Adhesions of small intestine and urinary bladder to fracture callus within the pelvic canal in two dogs

S. Yudelevitch
Department of Small Animal Surgery, Koret School of Veterinary Medicine, Hebrew University of Jerusalem, Rehovot, Israel

Summary
In this case report, we report on two cases of pelvic fractures with uncommon complications that resulted from adhesions of the small intestine to the fracture callus in dogs. The most likely cause of the clinical signs in the first case was adhesions between a segment of the jejunum and a coccygeal callus which resulted in luminal narrowing. This was further complicated by small obstructing trichobezoars. In case 2, which was admitted with incontinence, adhesions were found between fractured pubic bone callus and both the urinary bladder and a segment of the jejunum.

Keywords
Fracture callus, Intestinal adhesions, urinary tract adhesions

Prepublished online July 17, 2008
doi:10.3415/VCOT-07-10-0094

Introduction
Pelvic fractures are a frequent finding in the traumatized small animal patient. Pelvic fractures have been reported to occur in 16% and 25% of traumatized dogs and cats, respectively (1, 2). The force required to cause pelvic fractures frequently results in concurrent orthopaedic and soft tissue injuries, of which trauma to the urinary system is the most commonly reported soft tissue injury (3). The incidence of concurrent trauma to the urinary system in cases of pelvic fracture has been reported to be 39% in dogs (4). Peripheral nerve injuries, traumatic abdominal hernia and diaphragmatic hernia are also reported in cases of pelvic fractures (1, 5, 7).

Megacolon secondary to pelvic fracture malunion is considered to be the most common gastrointestinal (GI) complication in cats (1, 8). Direct GI injuries are rare, and there are few reports that describe intestinal injuries following pelvic trauma (6, 9–11). Two cases of small bowel entrapment in dogs following pelvic fracture have been reported (6). In the first case, the jejunum became entrapped within the callus of a pubic fracture which resulted in a partial obstruction and fistula formation between this segment and the perineal area. In the second case, the jejunum became entrapped within a pubic fracture which resulted in a partial obstruction and fistula formation between this segment and the perineal area. In the second case, the jejunum became entrapped within a pubic fracture, and perforated acutely (6). Rectal perforation, rectocutaneous fistula and jejunoocutaneous fistula, as a complication of pelvic trauma, has also been reported in a Yorkshire Terrier (9). It is unclear whether the perforation in this case was as a result of the initial trauma, the corrective orthopaedic surgery or entrapment within the callus (9). Rectal perforation associated with pelvic fractures (11), jejunal rupture due to entrapment in a pubic symphysial separation (10, 11), and incarceration of the small intestine in a coccygeal fracture in a dog (12) have also been reported.

This paper describes two cases of pelvic fracture with unusual complications resulting from the adhesion of abdominal organs to fracture callus within the pelvic canal.

Case 1
A 13-year-old, 4.7 kg spayed female mixed breed dog was presented to the Veterinary Teaching Hospital (VTH) with a history of three days of vomiting and anorexia. Four years prior to presentation at the VTH the dog was diagnosed with bladder rupture and a fracture of the first coccygeal vertebrae as a result of vehicular trauma. Bladder reconstruction and tail amputation at the level of the first coccygeal vertebrae were performed; recovery was uneventful. In the year prior to presentation episodes of vomiting and diarrhea occurred, resulting in a 1.3 kg decrease in body weight. Three days prior to presentation there was a marked increase in the frequency of vomiting which was accompanied by anorexia and depression. A tense and distended abdomen was the main finding on physical examination. Abdominal radiographs and ultrasonography were performed and a single, gas distended soft tissue structure extending from caudal to the bladder neck was visualized (Fig. 1). A complete blood count, serum biochemical profile and urinalysis were all within normal limits.

Explorative abdominal surgery via a midline celiotomy was performed. A gas distended segment of jejunum with a dia-
meter of 8 cm was observed. The cause of the distention was an obstruction of the jejunum due to an adhesion between the jejunum and the dorsal pelvic canal at the level of the coccygeal amputation. The adhesions were broken down bluntly and the jejunum was returned to the abdominal cavity. During the manipulation of the jejunum there was no leakage of bowel contents, however, the adhered segment appeared to be compromised, and an enterectomy was performed. Examination of the resected jejunum revealed functional obstruction due to its abnormal anatomical location. The sudden increase in the frequency of the clinical signs was most likely due to an additional mechanical obstruction caused by two trichobezoars which occluded the already narrowed lumen.

During the operative and postoperative period hypotension was noted and was treated throughout this period with dopamine and plasma. Hypoglycemia was recorded in the immediate postoperative period, which was treated with 5% dextrose solution intravenously. After 18 hours of clinical improvement there was an acute deterioration in her systemic condition, followed by acute respiratory and cardiac arrest. A necropsy was not authorized.

Case 2
A seven-month-old, intact male Miniature Pinscher was presented to the VTH with urinary incontinence, partial fecal incontinence, and severe hind limb lameness. Three months prior to presentation the dog had sustained multiple pelvic fractures and bilateral distal femoral fractures due to vehicular trauma. The femoral fractures were repaired with cross pins and a right femoral head and neck excision was performed. Prior to the trauma there were not any signs of incontinence. However, at presentation urine dribbled constantly from the penis and no attempt was made to urinate voluntarily. Urine could be easily expressed from the bladder and the anal reflex, although weak, was present. The remainder of the neurological examination was normal. Results of a complete blood count were within normal limits. No urinalysis was performed. A retrograde cystogram was performed (Fig. 2) and an abnormal bladder position as well as a caudally directed diverticulum of the bladder were demonstrated. As it was suspected that the abnormal bladder position was contributing to the urinary incontinence an explorative abdominal surgery via a midline approach was performed. During surgery the urinary bladder was found to be caudally displaced and the diverticulum was found to be connected to the fracture callus of the right pubic bone. The adhesions were broken down and the urinary bladder was returned to its anatomically normal position. It was noted that the right lateral ligament was absent, and only remnants of the left lateral ligament were present. All the pathology seen intraoperatively was attributed to the original trauma. Further abdominal inspection revealed part of the jejunum to be adhered to the same area. The jejunum was adhered in such a way that it created an acute bend in the bowel; however evidence of intestinal obstruction was not noted. The jejunal adhesion was released and an incisional left cystopexy and castration were performed. The dog recovered uneventfully, although the incontinence persisted.

Discussion
The cases presented herein are both rarely reported, long-term complications of pelvic fractures in dogs. The incorporation of an abdominal organ into a fracture callus may be due to either partial entrapment of intestinal wall within the fracture gap, or it is possibly caused by retention of the organ within the pelvic canal by a bone spicule onto which the organ is forced at the time of
the trauma. The callus then forms around the retained organ. These adhesions may lead to functional obstruction due to the confined space within the pelvic canal. Furthermore, adhesions in this area force the intestine into an acute angle, therefore increasing the risk of an obstruction even with otherwise harmless luminal content.

In the first case, the intestinal adhesion resulted in a functional obstruction, a condition which was exacerbated by the trichobezoars (also known as ‘hairballs’). In small intestine of a normal diameter, trichobezoars of the size seen in this case, would have passed easily. Although the clinical presentation was acute, further questioning revealed a history of chronic intermittent vomiting. It is not possible to exclude other causes of vomiting, but it is safe to assume that the intra-pelvic adhesions contributed to it. The large localized jejunal dilatation, somewhat resembling megacolon, also lends support to a chronic partial obstruction.

It is difficult to speculate on the cause of death in this case. The sudden onset of cardiac and respiratory arrest that occurred was unexpected considering that there had been slow but steady improvement for 18 hours. The hypotension and hypoglycemia noted in this dog can be expected considering the age and the malnourished state of the patient. The problems were discovered early and aggressive treatment of both problems was initiated immediately. There was no other supportive evidence of sepsis, other than the hypoglycemia, before, during or after the surgery.

In the second case, the intestinal adhesions were not clinically significant at the time of surgery. This type of adhesion should still be regarded as a predisposing factor for complete intestinal obstruction and should be treated when encountered. The bladder adhesions not only caused a diverticulum of the bladder wall, they also resulted in an abnormal caudal location of the bladder. Although the neck of the urinary bladder was cranial to the pubic brim, the abnormal bladder position was thought to be contributing to the incontinence seen in this case, in a manner similar to that of sphincter mechanism incompetence in incontinent bitches (13, 14). The damage to the lateral ligaments, the gender, the severe incontinence at presentation and the poor response to surgical repositioning seem to indicate that bladder position was not the main etiology of the urinary incontinence. The definitive cause of the urine dribbling was not determined. The clinical presentation was consistent with neurogenic incontinence due to lower motor neuron damage. The constant dribbling of urine with a urinary bladder of normal size that is easily expressed with an intact anal reflex indicates that the damage was done to the hypogastric nerve, which innervates the urethral sphincter, as opposed to a lesion within the vertebral canal. These two cases describe an uncommon complication of pelvic trauma that should be considered both in the immediate post trauma period as well as much later in life, in those cases that are admitted with clinical signs involving the GI tract.

References
7. Gilmore DR. Sphincter mechanism incompetence in incontinent bitches (13, 14). The damage to the lateral ligaments, the gender, the severe incontinence at presentation and the poor response to surgical repositioning seem to indicate that bladder position was not the main etiology of the urinary incontinence. The definitive cause of the urine dribbling was not determined. The clinical presentation was consistent with neurogenic incontinence due to lower motor neuron damage. The constant dribbling of urine with a urinary bladder of normal size that is easily expressed with an intact anal reflex indicates that the damage was done to the hypogastric nerve, which innervates the urethral sphincter, as opposed to a lesion within the vertebral canal. These two cases describe an uncommon complication of pelvic trauma that should be considered both in the immediate post trauma period as well as much later in life, in those cases that are admitted with clinical signs involving the GI tract.

Correspondence to:
Sigal Yudelevitch, DVM, Dip ECVS
Department of Small Animal Surgery
Koren School of Veterinary Medicine
Hebrew University of Jerusalem
P.O. Box 12, Rehovot 76100, Israel
Phone: +972 54 8520534
E-mail: yudelevi@agri.huji.ac.il

For personal or educational use only. No other uses without permission. All rights reserved.