Urethrostomy done using the anastomosis technique of the prepuce mucosa to the pelvic urethra in cats with penile urethral obstruction

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ABSTRACT: Penile urethral obstruction in cats is a commonly seen clinical manifestation. In cases where there is no response to catheterisation and medical intervention, surgery is needed to provide urination and correct uremia and hyperkalemia. Several surgical techniques have been described. The perineal urethrostomy technique, reported by Wilson and Harrison in 1971, has been used extensively and since then various modifications of this technique have been developed by other researchers. In 2000, Yeh and Chin described a modified perineal urethrostomy technique created by use of the prepuce mucosa. This technique was used in our clinic in 20 cats with penile urethral obstruction. Seventeen cats recovered without complication. A 2.6 mm diameter catheter was placed in each of the 3 cases in which leakage was determined in the anastomosis site. The urine gathered in the site subcutaneously was drained. Normal urination was achieved in 2 of the 3 patients treated with this technique. The remaining case was re-operated and the perineal urethrostomy technique, in which the urethra was sutured to the perineal skin (the Wilson and Harrison method, 1971), was applied. The advantages of this technique over the classical perineal urethrostomy technique are; return to urination shortly after the operation, better urination potential compared to normal cats, a more aesthetic appearance compared to other techniques (similar to a castrated cat), no narrowing of the orifice caused by re-growth of hair. It was also understood that, anastomosis of the urethra and the prepuce mucosa must be carried out with utmost care in order to prevent urine leakage.

Keywords: urethrostomy; cat; penile urethral obstruction

The urethra of the male cat is divided into 4 sections: the pre-prostatic urethra, the prostatic urethra, the post-prostatic urethra and the penile urethra. The penile urethra narrows towards the end of the penis. Obstruction of the penile urethra by crystal plaques and urethral calculi is due to its anatomic structure (Osborne *et al*., 1996a). The most important causes of urethral obstruction are; struvite crystals, calcium oxalate crystals and accumulation of cells due to urinary tract infections. Strictures occurring in the penis and the penile urethra also play a role (Arikan and Acar, 1993). K retention and hyperkalemia also develop in this condition, as well as inability to urinate and uremia. Hyperkalemia causes destruction of the cell membrane potential and ventricular fibrillation. All these negative developments carry life risk for the patient (Drobatz and Hughes, 1997). It has also been reported that, urethra atrophy may develop following castration in male cats and this could create the risk of penile urethra obstruction (Sevestre, 1979).

The initial procedures to be carried out when urine flow is obstructed are; catheterization of the urethra, rectal massaging of the pelvic urethra and decompressing of the bladder via cystocentesis. In some patients, medical treatment may be effective along with these methods (Arikan and Acar, 1993; Yucel, 1998). As long as the urine can be expressed, special diets selected according to laboratory results may prevent crystal development (Osborne *et al*., 1991, 1996a). However, recurrence is possible and when these procedures are ineffective, surgical intervention is indicated (Christensen, 1964; Mendham, 1970; Johnson, 1974; Long, 1977; Osborne *et al*., 1996a,b; White *et al*., 1997; Akin and Samsar, 1998; Folder, 1999; McLoughlin, 2000).

Several surgical methods and their modifications have been described for the treatment of penile

urethra obstruction in cats. Antepubic urethrostomy, urethrocolostomy-uretherocolostomy, penile urethrostomy and perineal urethrostomy are techniques which have been used since the 1950s. The perineal urethrostomy technique reported by Wilson and Harrison in 1971 has been used extensively and since then various modifications of this technique have been developed by different researchers.

Arikan and Acar (1993) performed the perineal urethrostomy technique in 17 male cats with urethral obstruction. One of these cases died during the operation and stenosis developed in one other cat 3 months after surgery.

In relation to penile urethra obstruction, complications such as; death due to anaesthesia, post-operative haemorrhage, subcutaneous urine accumulation, irritation dermatitis, perineal hernia, stricture, urinary incontinence, urethrorectal fistula and urinary system infections (USI) may develop (Gregory and Vasseur, 1984; Gregory *et al*., 1984; Griffin and Gregory, 1992; Osborne *et al*., 1991, 1996a; Kyles and Stone, 1998).

In a study they published in 2000, Yeh and Chin described a modified perineal urethrostomy technique using the prepuce mucosa. They reported uncomplicated recovery in all cases where they used this technique in 14 cats with urethral obstruction. Advantages of this technique are; return to urination shortly after the operation, better urination potential compared to normal cats, a more aesthetic post-operative appearance of the region compared

Figure 1. Appearance of the eliptical incision including the scrotum and the perineal region

Figure 2. Castrated appearance of a sexually active cat

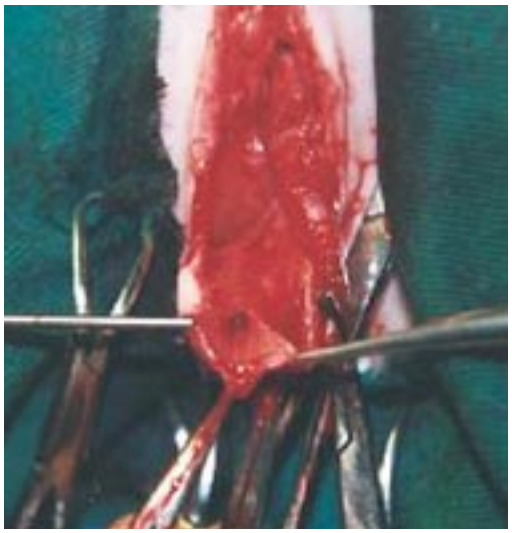

Figure 3. The tubular prepuce mucosa prepared for anastomosis

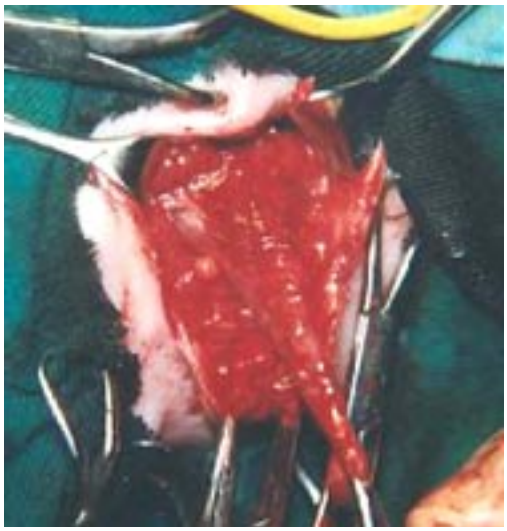

Figure 4. Dissection of the penis until the bulbourethral glands

to other techniques (same as castrated healthy cats), no development of irritation dermatitis in the surgical site and no narrowing of the orifice caused by re-growth of hair.

MATERIAL AND METHOD

The material of the study included 20 cats with obstructed urethras which could not be unblocked neither via catheterizing nor rectal massaging. Six of these patients had previously been castrated.

The patients were given a premedication of atropine sulphate (Atropin®, Vetas, Istanbul, Turkey) and diazepam (Diazem®, Deva, Istanbul, Turkey), followed by general anaesthesia induced by *i.v.* administration of ketamine hydrochlorure (Ketalar®, Pfizer Warher Lambert, Istanbul, Turkey). Following intubation, the animals were connected to a closed circuit anaesthesia machine and anaesthesia was maintained using halothane (Fluothane®, Astra Zeneca, Istanbul, Turkey) or isoflurane (Forane® likid, Abbot, Istanbul, Turkey).

The patients were placed in the Trienburg position and an elliptical incision was made including the scrotum and perineal region (Figure 1). Sexually intact cats were castrated (Figure 2). The penis was dissected until it was free from the surrounding loose connective tissue. The mucosal membrane of the prepuce was carefully incised around the penis and freed. In order to match the anastomosis, a small incision was also made on the midline of

Figure 5. Application of a 2.6 mm-diameter catheter via the incision in the pelvic urethra

Figure 6. Anastomosis of the prepuce mucosa and the pelvic urethra

Figure 7. Appearance of the operation site closed using 3/0 silk suture

Figure 8. Castrated male cat appearance of the patient whose sutures were removed 10 days after surgery

the interior wall of the prepuce mucosa. Thus, the tubular prepuce mucosa was prepared for anastomosis (Figure 3).

The ventral ligament of the penis and the bilateral ischiocavernosus muscles were cut. Careful dissection of the penis was continued in the ventral and lateral directions and pelvic connections were separated (Figure 4). Thus, the penis was freed further. The retractor muscle of the penis was excised until the bulbourethral glands and the penile urethra was reached. After catheterization of the urethra lumen with a male cat urinary catheter, the lumen was excised using iris scissors to within 1 cm of the bulbourethral glands. The catheter was replaced with a 2.6 mm-diameter catheter in the direction of the pelvic urethra (Figure 5). The distal portion of the penis was amputated after placing a ligature using 4/0 polyglactin 910 (Vicryl®, Ethicon, Edinburgh, United Kingdom) suture material approximately 1 cm distal to the incision in the penile urethra.

For the anastomosis, 4/0 polyglactin 910 suture material was used. Matress suture was applied to the upper end of the incision in the pelvic urethra and the most dorsal portion of the prepuce mucosa, this was continued with a continuous suture and a full-layer anastomosis was achieved (Figure 6). The surrounding soft tissue and subcutaneous connective tissue was closed using 4/0 polyglactin 910 and the skin was closed using 3/0 silk suturing material (Figure 7).

Broad spectrum antibiotics were administered to all patients for postoperative 5 days. The patients wore Elizabethan collars for 10 days. The skin sutures were removed on postoperative Day 10. The surgical site had the appearance of a castrated male cat (Figure 8).

Findings

Ages of the 20 male cats (6 of which had been castrated previously) included in the study changed between 1 and 12. The mean age was found to be 4.6. Of the patients, 2 were Persian cats, 2 Van cats and the remaining 16 were mixed breed. The patients were cases in which urination could not be achieved in spite of medical treatment either in our clinic or at private veterinary surgeons. In the biochemical check-ups of the blood sera done before the operation, urea and creatinine values were above normal in all cases.

The serum urea level of case No. 3 before the operation was 433 mg/dl and creatinine value was 36 mg/dl. In the post-mortem examination of this case that died on post-operative Day 2, while there were no complications related to the operation technique, the reason of death was understood to be nephrosis.

The edema formed post-operatively in the perineal region of case No. 4 made urination difficult. Urine flow was achieved with support by abdominal palpation until post-operative Day 7. The edema resolved after Day 8 and normal urination was achieved.

Seventeen patients recovered without any complication. Subcutaneous urine accumulation was observed in the surgical site in 3 patients which developed post-operative complications. This was seen to have been caused by urine leakage between the anastomosed urethra and prepuce mucosa. These patients were re-catheterized using 2.6 mm diameter catheters, 2 of the sutures in the incision site were removed and the region was drained. The catheters were removed 5 days later from one patient and 15 days later in one other and urination returned to normal. In the third patient, however, difficulty to urinate was found to originate from the stricture which had developed, whereupon the patient was re-operated using the classical perineal urethrostomy technique.

According to the information received from the patient owners for the late period check-ups, one case had died in a traffic accident, another patient had died due to reasons unrelated to urination problems and that the remaining 15 cases were continuing their lives without any problems.

RESULTS AND DISCUSSION

Castration in male cats has been reported to be a possible cause of urethra atrophy and in relation to this, penile urethra obstruction (Sevestre, 1979). On the other hand, the fact that only 6 of the 20 cats included in this study had been previously castrated, indicates that urethral obstruction is not necessarily seen in every castrated cat.

The most frequent complication in the classical urethrostomy technique is the narrowing of the orifice and the development of a stenosis. The perineal hair growing back in a few months also contributes to this narrowing (Carbone, 1963; Blake, 1968; Wilson and Harrison, 1971; Arikan and Acar, 1993; Osborne *et al.*,

1996b). No such complications were encountered in the new technique used in this study. This supports the views of Yeh and Chin (2000) .

In the classical urethrostomy technique, urine frequently causes irritation dermatitis in the perineal region where it is in contact with the skin at the site it is expressed (Osborne *et al*., 1996b). In the technique developed by Yeh and Chin (2000), it has been stressed that because urine is expressed directly outwards from the prepuce, irritation dermatitis does not occur and the appearance of the site is like that of a castrated male cat. The findings of this study are similar to these views.

In all the patients to which they applied prepucial urethrostomy, Yeh and Chin (2000) reported that, the potential to urinate was much higher than normal cats. In our study, with the exception of 3 cases with urine leakage and 1 case with edema in the perineal region, the remaining 16 cases confirmed this view.

According to Yeh and Chin (2000), anastomosis leakage was not seen in any of the 17 cats. In this study, which was carried out using the same technique, there was an anastomosis leakage in 3 of 20 cats. We think that this was due to lack of experience. The most important stage of the technique is the anastomosis stage. Subcutaneous urine accumulation was relieved by catheterizing and draining the urine from the region in 2 of 3 cats. The patient in which narrowing had developed in the anastomosis site at the same time was treated with the classical perineal urethrostomy technique. This indicates that, even if urine leakage developed in the prepucial urethrostomy technique, the patient could be treated with alternative methods.

In case No. 3, pre-operative serum urea level was 433 mg/dl and creatinine level was 36 mg/dl. In the post-mortem examination of the patient that died on post-operative Day 2, there were no complications related to the surgical technique and the cause of death was understood to be nephrosis. This is a significant warning against delaying the time of surgery.

In the light of these assessments, we would like to state that the technique we applied in this study has many advantages over other techniques used in our clinic over the years and that we can highly recommend it to practicing colleagues.

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