

## Prepubic urethrostomy opening within a prepuce in a dog: a case report

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**ABSTRACT:** The prepubic urethrostomy procedure has been shown to be a long-term diversion technique in dogs with intrapelvic urethral damage. This case report describes the clinical presentation and successful surgical management of an intrapelvic urethral stricture in a four month old male intact Labrador Retriever with hypospadias. The dog was presented for assessment of dysuria, stranguria, urinary incontinence, and urethrocutaneous fistula. After the diagnosis of perineal hypospadias with intrapelvic urethral stricture was made, surgery was performed to relieve the urethral obstruction and repair the urethrocutaneous fistula. A prepubic urethrostomy was made and the transected urethra was pulled through the inguinal canal into the prepuce. The postoperative recovery was uneventful. This technique can reduce postoperative peristomal skin irritation and leads to better cosmetic appearance than the standard technique.

**Keywords:** urethral stricture; hypospadias; diversion technique

Hypospadias is a relatively rare developmental anomaly that results from failure of fusion of the urogenital folds, leading to incomplete formation of the urethra (Bleedom and Bjorling 2012). The condition is rare, although more common in males, and the etiology is unclear (Hayes and Wilson 1986). Hypospadias manifests as varying degrees of urethral and corpus spongiosum deficiency, often accompanied by failure of fusion of the prepuce and an underdeveloped or absent penis. Male hypospadias is classified by the location of the urethral meatus opening, which may be anywhere from the penile tip to the perineum. The described types of hypospadias include glandular, penile, scrotal, perineal and anal (Hardy and Kustritz 2005; Cashmore and Ladlow 2010).

Urethrostomy is a surgical procedure performed in order to permanently relieve urethral obstruction by allowing urine flow around an irreversibly diseased or damaged urethra (Smeak 2000). The urethrostomy site is based on the location of the obstructive lesion. In a male dog it can be performed at prescrotal, scrotal, perineal, subpubic (transpelvic), and prepubic locations (Bernarde and Viguier 2004; Bleedom and Bjorling 2012). Prepubic urethrostomy (PPU) is indicated when there is an insufficient length of

normal urethra to perform a perineal urethrostomy or transpelvic urethrostomy (Bernarde and Viguier 2004). It has been shown to be a long-term, acceptable diversion technique in dogs and cats with intrapelvic urethral damage. Katayama et al. (2012) described urinary diversion via preputial urethrostomy with bilateral pubic-ischial osteotomy together with penile amputation and osteosynthesis of pelvic bones in a dog. Dogs with prepubic urethrostomy should be monitored for peristomal skin irritation, tissue necrosis, bacterial cystitis, incontinence, and stomal stricture (Bradley 1989; Baines et al. 2001).

The case reported herein illustrates successful surgical management of an intrapelvic urethral stricture in a dog with hypospadias. A PPU with an opening in the prepuce was performed primarily because of the possible development of postoperative peristomal skin irritation, and secondarily because of the cosmetic appearance.

### Case description

A four month old male Labrador retriever weighing 8 kg was presented to a primary care veterinar-

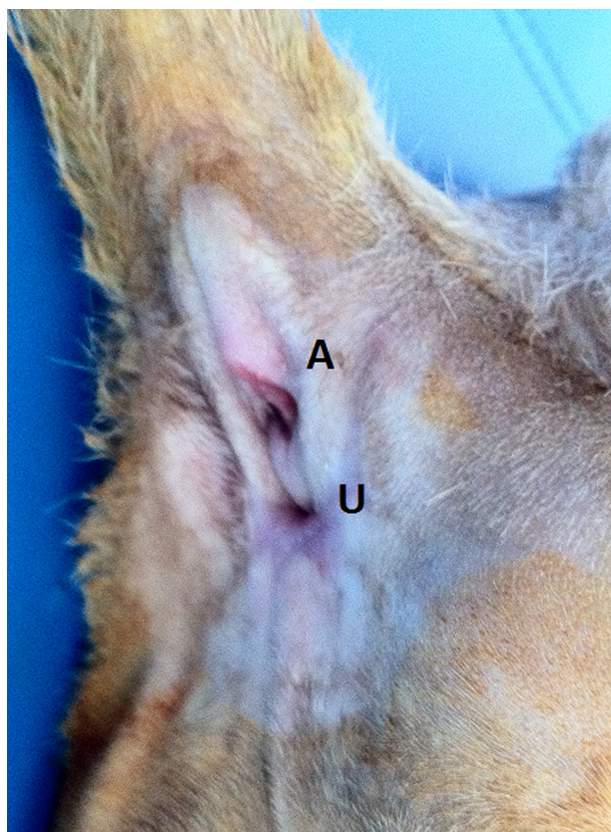


Figure 1. Perineal hypospadias. A = anus; U = urethral opening

ian with a history of dysuria, stranguria, urinary incontinence, and urethrocutaneous fistula. The dog was adopted from an animal shelter a week previously and therefore, his previous history was unknown. The blood laboratory results were unremarkable with the exception of elevated creatinine ( $176.8 \mu\text{mol/l}$ ). Abdominal radiographs revealed enlargement of both kidneys. Urethral penile catheterisation attempts were blocked in the caudal pelvic region. Unknown contrast media was administered through the catheter and intrapelvic stop was noted. A small opening ventral to the anus was also observed (Figure 1), but attempted catheterisation through this opening was also unsuccessful. Due to urine dribbling from this opening, a diagnosis of perineal hypospadias was made. Urine was also observed to dribble from the prepuce.

Three days later, the dog was referred to the author's clinic. On physical examination abdominal palpation revealed a distended urinary bladder with high degree of repletion and tension. Following native abdominal radiography, intravenous pyelography was performed with Iohexol at 350 mg/ml (Omnipaque®350, GE Healthcare Inc., USA), (Fig-



Figure 2. Intravenous pyelography. The renal pelvis, diverticula and associated ureter of both kidneys were filled with contrast media and hydroureters with mild hydronephrosis were observed

re 2). Filling of ureters with contrast media was slow (left kidney 20 min; right kidney 35 min). The urinary bladder was overdistended and staining with contrast media was also slow. Retrograde urethrogram was performed and a stop in the intrapelvic part of the urethra was observed (Figure 3). Ultrasound guided cystocentesis was carried out and Iohexol 350 mg/ml was administered into the urinary bladder. The final diagnosis was intrapelvic urethral stricture.

The owner wanted to keep the dog even in the case of residual urinary incontinence. In order to avoid possible peristomal skin irritation and to provide more acceptable cosmetic appearance, the decision was made to perform a prepubic urethrotomy with the opening within the prepuce.

### Surgical management

The protocol for general anaesthesia included premedication with methadone ( $0.3 \text{ mg/kg b.w.}$ ,

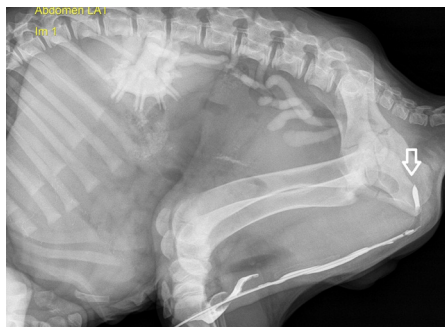


Figure 3. Retrograde urethrography. The arrow indicates intrapelvic stop of contrast

*i.v.*; Heptanon<sup>®</sup>, Pliva, Croatia) and midazolame (0.3 mg/kg b.w., *i.v.*; Dormicum<sup>®</sup>, Roche Pharma AG, Germany) followed by induction with propofol (3 mg/kg b.w., *i.v.*; Propofol<sup>®</sup> 1%, Fresenius Kabi, Germany). Epidural analgesia was administered using a mixture of 2% lidocaine (2 mg/kg b.w., epidural; Lidokain<sup>®</sup> 2%, Belupo, Croatia) and 0.5% bupivacaine hydrochloride (0.1 mg/kg b.w., epidural; Marcaine<sup>®</sup>, AstraZeneca, Sweden). After endotracheal intubation, general anaesthesia was maintained with sevoflurane (Sevorane<sup>®</sup>, Abbott, Canada) vaporised in oxygen using intermittent positive pressure ventilation. Postoperative analgesia was provided with one dose of meloxicam (0.1 mg/kg *i.m.*; Movalis<sup>®</sup>, Boehringer Ingelheim, Germany) and a fentanyl patch (4.37 µg/kg transdermal; Durogesic<sup>®</sup>, Johnson&Johnson, USA). Ampicillin 20 mg/kg *i.v.* (PAN-ampicillin<sup>®</sup> 1 g, Panpharma, France) was administered at induction and at the end of surgery, which lasted two hours.

The dog was positioned in dorsal recumbency. The ventral midline region and prepuce were aseptically prepared and a skin incision was made from the umbilicus to the cranial pubic brim. The skin incision was performed in the left paramedian preputial region. Following ligation of preputial blood vessels, the abdominal cavity was opened at the ventral midline. The urethra caudal to the prostate was detached from its pelvic attachment by blunt dissection with a cotton swab as caudal as possible, and a urethral transversal incision was performed. A cruciate suture with 4-0 polyglyconate (Maxon<sup>®</sup>, Covidien, AG, Ireland) was placed at the caudal cut end of the urethra. The transected urethra was pulled out from the abdomen through the medial part of the right inguinal canal. The ventral aspect of the prepuce was opened at the most caudal point of the preputial sac. A centime-

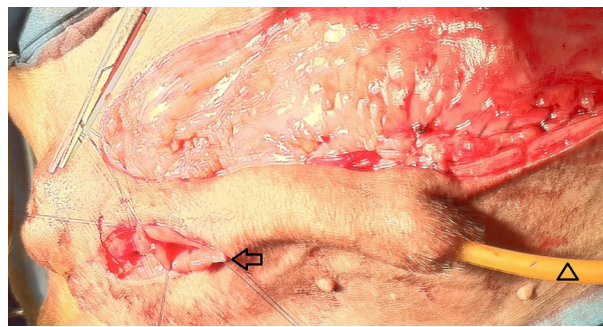


Figure 4. Intraoperative view. The triangle indicates the Foley catheter and the arrow indicates the preputial incision

tre long incision was performed with a #15 scalpel blade at the dorsal part of the preputial sac. The urethra was pulled into the prepuce using two stay sutures. A Foley catheter was placed retrograde from the tip of the prepuce through the inguinal canal to the urethra and urinary bladder (Figure 4). Eight 4-0 poliglecaprone 25 (Monocryl<sup>®</sup>, Ethicon, USA) sutures were placed in a simple interrupted fashion to suture the urethra to the brims of the dorsal preputial incision. Two sutures were also placed between the urethral adventitia and abdominal fascia at the inguinal ring (4-0 poliglecaprone 25). The ventral part of the prepuce was closed in two layers. The ventral midline, subcutis, and skin were closed in a standard fashion. An Elizabethan collar was recommended. Recovery was uneventful and four months after the surgery there was no evidence of any surgery-related complications.

## DISCUSSION AND CONCLUSIONS

The technique described in this paper was successfully used to treat perineal hypospadias in a male dog. Surgical treatment of hypospadias is based on the severity of clinical signs and location of the defect (Hobson 1998; Pavletic 2007; Cashmore and Ladlow 2010). The surgery is aimed at correcting the anatomical abnormality to minimise the risks of recurrent urinary tract infections, urethral stricture, urine scald dermatitis, or penile and urethral irritation (Adelsberger and Smeak 2007). Primary closure of the urethra may be complicated by insufficient mucosal tissue, in which case urethrostomy proximal to the site is often recommended (Bleedom and Bjorling 2012). Selection of urethrostoma type depends on the length of the healthy urethra, the condition of perineal, preputial, and



scrotal skin, and surgeon preference. Our choice was also based on the owner's acceptance regarding cosmetic appearance. Because of the position of the urethral stricture in this case, the only feasible type of urethrostomy was prepubic. In order to avoid the common complication of peristomal skin irritation, due to reduction of urine flow (Bradley 1989), the urethrostomy opening was placed within the prepuce. Furthermore, it resembled more closely the physiological urethral opening and additional postoperative complications associated with licking were also avoided. Nevertheless, this technique may have several disadvantages with respect to incontinence caused by hauling the urethra cranioventrally if too much pressure is applied during blunt dissection on pudendal nerves that originate dorsal to the urethra. Normal urinary control is maintained by sympathetic tone within the neck of the bladder, and parasympathetic tone within the proximal urethra. Prepubic urethrostomy therefore results in preserved continence by sparing the proximal urethra (Bradley 1989). The urethrovesical angle was limited to less than 45 degrees by putting the urethra through the inguinal canal, meaning that potential urethral obstruction was avoided (Dean et al. 1990). After dissection of the cranial urethra, we decided to pull it through the inguinal canal in order to avoid additional trauma to the abdominal musculature, and the likelihood of compression from the suture or scar on the *linea alba*. Also, the distance between the ventral midline and inguinal canal was less than 10 mm. Urine retention in the caudal prepuce is a potential complication although this was not observed in our case. Another, possible limitation of the described technique is that catheterisation can only be performed with endoscopic visualisation.

Katayama et al. (2012) described a similar technique, which they used to perform urinary diversion via preputial urethrostomy with bilateral pubic-ischial osteotomy in a dog. After preputial opening, the penis was amputated and the pelvic urethra was separated from the surrounding tissue, reflected cranially and sutured to the preputium. Afterward, the bony plate was stabilised with an orthopaedic wire. This technique is also an alternative method of urinary diversion, but for this type of surgery orthopaedic instruments are needed. Using this technique the stability of the pelvis is also disrupted. Therefore, our technique is simpler and the recovery period is shorter with the same expected complications.

Although the cause of hypospadias in dogs is unknown, due to the potential heritability of this condition (Hayes and Wilson 1986), affected dogs should not be used for breeding purposes, and castration is recommended. In this case an additional reason to perform orchiectomy was the potentially compromised testicular vascularisation due to the increased pressure within the inguinal canal. However, the procedure was rejected by the owner.

The technique reported in this paper can be used to treat intrapelvic urethral strictures, resulting in good voiding function and excellent cosmetic appearance. Based on our experience, prepubic urethrostomy opening within the prepuce may be considered a treatment of choice in dogs with hypospadias and concurrent urethral strictures, where a preputial remnant exists.

## REFERENCES

- Adelsberger ME, Smeak DD (2007): Repair of extensive perineal hypospadias in a Boston terrier using tubularized incised plate urethroplasty. *Canadian Veterinary Journal* 50, 937–942.
- Baines SJ, Rennie S, White RS (2001): Prepubic urethrostomy: A long-term study in 16 cats. *Veterinary Surgery* 30, 107–113.
- Bernarde A, Viguiet E (2004): Transpelvic urethrostomy in 11 cats using an ischial osteotomy. *Veterinary Surgery* 33, 246–252.
- Bledom JA, Bjorling DE (2012): Urethra. In: Tobias KM, Johnston SA (eds.): *Veterinary Surgery – Small Animal*. Elsevier, St. Louis. 1993–2010.
- Bradley RL (1989): Prepubic urethrostomy: An acceptable urinary diversion technique. In: Bradley RL (ed.): *Problems in Veterinary Medicine: Urogenital Surgical conditions*. Lippincott, Philadelphia. 120–127.
- Cashmore RG, Ladlow JF (2010): Creation of a urethral conduit from a preputial indirect flap in a dog with perineal hypospadias. *Veterinary Surgery* 39, 14–20.
- Dean PW, Hedlund CS, Lewis DD, Bojrab MJ (1990): Canine urethrotomy and urethrostomy. *Compendium on Continuing Education for the Practicing Veterinarian* 12, 1541–1554.
- Hayes HM, Wilson GP (1986): Hospital incidence of hypospadias in dogs in North America. *Veterinary Record* 118, 605–606.
- Hardy RM, Kustritz MV (2005): Theriogenology question of the month. Hypospadias. *Journal of American Veterinary Medical Association* 227, 887–888.

Hobson HP (1998): Penis and prepuce. In: Bojrab JM (ed.): *Current Techniques in Small Animal Surgery*. Williams & Wilkins, Baltimore. 527–537.

Katayama M, Okamura Y, Kamishina H, Uzuka Y (2012): Urinary diversion via preputial urethrostomy with bilateral pubic-ischial osteotomy in a dog. *Turkish Journal of Veterinary and Animal Sciences* 36, 730–733.

Pavletic MM (2007): Reconstruction of the urethra by use of an inverse tubed bipedicle flap in a dog with

hypospadias. *Journal of American Veterinary Medical Association* 231, 71–73.

Smeak DD (2000): Urethrotomy and urethrostomy in the dog. *Clinical Techniques in Small Animal Practice* 15, 25–34.

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