

## Radiographic Features of Traumatically Caused Retroflexion of Urinary Bladder in Two Dogs

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**Abstracts :** The urinary bladder retroflexion, flipped over backwards into the pelvic canal, by trauma has been rarely reported in dogs. This paper describes clinical and radiological features of urinary bladder retroflexion in two dogs with a history of traffic accident. The main clinical signs were hind limb lameness, severe pain and dysuria. Radiography and ultrasonography were performed to evaluate the patient's damages. No remarkable findings were observed except pelvic fracture on survey radiograph. On cystourethrography, caudal displacement and retroflexion of the bladders were identified. Cystopexy was performed and the bladders were repositioned. After surgery one dog with severe azotemia and bilateral hydronephrosis was deteriorated noticeably and euthanized by request of the owner, while the other dog was recovered no recurrence of the problem by 12 months post-surgery. It should be considered that contrast study and serial assessment in urinary tract be important to demonstrate the evidence of bladder retroflexion and evaluate the prognosis in dogs with severe trauma.

**Key words :** urinary bladder retroflexion, cystourethrography, trauma, dog.

### Introduction

Retroflexion of the urinary bladder can be occurred when in situ bladder is moved to caudally by abdominal pressure (12). The urethra is flipped back and the vertex of the urinary bladder is displaced caudally from the neck of bladder.

Bladder retroflexion (BR) is usually associated with perineal hernia. The incidence of BR takes nearly 20 % of all perineal hernia cases (6,11,12). Among many reasons of the perineal herniation, increased intra-abdominal pressure such as coughing or constipation are considered to be considerable factors in the development of herniation. The increased pressure is related to BR (12). Although BR confined to the vagina and visible through the vulvar cleft was reported in a pregnant bitch, BR has been mostly reported in the male dogs with or without the prostate gland (6,12).

However, BR occurred by trauma has been rarely encountered in dogs. Usually, urinary tract problems may be caused by blunt force particularly in association with pelvic fractures(1). BR induced by trauma has been only seen in two dogs; one female dog with abdominal trauma, (2) and one male dog with a history of motor vehicle accident (8).

Moreover, urethral obstruction may due to BR, which may lead to postrenal-renal failure; any evidence of uraemia or hyperkalaemia may be occurred as emergency situation. So, exact examinations of the BR as much as surgical procedure are important to treatment of patient.

This case report is to describe clinical appearance and radiological characteristics of the BR originated by trauma with pelvic fracture in two dogs.

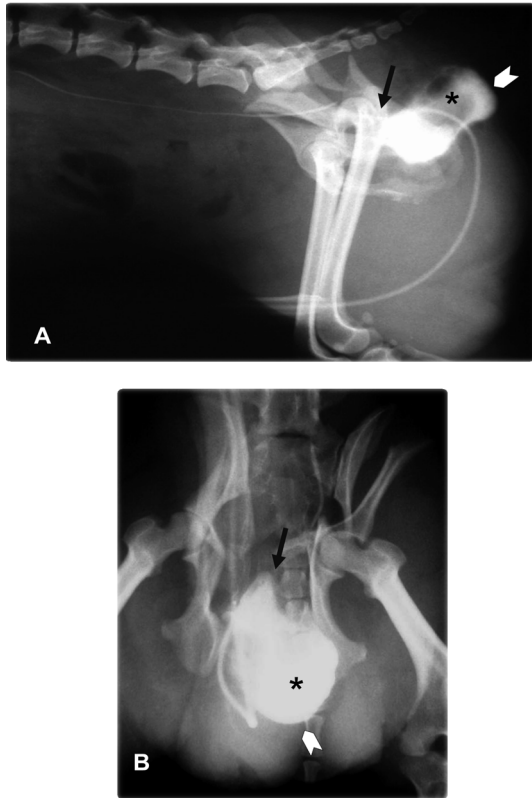
### Case Reports

#### Dog 1

A 2-year-old, intact male Yorkshire-Terrier with the history of a traffic accident three days ago was referred to the Animal Medical Center, Chonbuk National University. The dog showed hind limb lameness, urinary incontinence and severe pain. Mucosal color and capillary refill time were shown normally and vital signs were within the normal range. Undulatory protruded mass was palpable in the perineal region. The laboratory examination showed no remarkable findings except the high AST (204 U/l, normal range: 7-84), dexamethasone, butopanol and normal saline were administered intravenously for the control of abdominal pain and traumatic shock as emergency care.

On radiography and ultrasonography, the abdomen view revealed bilateral iliac body, pubis, and left acetabular fractures and a slight ventral displacement of descending colon. The urinary bladder was not clearly visible in the abdominal cavity on the survey radiography and ultrasonography. So, a positive contrast cystourethrography was performed to reveal the bladder status. The bladder filled with contrast media was identified at the caudal part of ischium with a state of turning backward (Fig 1). The bladder neck was displaced cranially, but there is no evidence of rupture or leakage of the

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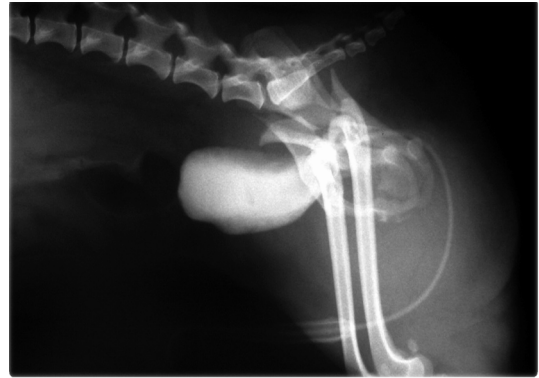


**Fig 1.** Positive-contrast cystourethrogram, lateral (A) and ventrodorsal (B) abdominal radiograph during excretory urography in the dog 1 with pelvic fracture. The urinary bladder flipped back over is displaced caudally within the pelvic cavity. Note the urethra is running dorsocaudally (arrow) and the vertex of bladder is displaced caudally to the bladder neck (arrowhead).

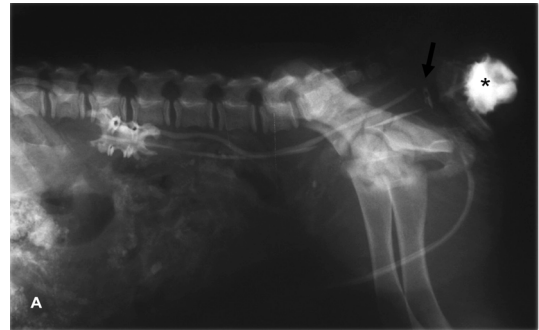
bladder and urethra. On excretory urography, no abnormalities were observed concerning the nephrogram and pyelogram. The entire right ureter was constricted straightly. Based on the examinations, multiple pelvic fractures and bladder retroflexion were diagnosed. Immediately, the displaced bladder was repositioned by hand temporarily followed by urinary catheterization. The proper position of bladder was confirmed on the repeated positive contrast cystography (Fig 2). And then surgery was performed to repair the hip fractures and to reposition the bladder by cystopexy. Two days after surgery, the patient showed unknown azotemia and bilateral hydroureter and hydronephrosis. Finally, the dog was euthanized according to the owner's request.

### Dog 2

A 3-month-old, male intact mixed dog with traffic accident 2 days ago was presented. On physical examination, a rounded mass adjacent to the prolapsed rectum was observed. The clinical signs included hind limb lameness and urinary incontinence. In laboratory examination, there were low PCV (18.9%, reference range: 37.0 ~ 54.0), erythropenia and thrombocytopenia. Serum chemistry profile is within



**Fig 2.** Positive-contrast cystogram, lateral view, after repositioning of bladder in the dog 1. The retroflexed urinary bladder relocated after manual correction.



**Fig 3.** Positive-contrast cystourethrogram, lateral (A) and ventrodorsal (B) abdominal radiograph during excretory urography in the dog 2 with pelvic fracture. The urinary bladder flipped back over is completely displaced caudally and the urethra is directed craniodorsally to the bladder (arrow). Dilated renal pelvis and ureters are observed.

normal range.

On the survey radiography and ultrasonography, it was revealed a left iliac body fracture and the soft tissue density of perineal region. The urinary bladder was not visible within abdominal cavity and the dilation of renal pelvis and ureter on left side were observed. The prolapsed mass with three layer walls containing anechoic fluid was considered urinary bladder. Through cystography and urethrography, the mass

was confirmed as the urinary bladder. Similar to the case 1, the bladder was retroflexed without evidence of rupture and leakage. (Fig 3) The excretory urography was also performed to evaluate overall urinary tract. The dilation of 3 regions on left renal pelvis, recess and ureter were identified. Based on those results, the diagnoses included pelvic fracture, bilateral hydronephrosis, and bladder retroflexion associated with trauma. For emergency care, a urinary catheter was placed to maintain urine output and the prolapsed bladder was repositioned by manual temporarily. Then, the prolapsed rectum was repaired by purse-string suture and the retroflexed bladder was reposed by cystopexy. The patient was recovered well and recurrence or complication was not observed by 12 months postsurgery.

### Discussion

It has been known that BR is associated with perineal hernia mostly in small animals (9,10,12). However, BR by trauma has been rarely reported in dogs. Anatomically, a urinary bladder is divided grossly into three parts: the vertex cranially, the body in the middle, and the neck caudally. It was loosely supported by three ligaments, formed from peritoneal reflections in position (4). The method of loosely holding makes bladder's position easily move by various injuries or abdominal pressures. Usually, trauma to the urinary tract may be caused by blunt force generally in associated with pelvic fracture. Due to the trauma, potential types of injury include contusions of the bladder or urethra, urethral tears, rupture or avulsion, urinary bladder rupture, and penile fracture (1). Additionally, BR could be one type of the injuries by trauma as our cases.

Retroflexion of the bladder can be assessed from the location of the urethra. Contrast radiography and ultrasonography are widely used in diagnostic work-up of dogs with urinary tract disease. Especially, the position of the bladder neck within the pelvic canal can be demonstrated during the contrast cytogram (3). In this report, cystography and urethrography were used as effective diagnostic tools of BR. The changed position of the neck of bladder and ureter was demonstrated by the methods. Excretory urography was also valuable for evaluation of the leakage or rupture of urinary tract and kidney condition (7). Clinical signs of urinary tract induced by trauma depend on the location of the trauma, the presence or absence of concurrent urinary tract infection, and duration and extent of urinary leakage (1). Contusions of the lower urinary tract may cause hematuria, dysuria, and pollakiuria or may be asymptomatic (1). In case of BR, clinical signs are characterized by dysuria, intense irritation and rectal prolapse, associated with disruption of supporting ligaments of the bladder and colon (2,5,8). On laboratory examination, elevated blood urea nitrogen and creatinine, hyperkalemia, hyperphosphatemia, and neutrophilic leukocytosis can be appeared in cases of BR (6, 8).

In this report, two patients with pelvic fracture by traffic accident were presented. One of the patients showed dysuria and intense irritation. The other one showed urinary incontinence and rectal prolapse. Both patients had no significant hematologic abnormalities related to postrenal obstruction, but rather it showed increased AST, decreased PCV and platelet count caused by muscle damage and hemorrhage. However, the dog 1 had unknown azotemia and hydronephrosis after surgery. On the other hand, the dog 2 was recovered completely despite noticeable dilation of renal pelvis and recess with severe BR. There was no problem of the recurrence or complication by 12 months after surgery. The abnormalities of pyelogram and the degree of bladder displacement can not be clearly estimated the prognosis of patient in early stage. Thus, a prompt and sufficient early treatment is important regardless of the result of diagnostic imaging. In addition, serial inspection must be performed to evaluate the damaged urinary tract even after correction of the problems. In our cases, two dogs were taken emergency care. Surgical procedures such as urinary catheterization, manually reduced bladder and cystopexy were performed. But unexpectedly, the dog 1 was euthanized due to the azotemia and hydronephrosis. The constriction of both proximal ureters was identified through necropsy. It was assumed that the ureteral stricture could be caused by traumatic laceration.

From the cases, it would know that a contrast study such as cystourethrography combined with excretory urography is essential for an evaluation of the BR as well as urinary tract leakage or rupture in case of traumatized dog. In addition, careful attention should be demanded if the contrast study is initially showed as normal condition in the dog.

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