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# Clinico-radiographic and histopathologic evaluation of iliac shaft fracture in dogs (an experimental study)

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ABSTRACT

The pelvic region has a great importance as it is the connecting ring between the hind limbs and the trunk as well as having special shape. The present study was conducted on 15 adult, mongrel male dogs aged 2–3 years and weighted 15–20 kg. Iliac shaft fracture was induced experimentally, and the fractured ilium was fixed by Dynamic Compatable Plate (DCP). Fracture healing was evaluated clinically, radiologically and histopahologically. The animals were partially-weight bearing on the limb of operated side 4th day post-operatively and they were full-weight bearing within 17th days post-operatively. The gait was varied from occasional lameness to full function at the 21–28th post-operatively. The results of this study was conducted along 16 weeks confirmed that the internal fixation for fractured ilium using a bone plate and screws had a good fixation and healing and all animals returned to normal gait within short time.


## 1. Introduction

The pelvic fractures are serious injuries associated with mortality rate ranged from 10% to 50% depending on the severity of the fracture itself, bleeding, as well as presence of soft tissue injuries or absence (Demetriades et al., 2002; Baylis and Norris, 2004). Pelvic fractures represent 22–25% of all fractures recorded among canine population (Piermattei et al., 2006). Iliac fracture is the most common fracture type represented by 46% of all pelvic bones fractures (Betts, 2003; De Camp, 2005 and Prassinos et al., 2007).

Recent trend for iliac fracture treatment aimed to achieve an anatomical reduction, short hospital stay, fastest healing and enable the animal return to normal function (Aron, 1998; Shahar, 2000; and Hirvensalo et al., 2007). The objective of this study is to achieve an evaluation for experimentally surgically induced iliac shaft fracture in canine model through clinical, radiological and histopathological investigations

## 2. Materials and methods

### 2.1. Experimental animal

The present work was done at Surgery, anesthesiology, radiology and Pathology departments, faculty of veterinary medicine, Beni – Suef and Sadat City Universities. It was carried out on 15 adult male apparently healthy mongrel dogs weighting 15–20 kg and aged 2–3 years. Food and water were withheld for a period of 8–12 h before the operation. A prophylactic course of cefotaxime sodium (Cefotax®, EPICO, A. R. E) at dose of 4.5 mg/kg body weight was received intravenously prior to the operation. All animals were given pre-operative, subcutaneously injected anthelmintics for external and internal parasites (Iver-mectin super) 2.5 mg/kg body weight.

All dogs were pre-medicated with I.V injection of a mixture of atropine sulfate 0.05 mg/kg. (Atropine sulfate® 1 mg/ml Med. Co., A. R. E) and diazepam 1 mg/kg. (Neuril® 0.5% sol. Memphis Co. for pharm. & chem. Ind. Cairo A.R.E). Anaesthesia was induced immediately through I.V injection of a mixture of Ketamin 10 mg/kg (Ketamar® 5% sol. Amoun Co. A.R.E) and Xylazine 1 mg/kg (Xyla-Ject® 2% ADWIA Co., A.R.E.). The anesthetic depth was maintained with 25 mg/kg b.wt 2.5% thiopental sodium (Thiopental® EPICO, A.R.E.) administrated intravenously if needed and all operated animals were controlled in lateral recumbence (Schmidt-Oechtering and Alef, 1995; Torad, 2000).

### 2.2. Induction of iliac shaft fracture

The pelvic region was prepared for aseptic surgery. The prepared area was extends from midline of the sacrum dorsally to an area of the stifle joint distally and from the last rib cranially to the base of the tail caudally. Induction of iliac shaft fracture by

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a lateral approach was performed according to (Piermattei and Johnson, 2004), the skin incision was began from the iliac crest cranially and extended caudally over the greater trochanter of the femur (Fig. 1-1). The incision is continued through the subcutaneous fat and blunt dissection to the gluteal fascia between superficial gluteal muscle and the tensor fascia lata to expose the aponeurosis of middle gluteal muscle. The middle gluteal muscle was retracted dorsally with superficial gluteal muscle while the tensor fasciae lata retracted distally (Fig. 1-2). The deep gluteal muscle was elevated by sharp dissection to expose the lateral surface of the iliac wing and shaft. By using bone hummer and bone chisel, the iliac shaft was completely transverse fractured (Fig. 1-3).

Stabilization of iliac shaft fracture according to (Brinker et al., 2006) following reduction of the fracture ends. A Dynamic Compression Plate (DCP) of six holes and of sufficient length were selected of a minimum of three screws cranially and a minimum 2 screws of 3.5 mm Ø caudally (Fig. 2-1). The plate is contoured by using plate bender to the lateral concave surface of the ilium (Fig. 2-2 and -3). The surgical field was flushed several times by normal saline then irrigation by gentamycin 10%. The surgical wound closed using simple continuous suture pattern and polyglactin 910 (Vicryl®) No. 0 (Fig. 2-4) for muscles. The continuous interlocked suture pattern was used for skin by silk No. 1 (Fig. 2-5).

### 2.3. Post-operative care

All operated dogs were confined to individual cages along the study. All Dogs were given course of antibiotic (Cefotax®) 1 g every 24 h for five days. The skin sutures were removed 10 days post-operatively.

#### 2.3.1. Post-operative Follow up

*2.3.1.1. Clinical evaluation.* All dogs were subjected to clinical examination daily for the first week and weekly along of the study; include wound drainage, weight bearing capacity, and return to full limb function.

*2.3.1.2. Radiographic evaluation.* Serial radiographs of the operated pelvis were performed two, four, eight and 16 weeks. Radiographs were evaluated for stability of fixation device, alignment and fracture gap (healing pattern). Radiographs were taken with a standard 30 × 40 cm F.F.D, at 50–60 kVp and 15–20 mAs in Ventro-dorsal projection.

*2.3.1.3. Histopathological evaluation.* It was performed for monitoring the different pathological changes that occurred during the healing process of experimentally induced fractured areas.

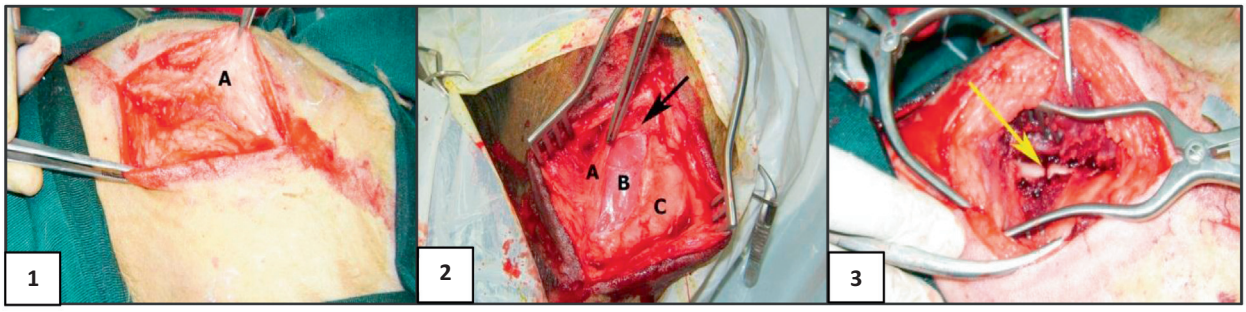


**Fig. 1.** (1) Showing S/C fat (A). (2) Tensor fascia lata (A), Middle gluteal muscle (B) and superficial gluteal muscle (C). (3) Induced iliac shaft fracture (yellow arrow).(For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

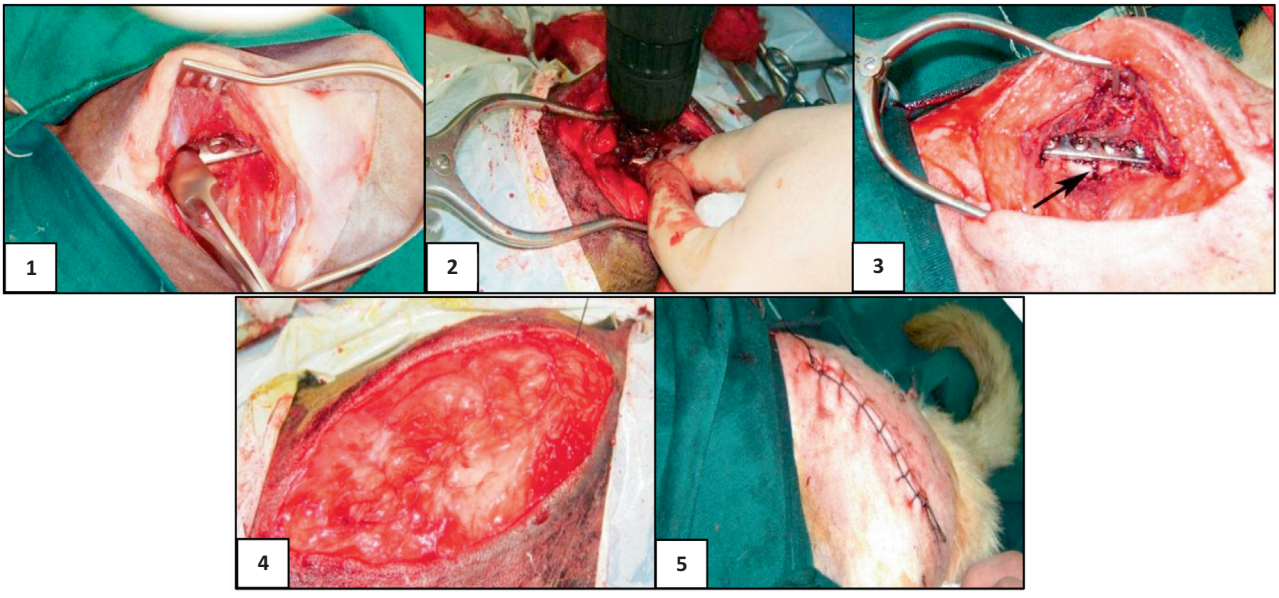


**Fig. 2.** (1) Selection of suitable plate (2) Using of bone drill. (3) Bone plate after fixation by bone screws (4) The surgical wound closed using simple continuous suture pattern (5) The continuous interlocked suture pattern for skin.

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