hooks of the K wire and tightened (see Fig. 3). Muscles and skin were closed routinely using chromic catgut no. 1 and nylon, respectively. Post-operative management included administering Cephalexin at a dosage of 25 mg/kg body weight orally for 7 days, along with alternate-day dressing



**Fig 1:** Survey radiograph showing avulsion fracture of olecranon with rotation



**Fig 2:** Tension band wiring was done and radiograph was taken immediately after surgery



**Fig 3:** Revealing callus formation

## Results and Discussion

The animal started bearing weight after 15 days postoperative and an x ray was taken 18 days post-operative revealing callus formation (Fig 3). An olecranon fracture is a rare occurrence, making up roughly 1.5% of fractures in the appendicular bones, 4.9% of forelimb fractures, and 7.5% of forelimb fractures specifically in dogs and cats [3]. Olecranon fractures are classified into extra-articular (proximal to the trochlear notch) or intra-articular (through the trochlear notch). In each case the bone fragment is displaced by the pull of triceps muscle. Simple extra-articular fractures are stabilized by tension band wires and two pins placed parallel to each other and directed distally and slightly cranially to penetrate the cranial cortex of proximal ulnar shaft just distal to the radial head [4]. Tension band wiring in olecranon fractures provide rigid fixation resulting in good clinical outcome even in heavy breed dogs. The bone of the olecranon is dense and pin insertion is facilitated by predrilling pilot holes of a slightly smaller diameter than that of the pins [1]. The bone of the olecranon is dense and pin insertion is facilitated by predrilling pilot holes of a slightly smaller diameter than that of the pins [4]. In order to achieve inter-fragmentary compression one must place the wire wherever there are maximal tensile forces i.e., farthest from load axis. This clinical paper reports the successful management of the olecranon fracture by tension band wiring [1]. On the other hand, both tension band wiring (TBW) and plate osteosynthesis (PO) are viable treatments for articular olecranon fractures. TBW typically offers stable fixation with a high union rate for non-comminuted fractures, making it an effective technique for simple olecranon fractures. However, for comminuted olecranon fractures, plate osteosynthesis is preferred as tension band wiring is unable to mechanically control more than two fragments. Since olecranon fractures can jeopardize elbow stability and consequently affect long-term functional outcomes, additional elbow-associated injuries should also factor into the surgeon's decision to opt for plate osteosynthesis over tension band wiring [3].

## Conflict of Interest

Not available

## Financial Support

Not available

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