



## CASE REPORT

### Dog with Hydronephrosis Due to Abdominal Trauma

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#### ABSTRACT

Hydronephrosis is a condition that results from complete or partial obstruction of the urinary flow. This paper reports the case of a two-year-old, mixed-breed dog diagnosed with hydronephrosis of the left kidney six months after being kicked in the thoraco-abdominal region. The diagnosis was based on radiographic and ultrasonographic examinations. Percutaneous antegrade pyelography was also performed and allowed the visualization of opacification of the left kidney, which confirmed the diagnosis. Because the exams indicated that the patient had normal renal function, nephrectomy was performed. The patient remained in good health during the postoperative period and in subsequent evaluations.

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#### INTRODUCTION

Hydronephrosis is a disease that occurs due to complete or partial obstruction of the urinary flow. This causes progressive distension of the renal pelvis and diverticula, which results in atrophy of the renal parenchyma and loss of function. The severity of the lesion depends on the time elapsed since the onset of obstruction (Santarosa *et al.*, 2007).

Kidney stones, neoplasms, retroperitoneal disease, trauma, accidental ureter ligation during surgery (such as spaying), perineal hernia, recurrent pyelonephritis, vesicoureteral reflux, complications of partial nephrectomy or renal biopsy and ectopic ureter can all cause hydronephrosis (Choi *et al.*, 2010; Vaidyanathan *et al.*, 2012). Furthermore, causes of ureteral obstruction that lead to renal pelvic dilation, such as stones, stenosis, mural or extrinsic masses, ureteral atresia (Kanazono *et al.*, 2009) and ureteropelvic injuries (such as ureteropelvic junction disruption) secondary to trauma (Miernik *et al.*, 2011), may be involved in the pathogenesis of this disease.

Clinical signs in cases of hydronephrosis can include anorexia, restlessness, polydipsia, polyuria, dysuria, hematuria, swelling of the affected kidney, abdominal distension, external fistula and signs related to the primary cause of obstruction. In some cases, there is no evidence of clinical signs, as the disease is progressive owing to continuous dilation of the renal pelvis; in these cases, the

lesion may not initially be clinically recognized (Rousset *et al.*, 2011). Renal failure and uremia are important consequences of hydronephrosis. Consequently, the patient can exhibit signs of azotemia (Silveira *et al.*, 2008).

Imaging exams are indicated for the diagnosis of hydronephrosis and include abdominal radiography, which can reveal renomegaly, excretory urography, which allows the identification of the affected kidney and the location of the obstruction, and abdominal ultrasound, which can detect renal pelvis dilation, the presence of diverticula and thinning of the renal parenchyma (Santarosa *et al.*, 2007; Miernik *et al.*, 2011; Vaidyanathan *et al.*, 2012). Percutaneous antegrade pyelography can also be considered as a good diagnostic tool and consists of the administration of contrast medium directly into the kidney to promote opacification of the pelvis and ureter, which allows identification of the obstruction location and, in some cases, its cause (Santarosa *et al.*, 2007). Retrograde ureteropyelography is an important exam to diagnose ureteral injuries such as partial and ureteropelvic junction disruption because these diseases can lead to hydronephrosis if left untreated (El Ammari *et al.*, 2011; Miernik *et al.*, 2011).

The recommended treatment for hydronephrosis is supportive fluid therapy, diagnosis of the cause of obstruction and, when possible, reestablishment of urinary flow (Silveira *et al.*, 2008). Nephrectomy is indicated in cases of severe hydronephrosis, in which there is severe

destruction of the renal parenchyma and the kidney becomes a fluid-filled sac (Santarosa *et al.*, 2007). However, this procedure is contraindicated when the remaining kidney is compromised (Santarosa *et al.*, 2007).

The objectives of this case report are to present an uncommon case of hydronephrosis that resulted from trauma and to describe percutaneous antegrade pyelography, a diagnostic method that is easy and can be used routinely in veterinary medicine to aid the confirmation of this disease.

**History and observations:** A two-year-old, male, mixed-breed dog was presented with a history of being kicked by the owner in the thoraco-abdominal region two days before. The patient was reluctant to walk. A physical examination revealed the presence of subcutaneous emphysema in the thorax, between the 11th and 13th ribs on the left side, hematomas in the abdomen and pain in both the thorax and abdomen.

Because the owner did not know if the animal urinated after the trauma, transurethral catheterization was performed, and a small volume of urine containing blood was observed. Bladder rupture was suspected, and a positive cystourethrography was performed. This exam revealed an intact bladder and urethra, the presence of vesicoureteral reflux and mild renal pelvic dilation (Fig. 1). Survey radiographs of the thorax were performed in two projections, lateral and ventrodorsal, and a fracture was observed on the 12th rib. No other alterations were observed.

A complete blood count revealed macrocytic hypochromic anemia with a packed cell volume (PCV) of 30% (reference range of 37 to 55%), which could be explained by the blood loss in the urine due to the trauma. The animal remained hospitalized for observation and received supportive treatment with saline intravenous fluid therapy, tramadol hydrochloride (2 mg/kg every 8 hours) and meloxicam (0.1 mg/kg every 24 hours) for four days. The thorax was bandaged, and activity was restricted.

With the improvement of the patient's condition and examination results (complete blood count, renal and hepatic function and urinalysis) within the normal range, the animal was discharged from the hospital. The owner was advised to maintain the bandage, which was to be replaced weekly at the hospital, and to continue the administration of analgesics for as long as the animal showed signs of pain. Systemic antibiotics were not prescribed because the animal did not show signs of infection, as confirmed by a normal complete blood count and urinalysis. The patient's condition was supposed to be assessed weekly; however, the client did not present the patient for further evaluations.

Six months after the first appointment, the patient was presented with a two-week history of anorexia, abdominal distention and sensitivity, with no history of recent trauma or other apparent cause.

Laboratory analyses revealed leukocytosis with a left shift, increased levels of total plasma protein and normal renal and hepatic functions. A radiographic examination revealed an enlarged left kidney and dilated stomach. Abdominal ultrasound revealed a fluid-filled sac in the anatomical position of the left kidney, which was suggestive of hydronephrosis.



**Fig. 1:** Positive cystourethrography revealing renal pelvic dilation (arrow) in a two-year-old, mixed-breed dog.



**Fig. 2:** Percutaneous antegrade pyelography demonstrating complete opacification of the left kidney (arrow). Gastric dilation can also be observed in this radiograph.

Ultrasound-guided aspiration of the left kidney yielded 20 ml of a brownish fluid devoid of uremic odor. Percutaneous antegrade pyelography was performed following the ultrasound-guided administration of 10 ml of an iodinated contrast medium (Pielograf®) into the fluid-filled sac using a 25x7 needle. Lateral (Fig. 2) and ventrodorsal abdominal radiographs were taken immediately after infusion of the contrast medium, and a general opacification of the kidney was observed, which confirmed the suspicion of hydronephrosis.

The animal was anesthetized and subjected to exploratory laparotomy, which allowed visualization of a turbid, brownish free fluid with no uremic odor in the abdominal cavity, similar to that observed during the ultrasound-guided aspiration. The left kidney was increased in size with a necrotic area and was adhered to the spleen and stomach, which was mildly dilated.

Total splenectomy was performed due to the impossibility of separating the tissues. Nephrectomy was performed, and the kidney was submitted for histological evaluation. The histopathology report confirmed the occurrence of hydronephrosis.

The postoperative care included pain management with tramadol hydrochloride (2 mg/kg every 8 hours) and dipyrone (25 mg/kg every 8 hours). The patient also received intravenous fluid therapy with saline solution, broad-spectrum antibiotic treatment (Enrofloxacin at 5

mg/kg and metronidazole at 15 mg/kg every 12 hours), peritoneal lavage with Ringer's lactate solution (2 liters every 8 hours), anti-inflammatory treatment with meloxicam (0.1 mg/kg every 24 hours) and omeprazole (0.7 mg/kg every 24 hours) for gastric protection.

The animal remained hospitalized for 10 days; at the end of this time, the sutures were removed. Before discharge, the laboratory exams were repeated and renal function was within the normal range (creatinine concentration 1.2 mg/dL – reference value 0.5 to 1.5 mg/dL; urea concentration 30 mg/dL – reference value 15 to 65 mg/dL). These values remained within the normal range in subsequent evaluations at 30 and 60 days.

### DISCUSSION

Hydronephrosis can occur as a result of obstruction of the renal pelvis or ureter, and among the causes, accidental ureteral ligation during spaying is one of the most reported in the literature (Ames *et al.*, 2005, Honsho *et al.*, 2010). Abdominal trauma has been associated with the development of hydronephrosis, as hematomas can obstruct urinary flow and lead to renal pelvic dilation; however, trauma is not commonly observed (Ames *et al.*, 2005).

This report presents a case of hydronephrosis caused by abdominal trauma because the patient was kicked by the owner. On the first evaluation, an imaging examination revealed renal pelvic dilation. Additionally, there was blood in the urine, which is indicative of a renal lesion because other causes, such as rupture of the bladder or urethra, were excluded.

Hydronephrosis was diagnosed in this patient with the use of imaging examinations, as reported in the literature (Santarosa *et al.*, 2007; Miernik *et al.*, 2011; Vaidyanathan *et al.*, 2012). Percutaneous antegrade pyelography demonstrated complete opacification of the left kidney, which helped to confirm the diagnosis of hydronephrosis.

In this case, nephrectomy was indicated and was therefore performed due to severe atrophy of the renal

parenchyma with normal renal function tests. The renal capsule presumably ruptured during the surgical procedure because imaging exams did not reveal the presence of abdominal free fluid.

Hydronephrosis has been reported to be caused by trauma, but no case reports were found during a review of the literature. Although the diagnosis of this disease can be suggested by radiography and ultrasound, percutaneous antegrade pyelography is a simple and effective technique for the diagnosis of hydronephrosis and can be easily used in routine veterinary practice.

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