

## Cat Pelvic Fractures

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### SUMMARY

An eight-month-old, 2.7 kg, male, neutered mixed breed cat was presented at the Sokoine University of Agriculture Teaching Animal Hospital with a history of lameness involving hind limbs, lethargy, anorexia and failure to urinate or defecate. Abdominal palpation revealed a distended urinary bladder and firm faeces within the colon. Manipulation of the hips elicited pain and lower lumbar pain was also elicited on palpation. Radiographic examination revealed, an old fracture of the sacrum, lordosis of the lumbar spine with indented vertebral end plates, left sacroiliac joint subluxation and abnormally ventral angling of the ilial wings. Narrowing of the pelvic canal was also observed. A diagnosis of old fractures of the sacrum, left sacral iliac subluxation and narrowing of the pelvic canal was made based on the history, clinical and radiographic examination. Limitation of activity for three weeks was recommended to facilitate healing process. The owner reported the patient had a gradual recovery from lameness. Computed tomography would have provided further insight on the nature and severity of the fractures that the animal sustained. However, it was not done due to unavailability.

**Keywords:** cat, fracture, pelvis, radiography, spine

### INTRODUCTION

The pelvis is a bony ring that surrounds the pelvic cavity (Bezuidenhout *et al.*, 2000). It is formed by the sacrum and paired *Os coxae* (Bezuidenhout *et al.*, 2000). Pelvic fractures account for approximately 20 to 30% of all fractures in small animal (Piermattei *et al.*, 2006). They often result from severe trauma such as vehicular accidents, animal fights and falls from heights (Johnson and Hulse, 2005).

Most fractures involving the pelvis are multiple (Bookbinder and Flanders, 1992), frequently resulting in soft tissue injuries such as peripheral nerve damage and urinary tract trauma (Lanz, 2002).

Gastrointestinal injury has also been reported to occur in small animals with pelvic fractures (Lanz, 2002). Jones (2000)

defined constipation as absent, infrequent or difficult defecation associated with retention of faeces within the colon and rectum. It has been linked to persistent or subsequent narrowing of the pelvic canal of greater than 45% (Hamilton *et al.*, 2009). The stenosis is partly due to axial displacement of any component of the pelvic canal combined with formation of bony or fibrous callus during fracture healing (Muir *et al.*, 2005). Severe pelvic narrowing has been associated with recurrent constipation in cats (Hamilton *et al.*, 2009).

This report describes a case of old fractures of the pelvis including the sacrum in a cat accompanied by narrowing of the pelvic canal. Incidental indentation of the lumbar vertebral end plates is also reported in this case.

## CASE PRESENTATION, DIAGNOSIS AND PROGRESSION

An eight-month-old, 2.7 kg, male, neutered mixed breed cat was presented at the Sokoine University of Agriculture Teaching Animal Hospital with a history of lameness involving hind limbs, lethargy, anorexia and failure to urinate or defecate after it went missing for a few days from home. On presentation, the cat was lethargic with good body condition. The vital parameters were within the normal limits. Abdominal palpation revealed a distended urinary bladder and firm faeces within the colon. Manipulation of the hips elicited pain and lower lumbar pain was also elicited on palpation.

The cat was anaesthetised for radiographic examination. Xylazine hydrochloride (Alfasan<sup>®</sup>, Holland) at a dosage of 0.44 mg/kg body weight and ketamine hydrochloride (Rotex Medica<sup>®</sup>, Germany) at a dosage of 20 mg/kg body weight were used as a sedative and general anaesthetic, respectively.

Xylazine hydrochloride and ketamine hydrochloride were mixed in a syringe and

given intramuscular in one injection. Radiography was performed using Roller 30 (Smam X-ray Equipments<sup>®</sup>, Italy) X-ray machine at a source to image distance of 100 cm. A kVp of 54 and a charge of 2.5 mAs were used. Images were acquired with a computed radiography system, Colenta Highcap Xr<sup>®</sup> (Fujifilm Corporation, Japan).

Radiographic examination revealed, an old fracture of the sacrum, lordosis of the lumbar spine with indented vertebral end plates, left sacroiliac joint subluxation, and abnormally ventral angling of the ilial wings. Narrowing of the pelvic canal was also observed; Sacral Index (SI), 1.18 (Hamilton *et al.*, 2009). The urinary bladder was filled with urine and the descending colon was filled with faeces (Fig. 1 and 2).

A diagnosis of an old fracture of the sacrum, left sacral iliac subluxation and narrowing of the pelvic canal was made based on history, clinical and radiographic examination. Limitation of activity for three weeks was recommended so as to facilitate healing process. The owner reported the patient had a gradual recovery from lameness through telephone follow-ups.



**Figure 1.** Right lateral radiograph of the caudal abdomen. Note the lordosis of the lumbar spine centered at L7 with indented vertebral end plates. Malalignment of the vertebral canal is seen at the first and second sacral segments (non-fused sacrum) (open white arrow). Note also the abnormally ventral angling of the cranial ilial wings (black arrow). The urine filled urinary bladder and descending colon with faeces are indicated by long and short white arrows, respectively.



**Figure 2.** Ventrrodorsal radiograph of the pelvis. Note the presence of subluxation of the left sacroiliac joint (open white arrow) and moderate laterolateral narrowing of the pelvic canal. Evaluation of the sacrum and L7 is not possible due to superimposed with faeces, however the sacrum appears short. The L7 appears to have an abnormal shape. .

## DISCUSSION

Pelvic fractures are common in small animals and constitute up to 30% of all fractures (Piermattei *et al.*, 2006). They are always multiple in nature and those involving the sacrum are frequently associated with pain (Piermattei *et al.*, 2006) as it was observed in this case. Sacral fractures in dogs and cats are classified into five categories based on radiographic appearance; type I, II, III, IV and V (Anderson and Coughlan, 1997). Previous reports on sacral fractures in dogs and cats indicated that 53% of cats had type III sacral fracture (Anderson and Coughlan, 1997). The latter, is a transverse fracture with the highest incidence of neurological deficits (Anderson and Coughlan, 1997).

Sacroiliac fracture subluxation revealed in this case is a common occurrence in cats with pelvic fractures (Bookbinder and Flanders, 1992; Meeson and Geddes, 2015; Bird and de Vicente, 2020). In a study

which characterised pelvic fractures in cats, more than 50% of cats had sacroiliac fracture luxation (Bookbinder and Flanders, 1992). A similar finding has been reported by Bird and de Vicente (2020). Majority of sacroiliac fracture luxations in cats occur unilateral (Bookbinder and Flanders, 1992; Bird and de Vicente, 2020) as it has been encountered in this case. Due to rigidity of the pelvis, unilateral sacroiliac fracture luxations can only occur with concurrent pelvic fractures (Bird and de Vicente, 2020).

Therefore, lordosis of the lumbar spine observed in this cat is believed to be the result of healed ilial fracture with abnormally ventral angling of the ilial wings. Further, narrowing of the pelvic canal in this case is most likely the result of malunion of concurrent pelvic fractures (Degroot *et al.*, 2016).

Axial displacement of any of the components of the pelvic canal and formation of bony or fibrous callus during fracture healing are the predisposing factors to pelvic stenosis (Muir *et al.*, 2005). Therefore, narrowing of the pelvic canal observed in this case is most likely the result of malunion of concurrent untreated pelvic fractures (Degroot *et al.*, 2016).

Other causes of narrowing of the pelvic canal in cats are insufficient fracture reduction and implant loosening (Hamilton *et al.*, 2009). The latter, has been reported to contribute up to 75% of the cases (Hamilton *et al.*, 2009). Cats with sacral index of  $0.97 \pm 0.025$  are considered having a normal sized pelvic canal (Hamilton *et al.*, 2009).

Pelvic fractures can either be managed surgically or non-surgically (Piermattei *et al.*, 2006). Non-surgical management is indicated when there is an intact acetabulum, little or no displacement of the fracture segments and when there is less than 45% narrowing of the pelvic canal (Piermattei *et al.*, 2006; Bird and de Vicente, 2020).

It consists of limitation of activity, cage rest and measures to ensure regular urination and defecation (Piermattei *et al.*, 2006) and cats have been reported to respond well with conservative management (Hamilton *et al.*, 2009; Bird and de Vicente, 2020).

The Sacral Index of 1.18 observed in this study indicates moderate narrowing of the pelvic canal (Hamilton *et al.*, 2009). Severe narrowing of the pelvic canal greater than 45% in cats is associated with recurrent constipation (Hamilton *et al.*, 2009). Therefore surgery is recommended for widening of the pelvic canal (DeGroot *et al.*, 2016). In cats, indented vertebral end-plates have been reported to be associated with mucopolysaccharidosis as a result of epiphyseal dysplasia (Dennis *et al.*, 2010).

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In mucopolysaccharidosis other skeletal changes are usually observed such as facial deformity, pectus excavatum, dwarfism and hip dysplasia (Konde *et al.*, 1987; Dennis *et al.*, 2010; Schultheiss *et al.*, 2000).

The indented vertebral end-plates observed in this cat are believed to be an incidental finding and should not be interpreted as pathological condition. Indentation of vertebral end-plates has also been reported to occur commonly in old cats involving the thoracic spine (Dennis *et al.*, 2010).

Radiography has been used as a standard diagnostic tool in examination of various forms of pelvic trauma in small animals (Sadan *et al.*, 2016).

However, due to complexity of pelvic floor fractures and superimposition of some of the bony structures; computed tomography (CT) has been used as an additional diagnostic imaging technique during pre-operative assessment (Crawford, *et al.*, 2003; Draffan *et al.*, 2009; Witte and Scott, 2012; Sadan, *et al.*, 2016).

Computed tomography has been reported to be superior in identification of different fractures of the ischium, ilium, sacrum, acetabulum and sacroiliac fracture luxations compared to plain radiography (Sadan *et al.*, 2016). Moreover, CT is useful in investigation of feline sacral fractures (Witte and Scott, 2012), which may be missed on plain radiographs due to the presence of other pelvic fractures, none or minimal displacement, constipation and delay in radiography (Anderson and Coughlan, 1997). Computed tomography would have provided further insight on the nature and severity of the fractures that the animal sustained in this case, however it was not done due to unavailability.

University of Agriculture Teaching Animal Hospital during handling of this case.

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