



FIRST REPORT OF NEPHROCUTANEOUS FISTULA IN A CAT

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Summary

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Nephrocutaneous fistula (NCF) is a very serious rare renal disorder that had not been recorded in cats. This case report describes – for the first time – the features and treatment of a nephrocutaneous fistula in a 3-year-old female intact Persian cat. The cat was referred with a history of lethargy, anorexia, vomiting and recurrent abscess discharging purulent material at the right flank region. Moreover, the cat had a history of cystitis, urethritis and urethral obstruction since 12 months. Physical, laboratory, radiographic and ultrasonographic examinations were performed. The cat was treated with simple nephrectomy and excision of the fistulous tract. The animal showed dehydration, fever, painful abdominal palpation, right nephromegaly, anaemia, neutrophilic leukocytosis and moderate azotaemia. Abdominal radiographs revealed a large radiodense mass at the mid abdomen displacing the intestine caudally. Ultrasonography revealed a renal abscess with marked enlargement of the right kidney, hyperechoic purulent content and loss of parenchymal details of the right kidney. Complete recovery of the cat without any complications was seen after surgical treatment. In conclusion, nephrocutaneous fistula should be listed as one of renal diseases in cats. Nephrectomy as well as excision of the fistulous tract appear to be successful in the treatment of this disorder in cats.

Key words: fistula, laparotomy, nephrectomy, Persian cat, pyonephrotic kidney, renal abscess

Nephrocutaneous fistula (NCF) is a very serious rare renal disease in both human beings and animals. It usually occurs as a complication of renal surgeries, uroliths and urinary tract infection with formation of peri-renal abscesses (Ansari *et al.*, 2004; Antunes *et al.*, 2004; Faucher *et al.*, 2017). In the majority of the recorded clinical cases in humans, NCF led to loss

of the affected kidney (Sarmiento *et al.*, 1990; Ansari *et al.*, 2004; Antunes *et al.*, 2004). Development of peri-renal abscesses can occur either from an organ adjacent to the kidney or from the kidney itself. Alternatively, abscesses can originate from a urinary pseudocyst which arises as a result of external or surgical trauma to the kidney, promoting loss of



Fig. 1. A 3-year-old female intact Persian cat showing emaciation and a nephrocutaneous fistula at the right flank region.

continuity between the kidneys and surrounding tissues (Sarmiento *et al.*, 1990). Purulent discharge may present at the cutaneous site of the fistula (Yu *et al.*, 2004).

In humans, the formation of fistula between the kidney and adjacent organs is an uncommon lesion. Moreover, other types of fistulas between the kidney and lungs or bowel were developed in humans. NCF usually shows a spontaneous drainage through the lumbar region in human beings (Bryniak, 1983; Ansari *et al.*, 2004; Antunes *et al.*, 2004).

Four cases of NCF have been described in dogs. One of these cases was a complication of traumatic induced renal abscesses (Lobetti & Irvine-Smith, 2006), two cases were complications of pyonephrosis with calculi (Oh *et al.*, 2017) while the last one was a complication of ovariohysterectomy (Paskalev *et al.*, 2018). To the authors' knowledge, this is the first report of a nephrocutaneous fistula in the cat.

Case description

A 3-year-old intact female Persian cat was admitted to the surgery clinic at the Fa-

culty of Veterinary Medicine – Cairo University with a history of lethargy, anorexia, vomiting and recurrent abscess at the right flank region. Moreover, the cat had a 12 months history of cystitis, urethritis and urethral obstruction and no history of a previous traumatic injury. The cat recovered after medical treatment with oral urinary antiseptics (Proximol[®] tab, Kahira Co., Egypt) and IM systemic Amoxicillin (Amoxil[®] vial, GlaxoSmithKline Co, UK).

Physical examination of the cat revealed dehydration, fever (39.4 °C), painful abdominal palpation, right nephromegaly and a large abscess discharging pus at the right flank region (Fig. 1). A large oval orifice (3 cm × 4 cm) with black necrotising edges was noticed at the right flank (Fig. 2).

Haematological examination revealed marked anaemia and leukocytosis with neutrophilia (49,230 neutrophils/ μ L; RI: 1480–10,290 / μ L). Abnormalities of serum biochemistry included a marked azotaemia and a mild increase in plasma alkaline phosphatase (ALP) activity (Table 1).

Right lateral abdominal radiograph revealed a large radiodense mass at the mid

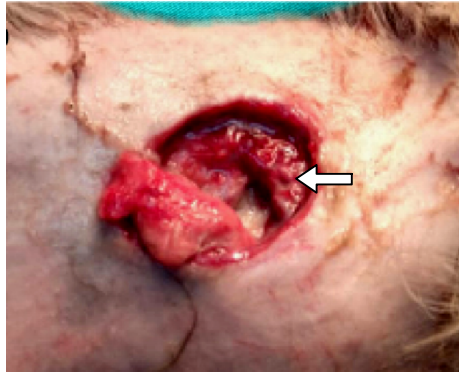


Fig. 2. The fistulous tract in the cat discharging purulent exudate (white arrow).

abdomen displacing the intestine caudally (Fig. 3). Ventrodorsal abdominal radiograph showed a large radiodense mass at the right side of the abdomen extending from the 2nd to the 4th lumbar vertebrae (Fig. 4). This mass was suspected to be the right kidney.

Ultrasonography revealed a marked enlargement of the right kidney (6 cm × 3.5 cm) with loss of parenchymal details of the right kidney. The kidney was filled with hyperechoic purulent debris that enclosed within a thin echogenic wall (Fig. 5). The left kidney, retroperitoneal space and both ureters showed normal ultrasonographic characteristics. The urinary

bladder had hyperechoic sediments.

For treatment, right flank laparotomy was performed under inhalation anaesthesia. The cat was pre-medicated with SC atropine sulphate (Atropine[®], ADWIA Co., Egypt) at a dose of 0.1 mg/kg and IM xylazine HCl (Xylaject[®], ADWIA Co., Egypt) at a dose of 1 mg/kg. The cat was anaesthetised with isoflurane inhalation. The right kidney appeared as a large sac having a thin capsule, containing purulent material and communicating with the skin by a fistulous tract. The other abdominal organs appeared normal. The right kidney and ureter were successively removed after ligation of the renal artery and vein as well as the ureter at the urinary bladder using polyglactin 910 suture materials #2/0. The fistulous tract was completely excised. The abdominal wall was closed as usual using polyglactin 910 suture materials #2/0. The skin was closed with nylon suture materials #2/0 using simple interrupted pattern. The cat was given oral enrofloxacin tablets (Baytril Tab[®], Bayer Co., Germany) at a dose of 5 mg/kg once daily for 5 days. For pain control, meloxicam was given at a dose of 0.1 mg/kg once daily for 3 days postoperatively. The stitches were cleaned 2 times daily up till their removal after 10 days.

Table 1. Time course of some haematological and blood biochemical parameters in a cat with NCF before and 6 months after nephrectomy

Parameters	Normal ranges	Before nephrectomy	6 months after nephrectomy
Haemoglobin, g/L	80–150	70	90
Erythrocytes ($\times 10^{12}/L$)	5–10	4.3	5.2
Haematocrit, %	24–45	22.3	27.5
Leukocytes ($\times 10^9/L$)	5.5–19.5	55.2	16.4
Platelets ($\times 10^9/L$)	300–800	420	423
ASAT, U/L	17.8–35.7	22.6	24.7
ALAT, U/L	47.4–97.3	50.3	51.9
Alkaline phosphatase, U/L	14–111	215	104.7
Urea, mmol/L	6.4–12.1	20.1	9.4
Creatinine, $\mu\text{mol}/L$	106–186	420	165.7

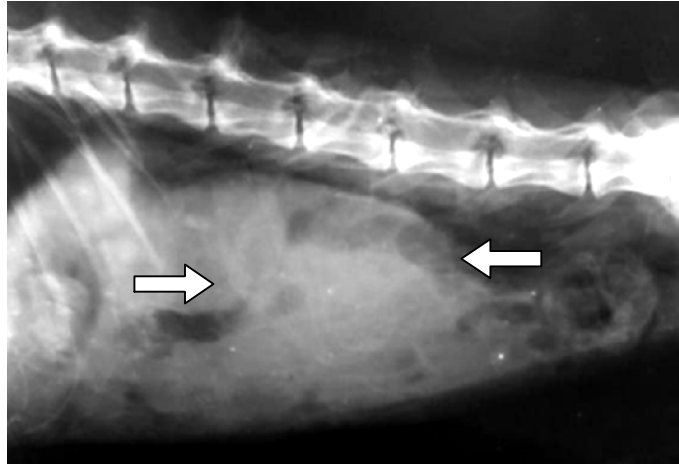


Fig. 3. Lateral abdominal radiograph of a 3-year-old cat with a nephrocutaneous fistula showing a large radiodense mass (white arrows) at the mid abdomen displacing the intestine caudally.

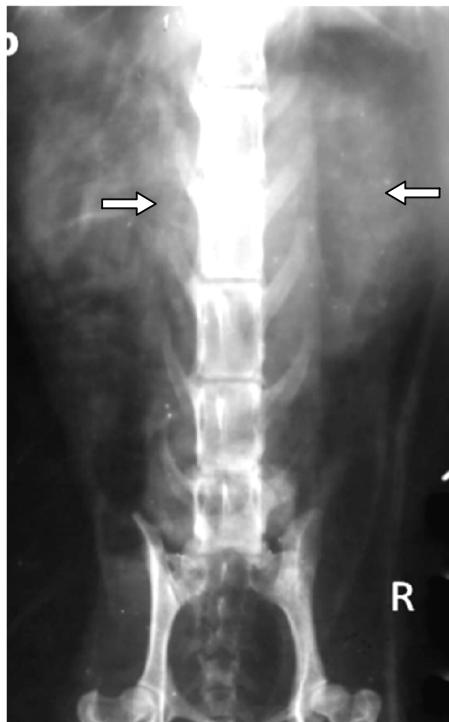


Fig. 4. Ventro-dorsal abdominal radiograph of a 3-year-old cat with a nephrocutaneous fistula showing a large radiodense mass (white arrows) at the mid abdomen.

The excised kidney exhibited severe enlargement with a very thin parenchyma and was filled with a large amount of yellowish-white purulent exudate (Fig. 6). After nephrectomy, the cytological examination of the renal exudate was carried out by pressing a microscope slide against the exudate. The slide was left to dry then stained with New Methylene blue and allowed to dry again. The stained slide was examined under light microscope. The cytological examination revealed suppurative inflammation. Culture of the aspirates yielded *Escherichia coli* with a sensitivity to enrofloxacin.

The cat was followed up every month for 6 months and routine CBC and serum biochemistry were carried out (Table 1). The patient showed a successful recovery from surgery with no evidence of a recurrent fistula or renal disease (polyurea, polydipsia, weight loss or abnormal kidney function tests) for 6 months following the surgery.

According to the available literature, NCF is a rare condition in animals and it was firstly recorded in a dog in 2006 (Lo-

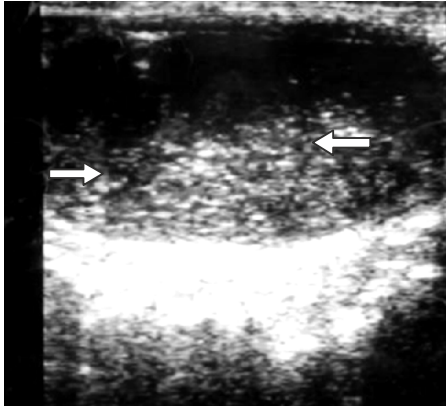


Fig. 5. Ultrasonogram of the right kidney of the same cat showing a large renal abscess, hyperechoic purulent content (white arrows), thin echogenic wall and loss of renal parenchymal details.

betti & Irvine-Smith, 2006). To the authors' knowledge, this is the first report of NCF in the cat.

Regarding the pathogenesis of the present case, NCF was formed as a complication of renal abscess. This renal abscess might have resulted from the previous urinary tract infection. Several renal abscesses were developed as a consequence to obstructive uropathy that resulted in hydronephrosis and destruction of renal pelvis (Finco, 1995; Nayyar *et al.*, 2005). Obstruction of the urine outflow also markedly increases the risk of renal infection via haematogenous or ascending bacteria. Moreover, the kidneys with obstructive uropathy have an irreversible loss of functional renal parenchyma (Mustonen *et*

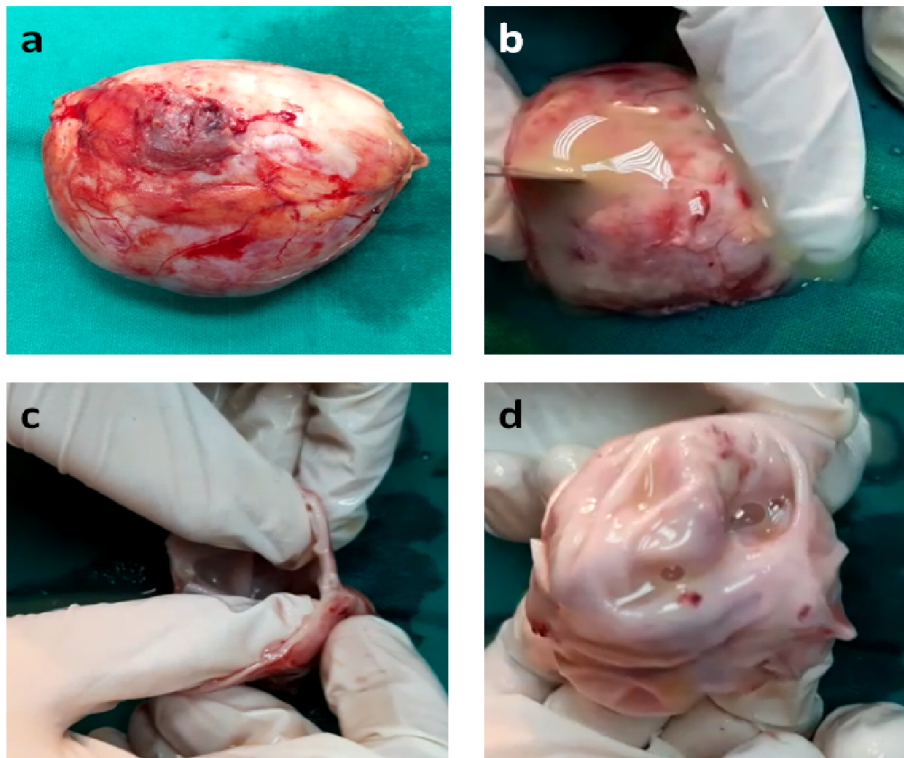


Fig. 6. The excised right kidney showing severe enlargement (A), yellowish white purulent content (B), very thin renal wall (C) and loss of normal renal anatomical structures (D).

al., 1999). Finally a draining fistulous tract is formed between the kidney and the exterior of the body leading to NCF. In the presented case, the cat had a history of previous cystitis, urethritis and urethral obstruction since 12 months. The urinary tract infection and obstructive uropathy might be the main causes of formation of renal abscess and NCF. Similar explanation was mentioned before (Finco, 1995; Nayyar *et al.*, 2005).

Clinically, the presented cat showed anorexia, vomiting and fever leading to lethargy and dehydration. Moreover, painful abdominal palpation and nephromegaly were also noticed due to formation of a renal abscess. Similar clinical findings were reported in six cats with renal abscesses (Faucher *et al.*, 2017). In our case, the presented cat showed NCF due to the chronicity of the case.

Not surprisingly, laboratory examinations revealed neutrophilic leukocytosis and azotaemia. These abnormalities might have resulted from the severe renal damage. The laboratory findings agree with the findings reported before in cats with renal abscesses (Faucher *et al.*, 2017).

In the presented case, the diagnosis was based upon the clinical manifestations, radiography and ultrasonography and was confirmed by laparotomy. Radiography revealed a large radiodense mass occupying the area of right kidney with absence of normal radiographic appearance of the right kidney due to complete destruction of renal parenchyma and formation of a renal abscess. Ultrasonography revealed severe right nephromegaly, absence of all ultrasonographic characteristics and presence of purulent material inside the kidney. Moreover the affected kidney was present under the draining fistulous tract. This may be attributed to the formation of renal abscess resulting in

loss of normal ultrasonographic appearance of the right kidney. In the meantime, the left kidney had normal radiographic and ultrasonographic characteristics. The radiographic and ultrasonographic findings were confirmed during laparotomy.

In humans, the diagnosis of NCF is based on CT enhanced with contrast materials and/or ultrasonography where the affected kidney is often nonfunctional (Yu *et al.*, 2004). Due to unavailability; CT could not be used for diagnosis of the presented case.

In the present cat, pyonephrosis with progressive destruction of the renal and abdominal walls resulted in fistulisation with the skin. Therefore, the pyonephrotic kidney was removed using nephrectomy and the fistulous tract was completely excised.

In conclusion, this report describes, for the first time, NCF due to obstructive nephropathy without previous history of surgeries or trauma. Early and comprehensive diagnosis of NCF based on clinical signs, radiography, ultrasonography and laparotomy can help in ensuring a successful outcome. Nephrectomy and excision of the fistulous tract are recommended for a successful treatment of NCF in cats.

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