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Case report

TRAUMATIC URETHRAL RUPTURE, ITS SURGICAL MANAGEMENT WITH TEMPORARY CYSTOSTOMY AND CONCURRENT WOUND RECONSTRUCTION IN A CAT

H. HASSIBI, M. REZAEI, D. VOSOUGH & M. SHAHRAKI

Department of Clinical Science, Faculty of Veterinary Medicine,
Shahid Bahonar University of Kerman, Kerman, Iran

Summary

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A 3-month-old male DSH cat was presented with a history of lethargy, anorexia, dysuria, urinary incontinence, dermatitis and swelling in the perineal area following a road traffic trauma. Retrograde positive-contrast urethrography revealed an intra-pelvic urethral rupture which was managed by performing transurethral catheterisation. Due to accidental removal, the case was presented for re-examination following a progressive urine scald dermatitis several days later. So, surgical placement of cystostomy tube was performed. The cat regained his ability to urinate normally a week later and the catheter was withdrawn. The extensive perineal dermatitis due to urine scald necessitated delayed primary closure. Topical and systemic antibiotics were administered for 2 weeks and second intention wound healing was completed after 5 weeks.

Key words: cat, temporary cystostomy, urethral rupture

Urethral rupture occurs infrequently in dogs and cats (Kolata & Johnston, 1975; Selcer, 1982; Anderson *et al.*, 2006). It may be accompanied by life-threatening complications and uremic cellulitis due to urine extravasation (Chapple, 2000). Regenerative properties of urethra are remarkable and the urethral healing occurs rapidly if mucosal continuity across the traumatised area is present and there is also no urine leakage (Boothe, 2000; Addison *et al.*, 2014). External trauma, urethral catheterisation, pelvic fracture and urethral obstruction secondary to calculi or plug or neoplasia can cause urethral injury (Fossum, 2013; Watrous *et al.*, 2016). Based on location, urethral rupture can be categorised into pre-, intra- and post-pelvic (Addison *et al.*, 2014). Location, extent and duration of the lesion affect clinical signs. Injury of the proximal urethra can cause urine retention and ac-

cumulation in the peritoneal cavity or retroperitoneal space and it may also lead to more severe systemic consequences and concurrent metabolic abnormalities (Boothe, 2000). Haematuria, dysuria, oliguria or anuria may be present (Colopy & Bjorling, 2015). Bruising and/or swelling of skin and subcutaneous tissues are initial signs of distal urethral injury which may result in necrosis if they are left untreated (Fossum, 2013) and fewer systemic signs are observed in the injuries of distal urethra (Boothe, 2000). Urethral perforation is diagnosed by positive-contrast urethrography (Addison *et al.*, 2014; Colopy & Bjorling, 2015). After correcting fluid, electrolyte and acid-base disturbances, treatment options include second intention healing by temporary urinary diversion via a urethral catheter or cystostomy tube, primary repair with anastomosis and permanent urinary diversion via an urethrostomy (Fossum, 2013; Watrous *et al.*, 2016). Temporary cystostomy or prepubic catheterisation was firstly introduced in 1965 for management of ruptured bladders in steers (Hastings, 1965). Since then, this technique has been performed to provide cutaneous urinary diversion in animals and humans with urethral obstruction or trauma and bladder atony secondary to neurologic disorders (Fossum, 2013; Gaber *et al.*, 2014; Berent, 2016). Herein, we report a case of urethral rupture and its surgical management with tube cystostomy concurrent urine extravasation and second intention wound healing in a domestic shorthair cat.

Case description

A 3-month-old intact male domestic shorthair cat weighing 1.9 kg was referred to the Veterinary Hospital of Shahid Bahonar University of Kerman with a history of lethargy, anorexia, dysuria, urinary incontinence, dermatitis and swelling in the perineal area (Fig. 1). The case also had a history of vehicular trauma 2 days ago. On physical examination, a large, firm and painful urinary bladder was palpated. A single attempt to gently press the bladder was unsuccessful. So, cystocentesis was performed to alleviate bladder distention and discomfort. A large amount of blood-tinged urine was then retrieved. Haematologic investigations showed leukocytosis with a left shift and anaemia. Biochemical profile was consistent with mild azotaemia. Urinalysis revealed a specific gravity of 1.025, haematuria and pyuria (Table 1).

No abnormality was detected in plain radiography, however, urethral rupture

Fig. 1. Severe dermatitis and swelling in the perineal area 2 days after motor vehicle trauma.

Table 1. Haematologic and biochemical values and urinalysis parameters of referred case

Parameter (unit)	Result
Complete blood count	
WBC (G/L)	21▲
RBC (T/L)	5▼
Haemoglobin (g/L)	80▼
Haematocrit (%)	21▼
Neutrophils (%)	70
Bands (%)	4▲
Lymphocytes (%)	24
Eosinophils (%)	2
Chemistry values	
Blood urea nitrogen (BUN) (mmol/L)	13.2▲
Creatinine (μmol/L)	221▲
Glucose (mmol/L)	5.55
Alkaline phosphatase (ALP) (IU/L)	85
Alanine aminotransferase (ALT) (IU/L)	61
Aspartate aminotransferase (AST) (IU/L)	35
Urinalysis	
Specific gravity	1.025
pH	7
Protein	1+▲
Glucose	–
WBC	12▲
RBC	10▲
Epithelial cells	1–2

was confirmed with retrograde positive-contrast urethrography (Fig. 2). The bladder was infused with a 20% solution of iohexol and the amount of contrast medium used was 7.5 mL (2 mL/kg). Urine accumulation and extravasation caused swelling in perineal region. After that, the penis was extruded, inspected, and gently massaged. Lidocaine 2% (0.25 mL) was applied in the urethral orifice and then, a urinary catheter was placed through the urethra into the bladder with difficulty, after multiple attempts and sutured.

After flushing the bladder with saline, the catheter was finally attached to a urine drainage bag. Treatment was initiated by fluid therapy and administration of ampicillin (20 mg/kg q8h). The cat was discharged from the hospital and its owners were instructed on how to drain urine through the tube. The following morning, the case was referred due to the accidental removal of urinary catheter and therefore another catheter was inserted. Four days later, the case was presented for re-examination following a progressive urine scald dermatitis (Fig. 4). After emptying the bladder, several tries were made in order to pass a urinary catheter but all of them were unsuccessful and the catheter could not be placed again into the bladder. So, surgical placement of cystostomy tube was performed. Anaesthesia was induced intravenously with ketamine (5 mg/kg), diazepam (0.2 mg/kg) and maintained with isoflurane.

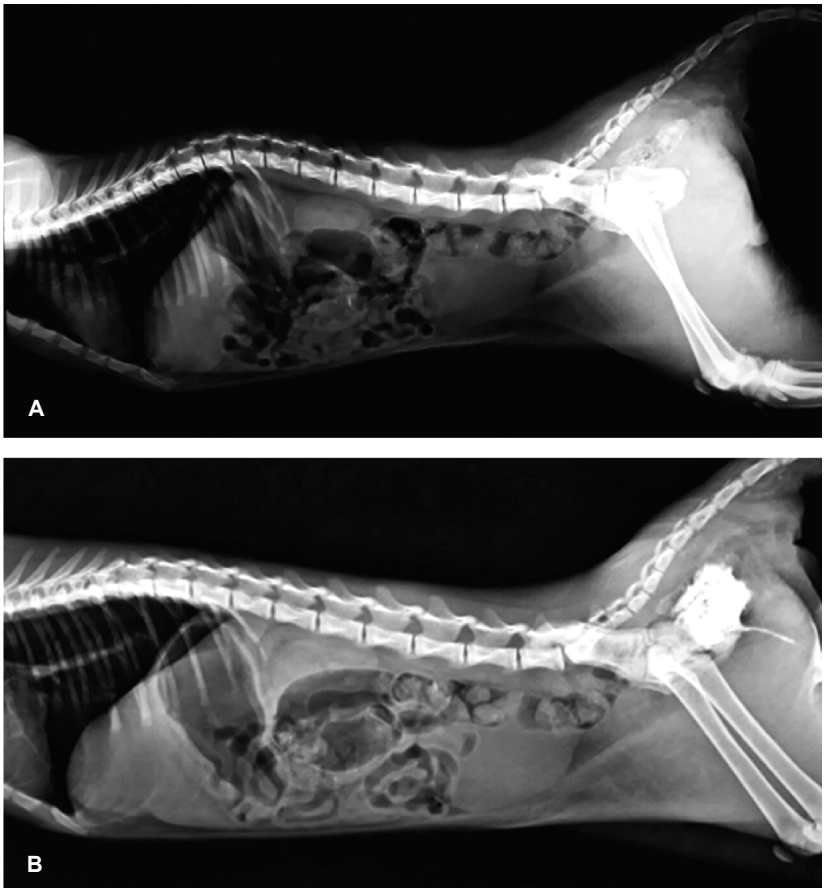

Fig. 2. Lateral radiograph of the cat demonstrating no problem in plain radiography (A) and leakage of contrast material into the periurethral tissues by retrograde contrast cystourethrography (B).

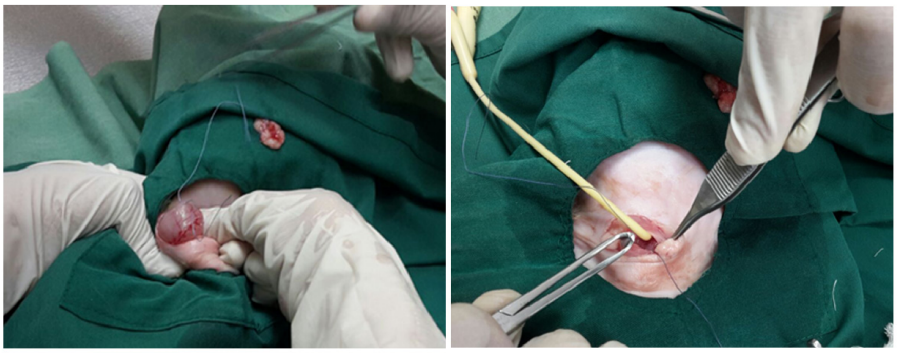

Fig. 3. Temporary cystostomy or prepubic catheterisation with insertion of a Foley catheter (8 Fr) in the urinary bladder.

Surgical preparation was carried out in a standard method. In order to place a Foley catheter, an oblique inguinal approach straightly over the bladder was considered. The bladder was identified and stabilised with multiple stay sutures and a purse-string suture was placed in the bladder wall. Then, a stab incision was made in the body wall and the tip of the Foley catheter (6 French [Fr]) pulled into the abdomen. Then, small stab incision was made within the purse-string suture and the Foley catheter was placed into the bladder lumen. Then, the balloon was inflated with a proper volume of saline and the catheter was secured within the bladder by tying the purse-string suture. A cystopexy was created by placing multiple interrupted absorbable sutures between the bladder and the body wall. The catheter was also checked for leakage by injection of saline to achieve moderate distension of the bladder. The body wall, subcutaneous tissue and skin were sutured in the standard way. The catheter was secured to the skin with a Chinese finger-trap suture and connected to a urine collection bag for continuous drainage of the bladder (Fig. 3).

The cat was hospitalised and urination was closely assessed to detect obstruction caused by urine sludge or blood plug enhanced by hematuria. Moreover, urine output was monitored to be in a minimum range of 0.5–1.0 mL/kg/h. Multiple tries were periodically made to find out whether the cat could urinate normally by sealing the catheter for 24 hours and monitoring the animal's ability to urinate. The cystostomy catheter was withdrawn 7 days after insertion. An extensive skin necrosis was developed in the perineal region and left hind limb that necessitated delayed primary wound closure (Fig. 4). Then, debridement of necrotic tissue distal to the proximal urethra was done. Conser-

Fig. 4. Second intention wound healing following urine extravasation (day 7–42 after injury).

vative treatment were considered for the case which included topical application of nitrofurazone and phenytoin ointments and also receiving systemic antibiotic therapy with co-amoxiclav suspension (25 mg/kg orally q12h) for 14 consecutive days. Second intention wound healing was completed after five weeks (Fig. 4).

Urethral rupture is an unusual observation in small animal practice. Although urethral rupture may be accompanied by life-threatening conditions, it is not life threatening by itself when treated appropriately (Anderson *et al.*, 2006). Urethral healing is rapid due to high regenerative properties of urethral epithelium. Urine extravasation and mucosal continuity are factors which influence the final urethral wound reconstruction (Boothe, 2000). Exposure of urine to traumatised tissues delays healing and results in fibrosis and stricture formation (Addison *et al.*, 2014). In this report, second intention healing by temporary urinary diversion via cystostomy tube was used for management of urethral rupture in a 3-month-old intact male domestic shorthaired cat.

In small animals, urethral injuries occur following external trauma, urinary calculi or plug, catheterisation and surgery (Anderson *et al.*, 2006). Similar to this case which had a history of vehicular accident, traumatic injuries (seen or suspected vehicular trauma) were reported as the most common cause of urethral injuries (Addison *et al.*, 2014). In consistence with the results of this study, urethral traumas are observed more commonly in male dogs and cats due to the anatomy of their urethra (longer and more accessible) and also their roaming behaviour (Boothe, 2000; Colopy & Bjorling, 2015). A retrospective analysis of urethral rupture in 63 cats was performed, in which males predominated (Addison *et al.*, 2014). The majority of cases in the mentioned study were domestic short- or longhair. Intra- and post-pelvic partial rupture were the most common cases in the traumatic and iatrogenic groups respectively (Addison *et al.*, 2014). In this cat, partial urethral rupture was detected by contrast cystourethrogram and found to be an intra-pelvic rupture. As we report here, stranguria, dysuria, oliguria or anuria are the most reported clinical symptoms. Urine exposure results in uremic cellulitis with signs of bruising, inflammation and swelling (Addison *et al.*, 2014). Most cases of traumatic urethral rupture in dogs are associated with pelvic fractures, however urinary tract injury should be suspected in any cat with abdominal or caudal trauma, regardless of the presence or absence of pelvic fractures (Addison *et al.*, 2014). In the current case, fracture was not detected in plain radiography.

Up to now, various techniques have been developed to manage urethral injury. Treatment is either conservative or surgical. Placement of an indwelling urinary catheter and/or cutaneous urinary diversion and urethrostomy are different treatment options available (Fossum, 2013; Stafford & Bartges, 2013). Choosing the best technique is influenced by many factors such as patient's status, location and extent of urethral rupture (Boothe, 2000). Its advantages and limitations for clinical applications needs to be clarified to overcome complications (Gaber *et al.*, 2014). There are few reports of temporary and permanent diversion of urine via tube cystostomy and its clinical use in dogs and cats (Hayashi & Hardie, 2003; Beck *et al.*, 2007). Surgical placement of a cystostomy tube has turned out to be a fast, secure and highly efficient technique. Percutaneous cystostomy does not require repeated urethral catheterisation or decompressive

cystocentesis and its associated urinary tract trauma (Hunt *et al.*, 2013). Minimal interference with urethral healing, lower incidence of urinary tract infections and ability to empty the bladder are advantages of using a cystostomy catheter (Boothe, 2000). Gaber *et al.* (2014) considered tube cystostomy as the most successful surgical treatment for obstructive urolithiasis in small animals. In contrary to the mentioned study, cystostomy tubes are commonly associated with secondary infections and other complications including inadvertent tube removal or displacement from the bladder (Berent, 2016). Inadvertent tube removal was reported as the most common complication in the study conducted by Beck *et al.* (2007). Urethrostomy as an alternative treatment option has more complications such as recurrent urinary tract infections (UTIs), stricture formation and incontinence and is impossible in small animals (Addison *et al.*, 2014). In patients with urethral rupture, urine flow should be diverted until epithelialisation is complete. If mucosal continuity is present, epithelialisation happens approximately in 7 days (Boothe, 2000). In the present report, the Foley catheter was removed after 7 days and the cat was able to urinate normally after this period. Similar to our finding, the median time for temporary urinary diversion was 6–7 days in other studies (Beck *et al.*, 2007; Addison *et al.*, 2014).

Since the urine is hyperosmolar to the surrounding tissues, the extravasation of urine results in great damages to soft tissues such as considerable inflammation, delayed wound healing, disturbance of blood supply and periurethral fibrosis (Anderson *et al.*, 2006; Meige *et al.*, 2008; Watrous *et al.*, 2016) and as a result aggressive medical and often surgical management is required. Prolonged wound management is the common consequence of urine extravasation (Watrous *et al.*, 2016). In the current case, wound healing was occurred approximately five weeks after injury. Final prognosis of urethral management is influenced by several factors. The presence of multiple traumatic injuries has a poor outcome (Anderson *et al.*, 2006). Addison *et al.* (2014) hypothesised that cats with a traumatic injury and those with a more cranial site of urethral rupture would have a poorer survival and/or outcome.

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Correspondence:

M. Rezaei
Department of Clinical Science,
Faculty of Veterinary Medicine,
Shahid Bahonar University of Kerman,
Kerman, Iran
tel: +989133431675
e-mail: mahdiehrrezaei@gmail.com