Clinical management of the feline urological syndrome

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ABSTRACT

The management of cases of the feline urological syndrome (FUS) is described with particular reference to urethral obstruction in the male cat. Treatment of the obstructive episode and in the post-obstruction period and the prevention of recurrence of blockage in the longer term are discussed and a technique for perineal urethrostomy described.

INTRODUCTION

The clinical signs associated with the feline urological (uro lithiasis) syndrome (FUS) – haematuria, increased frequency of urination and dysuria or anuria – are well recognized: the management of FUS however, presents considerable problems for the clinician in both the treatment of the initial episode and the prevention of recurrence.

Of the two major facets of the syndrome, namely cystitis and urethral obstruction, it is the latter which is the more immediately serious. The recent BSAVA/PFMA survey showed that 34% of cats which experienced an obstructive episode were dead at the time of follow-up 6 months later (Walker et al. 1977). Though mortality associated with cystitis is uncommon, both forms of the disease carry a considerable risk of recurrence: some 30% of the surviving cats in the BSAVA/PFMA survey suffered one or more recurrent episodes in the 6-month follow-up period.

However, some progress has been made in recent years, both in the understanding of the pathogenesis and treatment of an episode of urethral obstruction,
and in the prevention of recurrence (Jackson, 1971; Osborne, Hardy & Finco, 1972; Gaskell, 1973; Parks, 1975; Schaer, 1975; Greene & Scott, 1975; Burrows & Bovee, 1978). This paper reviews these recent advances and suggests a general approach to the clinical management of FUS.

**URETHRAL OBSTRUCTION**

The management of the cat with urethral obstruction can be arbitrarily divided into the immediate treatment of the obstructive episode, treatment in the post-obstruction period and the prevention of a recurrence of blockage in the longer term.

*Treatment of the obstructive episode*

Such treatment is aimed at the rapid restoration of urine flow and the correction of the systemic effects of the obstructive uropathy.

1. *Restoration of Urine Flow.* Although no two cases of urethral obstruction are the same, the following routine approach may be useful:

   a. Medical treatment: the use of tranquillisers (e.g. acetylpromazine), or antispasmodics (e.g. atropine, pancreatic extract), though having the advantage of being atraumatic, is rarely successful in relieving the obstruction.

   b. Urethral massage or ‘milking’: in cases where the obstruction is due to sabulous or matrix material in the penile urethra, a few minutes very gentle and well lubricated massage may be successful in milking the penis clear. The use of manual pressure on the bladder in an attempt to clear the obstruction forcibly is rarely helpful and should not be attempted as it carries a considerable risk of rupturing the bladder.

   c. Urethral irrigation and catheterization: many cases require urethral irrigation and catheterization to clear the obstruction and in all but the most depressed cats anaesthesia is necessary. Short acting agents, such as thiopentone, Saffan (Glaxo Laboratories Ltd, Greenford), or halothane are suitable but ketamine (Vetalar, Parke Davis), excreted via the kidney, should not be used. Following extrusion (Fig. 1) and cleansing of the penis, repeated urethral lavage should be carried out using sterile water, saline, or preferably, sodium acetate/acetic acid buffer (Walpoles solution Arnolds Veterinary Products Ltd, Reading) in an attempt to flush out, break up or dissolve the plug. The use of a sterile, blunt, end-opening silver or disposable lacrimal duct cannula is valuable in flushing the penile urethra, beyond which a plastic tom-cat catheter (‘Jackson’ Tom-cat catheter, Arnold Veterinary Products Ltd, Reading) should be used to irrigate the more proximal urethra. It is helpful in passing a catheter to be aware of the sites where obstruction most commonly occurs, namely at the tip of the penis and at the level of the bulbo urethral glands, and to remember that, with the penis extruded, resistance to the passage of the catheter will always be met where the urethra passes over the pubis (Fig. 2). When this point is reached, release of the
penis and traction on the prepuce caudally will straighten the urethra and allow the catheter to pass into the pelvis, avoiding damage to the urethral wall. Severe damage to the urethral wall may also occur if replacement if the wire stylet is attempted with the catheter in place.

Repeated lavage is often necessary before the obstructing material is removed. Its removal is important, for while a catheter may often be advanced past the material, the accompanying 'gritty' sensation indicates that the urethral mucosa is being damaged; the subsequent urethral scarring greatly increases the risk of re-obstruction. Walpole's solution may be used to differentiate between obstruction due to sabulous material and microcalculi, the former being rapidly dissolved by urethral flushing (Jackson, 1970). Microcalculi may be flushed back into the bladder by repeated lavage. Following passage of the catheter, urine should be drained by suction, rather than by relatively traumatic bladder expression. Lavage of the empty bladder with Walpole's solution may be helpful but should be reserved for those cases showing marked crystalluria and little or no haematuria (Jackson, 1971). Lavage using crystalline penicillin may also be of value where bacterial cystitis is present.

(d) Bladder paracentesis. If attempts at urethral catheterisation are unsuccessful, bladder paracentesis will provide temporary relief. A site should be prepared as for surgery in the ventral midline approximately 2 cm cranial to the pelvic brim and paracentesis carried out using a 22-gauge needle. The cat must be motionless.

Fig. 1. Extrusion of the penis for catheterisation; this is carried out initially using a lacrimal cannula.
During paracentesis to avoid tearing the bladder wall. In some cases urethral catheterization may be possible following paracentesis and the relief of the pressure of urine.

(e) Surgery. In certain cases emergency urethrostomy may be the only technique available to restore urine flow. Ideally, though, urethrostomy should be carried out as an elective, not emergency, procedure, when both the cat and the urethra have recovered from the acute stage of the obstruction.

2. Correction of the systemic effects of obstruction. The renal failure experienced by a cat with complete obstruction for longer than 12 to 24 hours is manifested by, amongst other changes, an acidosis and high plasma potassium levels. These features may be recognized clinically as a variable degree of depression or may be inferred from the elevation in blood urea. An appreciation of the life-threatening nature of these changes and the need for their rapid correction is essential. Treatment is based on the administration of sodium bicarbonate at a rate of 0.5-2 m equivalents per kg bodyweight either by slow intravenous injection over 5-10 minutes or following addition to 250 cm³ of a balanced electrolyte (Lactated Ringers) intravenous fluid. The use of insulin, immediately followed by dextrose, has also been described for the alleviation of the hyperkalaemia (Schaer, 1975). A balanced electrolyte fluid should be given intravenously, the volume dependent...
on the clinically assessed degree of dehydration (volume given in cm³ = percentage dehydration x weight in pounds x 5). Such animals are also frequently hypothermic, and require appropriate nursing, e.g. heat pad.

**Treatment during post-obstructive period**

1. **Indwelling Urinary catheter.** The prevention of recurrence in the immediate post-obstruction period is most easily achieved by leaving a urinary catheter indwelling for 3 to 5 days. The catheter is secured to the prepuce by three or four loose nylon sutures; an Elizabethan collar is necessary in most cats to prevent interference with the catheter. This technique is also of value where a degree of bladder atony exists following prolonged or repeated obstructions. Catheterized cats are of course incontinent but urine soaking can be prevented in the co-operative (or depressed) cat by the attachment of tubing (e.g. from an intravenous administration set) to the catheter, leading urine away to a collecting bottle. The catheter should be checked every few hours for patency, and if blocked, cleared by flushing with a sterile solution (e.g. Walpoles).

2. **Fluid therapy.** Some cats undergo a moderate to marked diuresis following the relief of obstruction which is believed to be due to both the clearance of accumulated metabolites and a transient inability of the proximal tubules to concentrate urine effectively. The administration of fluids to such animals, either subcutaneously or intravenously, is essential to maintain hydration. As in the initial fluid therapy, a balanced electrolyte solution is indicated though prolonged diuresis may lead to excessive sodium and potassium loss reflected in low serum levels and the solution therefore may require supplementation. A fuller discussion of the management of these isolated cases is provided by Greene & Scott (1975).

3. **Antibiotic therapy.** All cases should receive antibiotic or urinary antiseptic therapy, as bacterial cystitis is a not uncommon sequel to obstruction with or without catheterization. Methylene blue has been shown to cause haemolytic anaemia in some cats and should not be used as a urinary antiseptic: potentially nephrotoxic antibiotics (e.g. Kanamycin, Neomycin, Gentamycin) should also be avoided. The use of urinary acidifiers should be delayed for a few days post-obstruction to avoid complicating any acidosis present.

**Long-term treatment**

Long-term treatment of urethral obstruction is based on the attempted prevention of recurrence, a task made difficult by the poor understanding of the underlying mechanism of the disease. However certain steps may be taken.

1. **Management.** A number of factors related to the management of the cat have been identified as predisposing to FUS. A cat suffering from FUS has been shown to be more likely to be fed dry cat food, neutered, lazy and inactive, overweight and to drink less (Walker *et al.* 1977). One of these factors, low fluid intake is readily amenable to manipulation, and this should be attempted. The intake of additional water leads to an increase in urine volume, a lowering of urine
specific gravity and a reduction in crystalluria but may not, though, be effective in preventing recurrence of FUS. An increase in fluid intake is best achieved by one or more of the following: the feeding of high-moisture foods (e.g. canned), the mixing of additional fluid with this food, the addition of salt to the diet and the offering of gravy, as well as fresh water and milk, to the cat. Advice on body-weight and activity, also shown to be predisposing factors in FUS, is easier to give than to carry out.

2. Medical prophylaxis. (a) Urinary acidifiers. Although struvite crystalluria per se is not the cause of urethral obstruction, reduction of the quantity of crystals in the urine may help to reduce the rate of recurrence. Chlorethamine (Ethylene-diamine hydrochloride Intervet Laboratories Ltd, Cambridge), methionine, ammonium chloride and ascorbic acid are all effective in reducing urinary pH, though they may become less so after variable periods of time. However, urinary acidification will not necessarily prevent recurrence.

(b) Megestrol acetate. The use of megestrol acetate (Ovarid Glaxo Laboratories Ltd, Greenford) to reduce the incidence of recurrence of obstruction has been reported (Evans 1976); it has also been used by one of us (CJG) successfully to control recurrent cystitis in the female, and in males following perineal urethrostomy. The mechanism of action is unclear.

3. Surgery. The value of surgical methods in preventing re-obstruction by removal of the narrower portion of the male cat’s urethra is increasingly apparent. The decision to carry out surgery should be strongly considered in those cases where obstruction occurs repeatedly, where urethral damage during an episode has been severe or where the owners are unable or unwilling to cope with the possibility of further obstructive episodes. Wherever possible surgery should be carried out when the cat has recovered fully from a previous obstruction.

The most commonly employed surgical techniques are prepubic and perineal urethrostomy, of which the latter seems to be the more effective. Johnston (1974) and Long (1977), have reviewed and modified this technique which is based on the removal of the distal narrow portion of the urethra (Fig. 2). The method given now closely resembles previous descriptions and has been successfully used in 30 cases (follow up period 4–40 months, mean 20 months) (Gaskell & Denny, 1977).

**Surgical technique for perineal urethrostomy**

The cat is premedicated with atropine. Anaesthesia is induced with thiopentone and maintained, following endotracheal intubation, with methoxyfluorane, nitrous oxide and oxygen. The cat is placed in sternal recumbency with its hindquarters raised over a sandbag, and the tail is pulled forward. A purse-string suture is placed around the anus to prevent faecal contamination of the operation site and a urinary catheter is passed (Fig. 3). A triangular skin incision which includes the dorsal surface of the prepuce, and the scrotum in entire cats, is made directly over the penis (Fig. 4). The entire triangle of skin is removed, together with the testes (if present) to expose the penis. The penis is freed from its
Fig. 3. a. Purse-string suture placed around the anus. b. Catheter inserted.

Fig. 4.
Fig. 5. The penis is freed from its preputial attachments.

Fig. 6.
Fig. 7. a, The right ischiocavernosus muscle.

Fig. 8. a, Membranous urethra; b, Bulbo-urethral glands; c, Ischiocavernosus muscle.
Fig. 9. a, Stay suture.

Fig. 10. a, Catheter; b, Membranous urethra; c, Bulbo-urethral glands.
preputial attachments (Fig. 5). The penis is then reflected dorsally (Fig. 6), and dissected free from its cranial attachments to reveal the ischiocavernosus muscles which attach the penis to the ischium (Fig. 7). These muscles are severed as close to the ischium as possible, as section at this point results in minimal haemorrhage. Further dissection reveals the bulbo-urethral glands (Fig. 8). The membranous urethra cranial to these glands is then freed from its surrounding tissues, dissection being carried well cranial into the pelvic cavity in order to bring the appropriate site to the skin edges without excessive traction. A stay suture (all sutures are of 000 (B.P.) chromic catgut) is used to anchor the dorsal side of the membranous urethra to the proximal end of the skin incision (Fig. 9). A longitudinal incision is then made in the dorsal surface of the membranous urethra just cranial to the bulbo-urethral glands exposing the catheter. The cut edges of the urethra including the mucosa are sutured to the skin edge using simple interrupted sutures (Fig. 10). Having sutured the membranous urethra to the skin the remainder of the urethra is transected at the level of the bulbo-urethral glands and the penis removed to allow the urethrostomy to be completed (Fig. 11). Dead space below the ‘shelf formed by the urethrostomy is closed with a continuous suture placed in the subcutaneous fat (Fig. 12). The ventral edge of the prepuce is reflected dorsally and sutured to the ventral edge of the membranous urethra (Fig. 13). The urethrostomy is completed by coapting the sides of the prepuce with interrupted sutures (Fig. 14) and the purse string suture is removed from the anus. The perineal region is protected from urine scalding postoperatively.

Following recovery from anaesthesia the cat is given 5 mg of pethidine intramuscularly. A 5-day course of antibiotics (e.g. Penicillin, Tetracycline) is given post-operatively and the perineal region is repeatedly dressed with petroleum jelly. An Elizabethan collar is used on those animals which lick the wound excessively. There are no sutures to remove. Post-operative complications of perineal urethrostomy are few. Urethral stenosis has not been a problem with this technique. ‘Spotting’ of urine where a cat has been lying has been reported by a few owners in the period immediately following surgery but the problem has always resolved without treatment. The incidence of the cystitis seen as part of FUS will of course be unaffected by surgery which treats the effect, not the cause of the disease. Thus surgical treatment should always be accompanied by management advice and, if necessary, medical treatment.

**CYSTITIS**

Little attention has been paid to the frustrating problem of recurrent and often unresponsive cystitis seen in both sexes as part of the feline urological syndrome. Treatment consists of antibiotics, urinary antiseptics and acidifiers with advice on management as described for urethral obstruction. Success has also been achieved using megestrol acetate. Care must be taken to distinguish the idiopathic
haematuria of FUS from that associated with a bacterial cystitis, the presence of true cystic calculi or the rare cases of neoplasia of the urinary bladder.

REFERENCES