**International Journal of Interdisciplinary Research in Medical and Health Sciences**
ISSN: 2837-9969 | Impact Factor : 6.55
Volume. 10, Number 2; April-June, 2023;
Published By: Scientific and Academic Development Institute (SADI)
8933 Willis Ave Los Angeles, California
https://sadipub.com/Journals/index.php/ijirmhs | editorial@sadipub.com

# THE APPLICATION OF DYNAMIC COMPRESSION PLATING IN TREATING A DOG'S RADIO ULNAR FRACTURE - A SUCCESSFUL CASE REPORT

**Dilip Kumar D**
Veterinary Polyclinic, Mavelikara, Alappuzha, Kerala-690101

**Abstract:** Fractures in dogs resulting from trauma, such as automobile accidents, can be successfully managed using dynamic compression plating (DCP). This case report presents the surgical management of a non-descript male dog with a radio ulnar fracture using DCP. The animal had resumed bearing weight on the affected limb by the 14th post-operative day and made an uneventful recovery. The article outlines the surgical procedure and discusses the advantages and disadvantages of DCPs and other fracture management procedures, as well as post-operative considerations for patients. Moreover, it provides an overview of fractures and their classification, with a focus on dog fractures resulting from trauma. The craniomedial surface of the radius and the caudal lateral surface of the ulna are easily palpated and have minimal soft tissue coverage, making open fractures relatively common in these areas. Treatment recommendations for fractures depend on the severity and configuration of the fracture, as well as the size, age, and conditions of the patient. Implant application techniques specific to the radius include cast, intra medullary pins, external skeletal fixators, bone plates and screws, among others. However, DCP is a standard plate type that achieves fixation of the fracture by friction generated by the application of a well-contoured plate to the bone surface with screws. The DCP's geometric shape allows longitudinal and transverse screw angulation and the amount of compression depends on the plate and screw size. Proper fracture management procedures lead to good prognosis and physical rehabilitation encourages controlled limb use and optimal limb function after fracture healing.

**Keywords:** dynamic compression plating, dog fractures, trauma, fracture management procedure, post-operative considerations, physical rehabilitation, animal recovery.

## INTRODUCTION

A fracture may be defined as a disruption in the continuity of a bone (Denny and Butterworth, 2000). It can be accompanied by various degrees of injury to the surrounding soft tissues, including blood supply and compromised function of locomotor system. Fractures may be classified according to anatomical location, external wounds, extend of bone damage, direction of fracture line and relative displacement of the bone fragments (Denny and Butterworth, 2000). Radio-ulnar diaphyseal fracture occurs as a result of trauma (especially automobile accidents) to the fore limb and disruption of the continuity of the diaphyseal cortical bone. According to Milovancev and Christopher (2004), the diaphysis is the most common site for fractures of the radius and ulna specifically distal third of the diaphysis. This is thought to be a result of poor blood supply and the minimal soft tissue coverage of the distal ante brachium. Ulnar fractures are almost always found concurrently with radial fractures. Although the ulna is usually fractured alongside, it is seldom stabilized unless the stability of the elbow or knee joint is threatened as it acts as a natural splint. Radial fractures can be transverse, oblique, spiral and comminuted fracture. The immobilization of fractured fragments either with external skeletal fixation or internal skeletal fixation is a prime need of bone healing process. The present case describes successful management of the radial ulnar multiple diaphyseal fracture by dynamic compression plating.

## CASE HISTORY AND OBSERVATION

A four years old non-descript male dog was presented to Veterinary Polyclinic, Mavelikara with the complaint of non-weight bearing lameness of the left forelimb after encountering an automobile accident. On clinical examination, all the physiological parameters were found within the normal range. On orthopedic examination, the animal manifested pain on palpation above carpal joint along with crepitus over mid shaft of radius and ulna. Radiographs of left ante brachium, revealed multiple diaphyseal fracture of mid-shaft of radius and ulna (Fig.1). Surgical correction by open reduction and fixation with dynamic compression plating was decided.

## TREATMENT AND DISCUSSION

The animal was pre- medicated with xylazine hydrochloride at the rate of 1.5 mg/kg intramuscularly. The induction of anesthesia was carried “upto effect” using 1ml of Ketamine (at the rate of 10 mg/kg BW) mixed with Diazepam (at the rate of 0.5 mg/kg) in the ratio 1:1 intravenously. The dog was administered with Inj. Ceftriaxone Tazobactam (20mg/kg BW) and Inj. Meloxicam (0.3mg/kg BW) intravenously. The animal was positioned in right lateral recumbency. Surgical site was prepared for an aseptic surgery. Anesthesia was maintained by administrating 1 ml Ketamine mixed with Diazepam in the ratio 2:1 as intravenous bolus depending upon the regaining of consciousness of the animal based on palpebral reflexes, vocalization etc. Skin incision was made on the craniomedial aspect. Continued dissection through the fascia, avoiding the medial cephalic vein and nerve crossing the middle to distal third of the radial diaphysis. The fractured segments of the radial diaphysis were brought in to apposition using bone holding forceps and applied hemi circlage wiring. Dynamic compression plate (2.5 mm) of 6 holes was contoured and applied over the fracture line in radius. It was fixed with five cortical screws of size 18 mm; two proximally and three distally (Fig.2.). Apposed muscle in simple continuous suture pattern using polyglactin 910 of size 10. The skin was apposed with cross mattress sutures using non absorbable silk of size 1-0. The limb was immobilized using stabilizing bandages. Post operatively, the dog was administered with Inj.Montaz 1g (Ceftriaxone + Tazobactam) at 20 mg/kg bodyweight i/v and Inj. Melobest 15ml (meloxicam) at 0.3mg/kg body weight i/m for five days. The animal made an uneventful recovery.

Small breed dogs often suffer fractures because of landing on their forelimbs from a height, such as jumping from their owner’s arms. In comparison, radius or ulna fractures in the large breed dogs usually result from more severe trauma such as automobile accidents. The craniomedial surface of the radius and the caudal lateral surface of ulna are not covered by muscles and can be easily palpated to serve as landmark for location of incision. Because of the minimum soft tissue coverage, open fractures are relatively common (Milan and S. Christopher, 2004). Extensor muscles are located cranial to and flexor muscles caudal to radius and can be retracted to expose the bone. Caudolateral displacement of the distal fragment is most common because of contraction of flexor muscles of the ante brachium.

Treatment recommendations depend on patient's size, age, condition of fracture site, severity and configuration of fracture itself.

Implant application techniques specific to the radius include application of cast, Intra Medullary Pins, External Skeletal Fixators, bone plates and screws (Fossum, 2013). The treatment goal of fracture fixation is to restore the patient to normal function as quickly as possible and a successful technique is fixation with screws and bone plates. (Mike Conzernius and Scott Swainson,1999). Bone plates achieve fixation of the fracture by friction generated by the application of a well-contoured plate to the bone surface with screws. When applied properly, bone plates effectively resist the axial loading, bending and torsional forces acting on fractured bones. The surface on which the plate is located influence the degree of stability obtained.

The dynamic compression plate (DCP) is a special plate developed by the AO group and it is standard plate type for many decades in the veterinary profession, the geometry of the DCP hole allows longitudinal angulation of screws of up to 25 degrees, and transverse angulation of up to 7 degrees. The amount of compression depends on the plate and screw size (Jagan Mohan *et al.,* 2020). The advantages of the DCP include low incidence of malunion, stable internal fixation, and no need for external immobilization, thus not allowing immediate movement of neighboring joints. Certain disadvantages with the DCP include delayed union as well as persistence of a microscopically detectable fracture gap that acts as a stress riser after plate removal. Cortical bone loss under the plate was another disadvantage (Hans K. Uhthoff *et al.,* 2006). Post-operative pain management may be indicated. Activity should be restricted to leash walking and physical rehabilitation until the fracture has healed. Physical rehabilitation encourages controlled limb use and optimal limb function after fracture healing. After placement of a plate on a diaphyseal fracture, the limb should be supported for a few days with a soft-padded bandage to reduce swelling which should be changed weekly. The prognosis is generally good if proper fracture management procedures are followed (Fossum, 2013).

**SUMMARY**

The diaphyseal radial ulnar fracture was successfully corrected by dynamic compression plating. The animal made an uneventful recovery.

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