

Spontaneous nephro-cutaneous fistula with pyonephrosis in two dogs: two case reports

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ABSTRACT: This report describes the case of spontaneous nephro-cutaneous fistula with pyonephrosis due to renal calculi and obstructive nephropathy without renal surgery or trauma history in two dogs. A five-year-old, female, Shih-tzu and a seven-year-old, female, Maltese were presented with erythematous swelling, and subcutaneous abscess formation in their flanks. Complementary exams were performed and ultrasonography revealed marked enlargement of the kidneys with hyperechoic purulent debris filling, subcutaneous abscesses and the formation of draining sinus tracts between renal abscesses and subcutaneous tissue. At surgery, kidneys were grossly dilated and contained purulent material, which was visible in the draining sinus tract in the abdominal wall. Thus, a nephrectomy was performed. The dogs recovered uneventfully and three months later there were no further specific problems.

Keywords: dog; obstructive nephropathy; renal calculi; subcutaneous abscess

Spontaneous nephro-cutaneous fistula (NCF) with pyonephrosis is a rare condition. Several published cases of NCF have been reported to date in humans (Ansari et al. 2004). However, to our knowledge, only one case of NCF has been reported in dogs (Lobetti and Irvine-Smith 2006).

In humans, fistulas can develop between the kidney and several other organs (pleural cavity, lungs, bronchia, bowel, skin; Bryniak 1983). The majority of cases were reported in patients with a history of previous renal surgery, renal trauma, renal tumours, or chronic urinary tract infection with renal abscess formation (Ansari et al. 2004). However, spontaneous NCF from asymptomatic kidney stones without prior surgery are also very rare (Das and Ching 1979; Hitter et al. 1988).

This report describes two cases of spontaneous NCF with pyonephrosis in dogs.

Case description

Case 1. A five-year-old, neutered female Shih-tzu dog was referred for evaluation of subcutaneous abscess formation in the right flank. The dog had

been treated with cystotomy two years previously owing to urinary bladder calculi. The dog did not suffer from diabetes and had no past history of local trauma.

Abnormal physical examination findings included anorexia, fever (39.2 °C), erythematous swelling and drainage of purulent secretion in the right flank (Figure 1A). Haematological evaluation revealed a marked mild anaemia (PCV 28.9%), and leukocytosis (46.2×10^9 cell/l) with a regenerative left shift. The serum chemistry analysis was within normal limits. The urinalysis revealed struvite crystals. Abdominal ultrasonography revealed marked enlargement of the right kidney with loss of renal parenchyma, hyperechoic purulent debris filling in the dilated thin renal wall with calculi and a subcutaneous abscess in the right flank (Figure 1B). A ventral midline laparotomy was performed. At surgery, the right kidney was enlarged and contained purulent material, which was observed in the draining sinus tract in the right flank wall. The right kidney and ureter were removed successfully, and the sinus tract was completely excised. After surgery, the removed kidney was found to be filled with a large amount of reddish brown-coloured

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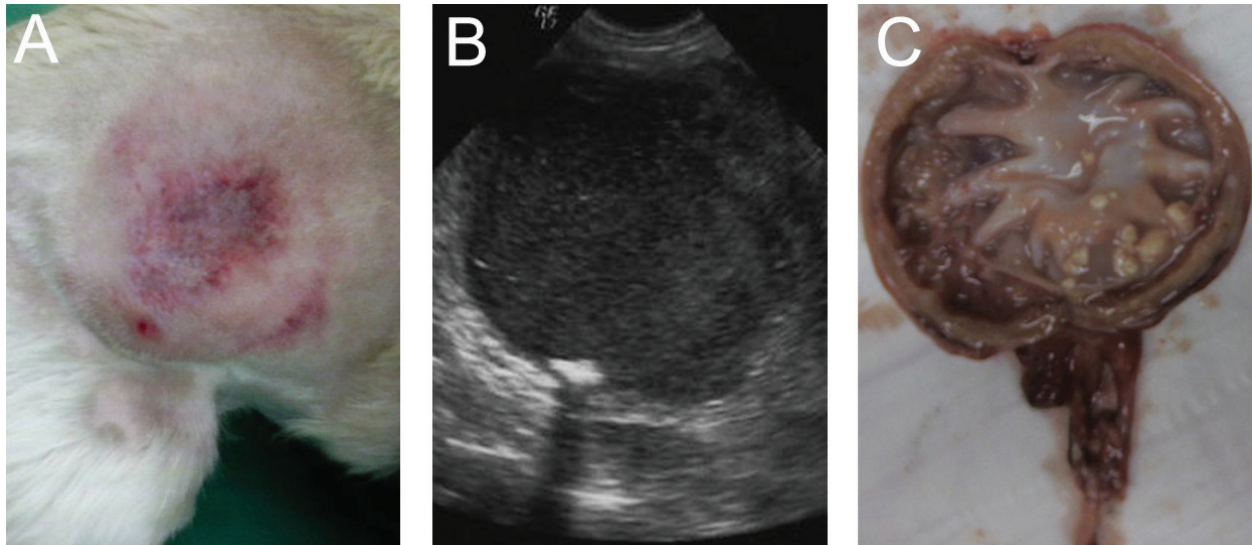


Figure 1. Clinical appearance, postoperative and ultrasonographic images of the right kidney in Case 1. (A) The right flank was observed to have erythematous swelling, subcutaneous abscess formation and drainage of purulent secretion. (B) The ultrasonographic image of the enlarged right kidney with loss of renal parenchyma, hyperechoic purulent debris filling in the dilated thin renal wall with calculi. (C) The removed kidney was observed to have loss of renal parenchyma, reddish brown-coloured exudates and renal calculi

exudate with calculi (Figure 1C). *Staphylococcus aureus* was isolated from purulent exudates.

Case 2. A seven-year-old, intact female Maltese dog was referred for investigation of recurrent abscess formation in the left flank. Three weeks previously, the dog was first observed to harbour swelling with abscess formation in the left flank, which was managed with antibiotic and drainage

therapy. However, the abscess exhibited recurrence in the same location. On clinical examination, an abscess was present in the left flank (Figure 2A). Haematological evaluation revealed marked leukocytosis (27.8×10^9 cell/l) with a regenerative left shift. The serum chemistry and urinalysis were in normal ranges. On abdominal ultrasonography, the left kidney was observed to be enlarged,

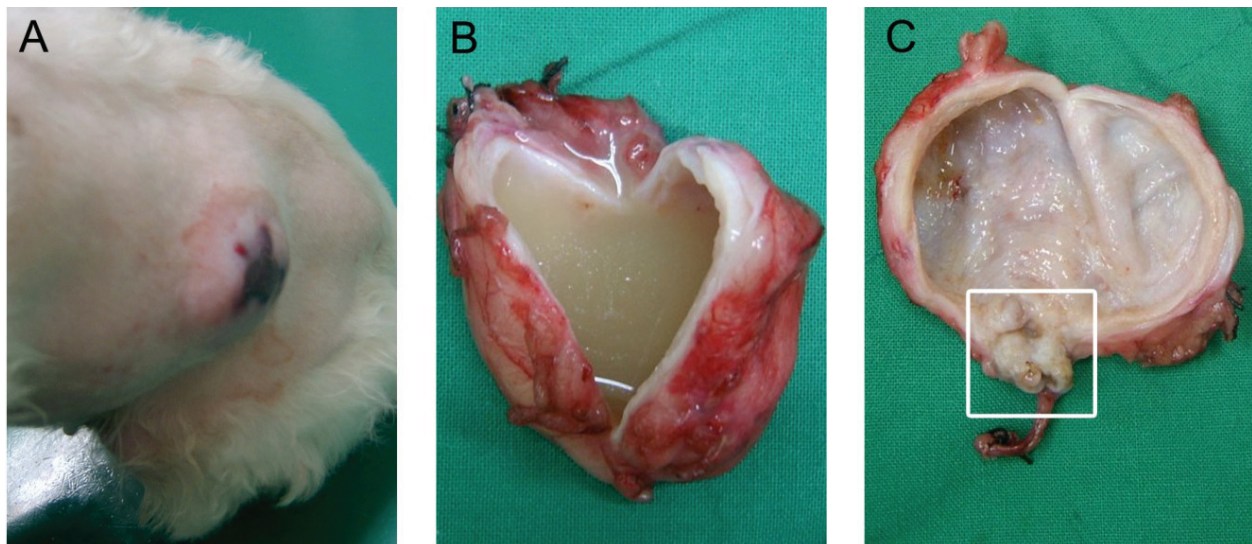


Figure 2. Clinical appearance and postoperative photographs of the removed left kidney in Case 2. (A) The left flank was observed to have swelling with partial skin necrosis and drainage of purulent secretion. (B) The removed kidney was filled with a large amount of yellowish-coloured exudate. (C) An obstructive structure (boxed area) was observed between the renal pelvis and ureteral opening in the removed kidney

with a thin wall, and there was loss of renal parenchyma containing hyperechoic purulent content. Furthermore, there was a connection between the left nephric space and the left flank subcutaneous abscess (Figure 3). The uterine horn was also enlarged and contained hypoechoic fluid. Nephrectomy and ovariohysterectomy were performed. The left kidney, ureter, ovary, uterus and sinus tract were excised. The dog recovered uneventfully from surgery. After surgery, the dog was treated with antibiotics and drainage therapy. The removed kidney was found to be filled with a large amount of yellowish-coloured exudate (Figure 2B), from which *Escherichia coli* was isolated.

DISCUSSION AND CONCLUSIONS

In humans, spontaneous renal fistula to adjacent organs is not an uncommon phenomenon; however, a spontaneous communication between the kidneys and skin is rare (Antunes et al. 2004). Lobetti and Irvine-Smith (2006) first reported a nephrocutaneous fistula in a dog with a history of previous renal trauma.

The majority of cases reported in human patients are associated with chronic urinary tract infection and renal stones (Ansari et al. 2004). However, the occurrence of spontaneous NCF without surgical history or trauma is rare (Singer 2002). The occurrence of NCF in the cases reported here was associated with renal calculi, chronic urinary tract infection (Case 1) and/or reflux (obstructive) nephropathy (Case 2), in two dogs without history of renal surgery or trauma.

In Case 1, the dog was diagnosed with pyonephrosis with calculi. We observed a large amount of purulent exudate with calculi in the removed kidney. In a case described by Ansari et al. (2004), a renal stone progressively destroyed renal function and structure by causing stasis of urine, infection and stone growth contributing to chronic pyelonephritis and pyonephrosis. This ongoing chronic inflammatory disease process may have been central to the causation of the NCF.

In Case 2, obstruction of the urine outflow induced by the obstructive structure was observed between the renal pelvis and the ureteral opening in the removed kidney, but the ureter was normal (Figure 2C). Therefore, we infer that this structure had caused the obstruction of normal urine outflow. Histopathologically, the removed kidney was diagnosed with chronic hydro/pyonephrosis and the obstructive structure was found to have no specific lesion. Obstructive uropathy occurs when the urine outflow is blocked at some point in the urinary tract and this obstruction was described to result in the dilation of the renal pelvis with progressive damage leading to hydronephrosis (Finco 1995; Nayyar et al. 2005). Obstruction of the urine outflow also markedly raises the risk of renal infection via haematogenous or ascending bacteria and kidneys with obstructive uropathy have an irreversible loss of functional renal parenchyma (Mustonen et al. 1999).

In humans, NCF is most commonly diagnosed using fistulography. The best initial examination for the diagnosis of NCF is a CT enhanced with intravenous contrast material (Yu et al. 2004).

In the cases reported here, the diagnosis of NCF was suspected on the basis of ultrasonography. This

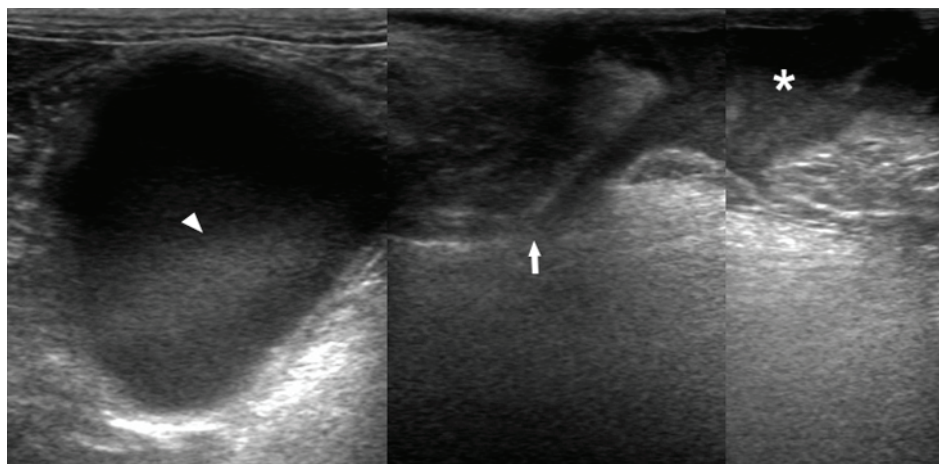


Figure 3. Ultrasonographic images of the nephro-cutaneous fistula in Case 2. The fistula sinus (arrow) appeared between the dilated kidney (arrow head) and the subcutaneous abscess (asterisk) in serial ultrasonographic images

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technique allowed us to confirm hyperechoic fluid-filled renal structures, abscesses of the flank, and links between the nephric space and the subcutaneous abscesses in the flank.

We diagnosed pyonephrosis and nephro-cutaneous fistula based on these results.

In humans, the treatment of NCF includes total nephrectomy, partial nephrectomy, isolated antibiotic therapy, or percutaneous injection of fibrin glue (Singer 2002; Bradford and Wolf 2005). In our two cases, we observed pyonephrosis, progressive destruction of the abdominal wall, and fistulisation with the skin. We therefore removed the pyonephrotic kidney using nephrectomy and the sinus tract was completely excised.

In conclusion, this report describes the occurrence of spontaneous NCF due to nephrolithiasis and obstructive nephropathy without previous history of surgery or trauma. Early and definitive diagnosis of NCF based on clinical signs, ultrasonography and laparotomy can help in ensuring a successful outcome for females affected by this condition.

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