

Hemipelvectomy for the Treatment of Obstipation Secondary to Narrowing of the Pelvic Canal in a Cat

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ABSTRACT

A four-year-old, domestic long haired cat presented with a two-month history of obstipation unresponsive to medical treatment, enemas and dietary management. Plain radiographic studies revealed unilateral malunion fractures of the ilium, acetabulum and ischium resulting in a narrowed pelvic canal and an ipsilateral tibiotarsal luxation. These injuries resulted from automobile trauma three years previously. Hemipelvectomy was performed to relieve the cause of obstipation and non-reducible tibiotarsal luxation. (Liptak, J.M. (1998) *Aust. Vet. Practit.* 28:2)

CASE HISTORY

A four-year-old, 4.2kg, male, neutered, domestic long-haired cat was presented with a two-month history of intermittent tenesmus. Previous treatment with warm water enemas, stool softeners, stimulant laxatives and dietary manipulation had been unsuccessful in relieving the obstipation. The cat had sustained pelvic fractures and left tibiotarsal luxation three years previously following automobile trauma. Defaecation abnormalities were not observed prior to the recent history of constipation.

CLINICAL EXAMINATION

The cat was in good clinical condition with a non-weight bearing lameness, marked generalised disuse muscle atrophy of the left pelvic limb, and 90° internal rotation of the left tarsus. Pain was not evident during left pelvic limb manipulation and the tarsus was ankylosed in an extended position. No abnormalities were detected on neurological examination. Concreted faeces were evident in the transverse and descending colon on abdominal palpation. The diet consisted of a combination of commercial canned and dry food and there was no history of bone consumption or hunting

activity. The results of preanaesthetic blood analysis to assess renal and hepatic biochemistry, electrolytes and haematology were within normal laboratory limits.

DIAGNOSIS

The cat was anaesthetised and plain radiographic views of the abdomen, pelvis and tarsus were taken. These revealed malunion fractures of the left ilium, acetabulum and ischium with narrowing of the pelvic canal (*Figs. 1 and 2*), and a tibiotarsal luxation with marked disuse osteoporosis of the left ilium, femur and tibia (*Fig. 1*). Closed reduction of the tibiotarsal luxation was attempted but was not successful. Rectal examination under general anaesthesia revealed marked stenosis of the pelvic canal with a pelvic diameter of 1cm.

The tentative diagnosis was obstipation secondary to pelvic canal stenosis resulting from malunion of the left ilium, acetabulum and ischium fractures, and a left pelvic limb non-weight bearing lameness due to a chronic, non-reducible tibiotarsal luxation. A secondary megacolon could not be excluded at this time.

TREATMENT

Hemipelvectomy was performed so that narrowing of the pelvic canal and ipsilateral tibiotarsal luxation resulting in obstipation and a chronic non-weight lameness could be addressed by a single procedure. The cat was

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premedicated with a combination of subcutaneous acepromazine¹ (0.05mg/kg) and pethidine² (1mg/kg). General anaesthesia was induced with intravenous thiopentone³ (25mg/kg) and maintained on halothane⁴ and oxygen through an endotracheal tube. Cephazolin⁵ (22mg/kg) was administered at induction of anaesthesia and then every eight hours for a 24 hour period. Analgesia was achieved with subcutaneous morphine sulphate⁶ (0.1mg/kg) every 30 minutes during the surgical procedure. The cat was maintained on an intravenous infusion of a balanced electrolyte solution⁷ (10ml/kg/hr) throughout the surgical procedure and for 24 hours post-operatively at 60ml/kg/d. A 4 French gauge urinary catheter⁸ was inserted to permit identification of the urethra during surgery. A 3-0 nylon⁹ purse string suture was placed around the anus to prevent intra-operative faecal contamination.

A lateral skin incision curving from the crest of the ilium over the greater trochanter and to the ischiatic tuberosity was continued medially around the proximal aspect of the left pelvic limb. The insertion of the superficial gluteal muscle was incised and an osteotomy of the greater trochanter was performed. The middle and deep gluteal muscles were separated from the tensor fascia lata and elevated from the shaft of the ilium. Tenotomy and subperisoteal elevation of the internal obturator, external obturator, adductor longus, quadratus femoris and gemilli muscles were performed to expose the ischiatic tuberosity. The pelvic limb was amputated distal to the femoral neck to allow manipulation of the hemipelvis via the proximal femur and the attachment of the teres ligament from the femoral head to the acetabulum. The femoral artery and vein were double ligated with 4-0 polyglyconate suture material¹⁰ and divided proximal to the lateral circumflex femoral artery. The cranial gluteal artery, nerve and vein, and then the iliolumbar artery and vein were double ligated and divided. The ilium was osteotomised caudal to the sacrum (*Fig. 3*). Muscles from the medial aspect of the os coxa were elevated subperisoteally. The sciatic nerve was transected at the ilial osteotomy site. Pubic and ischial osteotomies were performed at the medial aspect of the obturator foramen. Gigli wire was used for all osteotomies. The hemipelvis was removed. The wound was closed by suturing the levator ani and coccygeus muscles to the middle and deep gluteal muscles; the middle gluteal was sutured to the remnants of the tensor fascia lata; and the tensor fascia lata, sartorius and iliacus muscles sutured to the contralateral sheath of the rectus abdominus muscle, prepubic tendon and adductor and gracilis muscles. The closure was performed with 2-0 polyglyconate suture material in an interrupted horizontal mattress pattern. The subcutaneous and

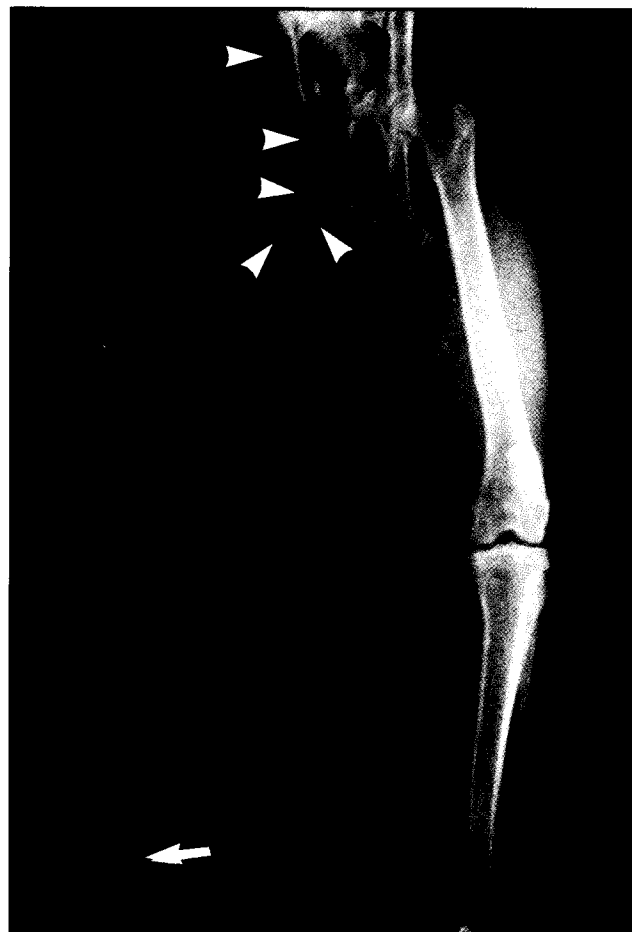


FIGURE 1: Ventrodorsal radiograph of pelvis and pelvic limbs. Note narrowing of the pelvic canal due to malunion fractures of the ilium, ischium, and pubis (arrow heads), disuse osteoporosis of the left pelvic limb and tibiotarsal luxation (arrow at bottom).

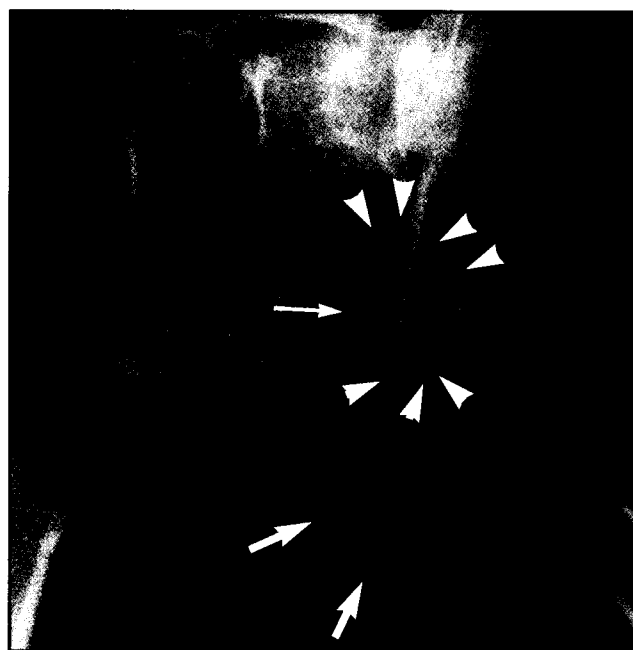


FIGURE 2: Ventrodorsal radiograph of the pelvis showing fracture malunion of a free acetabular segment with fractures of the ilium (arrow heads), pubis (small arrow) and ischium (large arrows).

¹Promex 2, Apex Laboratories

²Pethidine, Parnell Laboratories

³Pentothal, Boehringer Ingelheim

⁴Halothane BP, Veterinary Companies of Australia

⁵Kefzol, Eli Lilly

⁶Morphine sulphate, David Bull Laboratories

⁷Plasmolyte 148, Baxters

⁸Portex Limited

⁹Dermalon, Davis+Geck

¹⁰Maxon, Davis+Geck



FIGURE 3: Osteotomy of the ilium caudal to the sacrum (large arrow). Note the proximal femur and femoral head used for traction and manipulation of the hemipelvis during hemipelvectomy (small arrows).

adipose tissues were closed in a simple continuous pattern and the skin with staples.¹¹

The cat was maintained on stool softeners¹² following surgery for 14 days. A warm water enema was required five days post-operatively for recurrent constipation. Follow-up examinations were performed at two and four weeks and three, six and 12 months post-operatively. Bowel function was considered normal at the six month examination although a large mass of faeces was present on radiographs at this time (Fig. 4). Bowel function was normal 12 months post-operatively. The owners considered the cosmetic appearance acceptable.

DISCUSSION

Pelvic fractures are a common orthopaedic injury in small animal practice accounting for 20 to 30% of all traumatically induced fractures (Bookbinder & Flanders, 1992). The majority of pelvic fractures occur before 12 months of age and result from automobile trauma although one report suggests high-rise syndrome is the most common cause in cats (Verstraete & Lambrechts, 1992). Fractures of the pelvis tend to be multiple because of its box-like structure (DeCamp, 1992; Houlton & Dyce, 1994).

The indications for conservative and surgical management of pelvic fractures in cats are not well defined but can be adapted from recommendations for dogs. Houlton & Dyce (1994) have divided the management of pelvic fractures in cats and dogs into three categories: conservative, conservative management possible but surgical intervention preferred, and surgical. Conservative management is often elected for feline pelvic fractures and can often be successful, because of the high cancellous to cortical bone ratio in the pelvis and the inherent stability provided by the extrapelvic musculature (Robins, 1992; Houlton & Dyce, 1994). Conservative management is indicated for fractures with minimal displacement and those which do not involve the coxofemoral joint or reduce the diameter of the pelvic canal (Houlton & Dyce, 1994). Fractures of the caudal third of the acetabulum have been managed

conservatively as this is not a significant weight-bearing area but degenerative joint disease usually develops (DeCamp, 1992).

Unstable fractures, narrowing of the pelvic canal, displacement of the acetabular segment and some sacroiliac fracture/luxations can be managed conservatively but surgical treatment should be recommended (Houlton & Dyce, 1994). These fractures will heal but long-term complications include chronic lameness, degenerative joint disease, constipation and dystocia (DeCamp, 1992; Houlton & Dyce, 1994).

The weight-bearing arc of the pelvic limb extends through the femur to the acetabulum and along the axial skeleton to the ilium and sacroiliac joint (DeCamp, 1992). Surgical management of pelvic fractures should be selected with fractures of the sacroiliac joint, body of the ilium and acetabulum, unstable acetabular segment, any fracture which reduces the diameter of the pelvic canal by greater than 50% and multiple limb fractures (DeCamp, 1992; Bookbinder & Flanders, 1992). Other influencing factors include signalment, temperament of the animal, owner compliance and degree of soft tissue damage (Houlton & Dyce, 1994).

Chronic malunion fractures of the pelvis can result in persistent lameness and chronic obstruction of the pelvic canal (Robins, 1992). Narrowing of the pelvic canal may not be evident immediately after trauma but can develop as bony fragments are displaced or fracture callous develops (McKee & Wong, 1994). Regular rectal examinations are recommended to assess pelvic canal diameter. Rectal palpation is considered more accurate than radiography for determining the degree and nature of pelvic canal stenosis (Schrader, 1992). The degree of pelvic canal stenosis in this case was more severe on rectal examination than that suggested by the radiographs. Surgical options for the treatment of chronic obstruction include pubic osteotomy (Ferguson, 1996) or ostectomy, subtotal colectomy, triple pelvic osteotomy (Ferguson, 1996) or hemipelvectomy. The removal of the entire pelvic floor has been described as an effective treatment for relieving obstipation secondary to pelvic canal stenosis (Denny, 1993). Distraction-osteotomy of the pelvic symphysis has been maintained with a metal spacer (Ward, 1967; Leighton, 1969), syringe case (Webb, 1985), ilial allograft (Evans, 1980), ulnar autograft (McKee & Wong, 1994), and ilial autograft (Schrader, 1992). Widening of the pelvic canal can be difficult with distortion of the pubis and fusion of the sacroiliac joints due to either injury or aging (Robins, 1992). Acquired megacolon was the principal complication following these pelvic reconstructive procedures (Schrader, 1992).

Subtotal colectomy is performed to treat acquired megacolon secondary to pelvic narrowing in cats (Bright *et al.*, 1986; Matthiesen *et al.*, 1991). Acquired megacolon results from prolonged distension of the colon causing intramural myoneural damage and irreversible colonic dysfunction (Matthiesen *et al.*, 1991). Subtotal colectomy removes the dilated colon and results in the formation of a soft stool. Sweet *et al.* (1994) recommend preservation of the ileocaecal junction to prevent excessively loose stools. Megacolon

¹¹Appose, Davis+Geck

¹²Coloxyl 50, Fawns & McAllan

could not be ruled out in this case due to the sudden onset of tenesmus three years after sustaining pelvic fractures; recurrence of constipation five days post-operatively, presumably resulting from a failure of aboral movement of faeces despite an increased pelvic diameter; and the radiographic evidence of a large faecolith in the colon six months post-operatively. This did not cause any problems with defaecation and the cat was considered clinically normal when rechecked. Surgical intervention is recommended within six months of clinical signs of pelvic canal stenosis to prevent intramural neuromuscular dysfunction (Schrader, 1992) hence the severity of megacolon may have been minimised in this case by performing a hemipelvectomy two months after the onset of clinical signs.

The most common indication for hemipelvectomy in human and veterinary medicine is oncological disease of the proximal pelvic limb and pelvis (Straw *et al.*, 1992) but it has previously been described in the management of pelvic fractures (Alexander & Carb, 1979; Kasa & Kasa, 1986). There are three categories of hemipelvectomy: radical, conservative and internal (Karakousis *et al.*, 1989). Radical hemipelvectomy is separation of the os coxa proximally through the sacroiliac joint. Conservative hemipelvectomy preserves the ilium and internal hemipelvectomy preserves the lower extremity. Other pelvic reconstructive procedures were considered in this case but conservative hemipelvectomy was preferred as this provided definitive treatment for obstipation secondary to pelvic canal stenosis and chronic non-weight bearing lameness resulting from a non-reducible tibiotarsal luxation. The most significant intra-operative problem during human hemipelvectomy is closure of the resulting wound. Musculocutaneous flaps are preferred but fasciocutaneous flaps can be used when this is not possible (Karakousis *et al.*, 1989; Workman *et al.*, 1992; Apffelstaedt *et al.*, 1995). Wound closure was not considered a problem in this case.

Complications of human hemipelvectomy include skin flap necrosis, infection and herniae (Karakousis *et al.*, 1989; Kraybill *et al.*, 1992; Workman *et al.*, 1992; Apffelstaedt *et al.*, 1995). Infection was postulated to result from genitourinary or gastrointestinal injuries (Apffelstaedt *et al.*, 1995). Herniae were a long-term complication, occurring two to 33 years post-surgically, with identified risk factors including obesity, infection and trauma (Kraybill *et al.*, 1992). In this case, intra-operative contamination and injury were minimised with the placement of a purse string suture around the anus and the insertion of a urinary catheter. The only complication observed in this case report was the recurrence of constipation five days post-operatively possibly resulting from mild intramural neuromuscular dysfunction due to prolonged colonic distension secondary to malunion fractures of the pelvis and narrowing of the pelvic canal.

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FIGURE 4: Six-month post-operative ventrodorsal radiograph of the pelvis. The diameter of the pelvic canal is sufficient to allow the passage of faeces. A large mass of faeces is evident (arrow heads) but this was not clinically significant.

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