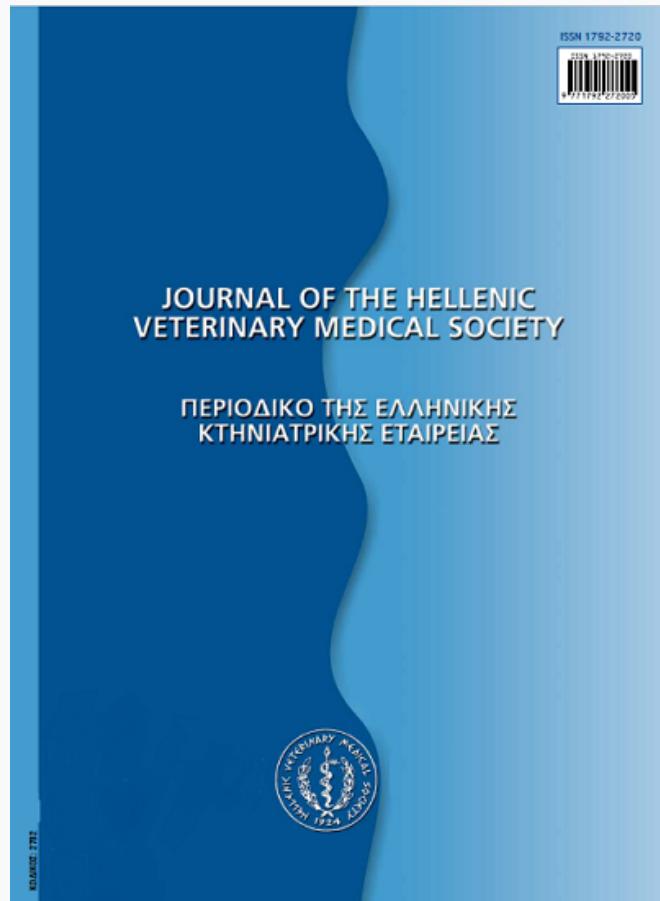


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■ Preputial reconstruction and urethrostomy after subtotal penile amputation in a dog

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ABSTRACT. A 7-year-old, 4.2-kg intact male toy poodle was presented to the referring veterinarian with a persistent penile erection and secondary paraphimosis. A full-thickness longitudinal incision was made in the prepuce to release strangulation by the preputial orifice. Castration was also performed. However, the persistent erection did not resolve, which suggested idiopathic priapism. Although prescrotal or scrotal urethrostomy was considered, these procedures commonly have complications, such as severe hemorrhage, stricture of the urethral opening, urine scalding, and abnormal cosmetic appearance. Therefore, preputial reconstruction and urethrostomy were performed following amputation of the penis. A V-Y skin plasty was performed to retract the prepuce caudally. Two triangles of preputial skin at the middle of the prepuce were removed to shorten the prepuce. A 6-Fr catheter was kept in place for 9 days after surgery to prevent stricture formation and to divert urine during initial healing. After surgery, the dog was able to urinate through the natural preputial orifice, showing no urine scalding of the urethrostomy site. Six months after surgery, no major complications were observed. The owner was satisfied with the functional and cosmetic outcome.

Keywords: dog, penile amputation, preputial reconstruction, preputial urethrostomy, priapism

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CASE HISTORY

A 7-year-old, 4.2-kg intact male toy poodle was examined by the referring veterinarian for a sudden onset of penile protrusion from the prepuce and edema (Figure 1). The dog was alert and responsive, and general physical examination failed to reveal any obvious abnormalities other than the persistently erect penis and secondary paraphimosis. The complete blood count and serum biochemical values were within the reference range. A full-thickness longitudinal incision of the prepuce was performed to release strangulation by the preputial orifice. Castration was also performed. Nevertheless, the persistent erection did not resolve during the following days, which was suggestive of idiopathic priapism.

The dog was referred to Iwate University Veterinary Teaching Hospital 2 weeks after the first surgery for a persistent erection of the penis. The exposed penis was necrotic (Figure 2). The dog could urinate without severe pain. No physical or neurological abnormalities were observed. A complete blood count showed leukocytosis (50,500/ μ L; reference range: 6000–17,000/ μ L) with neutrophilia (47,470/ μ L; reference range: 3000–11,500/ μ L). Serum biochemistry tests revealed only slight elevation of alkaline phosphatase (217 U/L; reference range: 47–254 U/L) and marked elevation of C-reactive protein (15 mg/dL; reference range: \leq 0.7 mg/dL). Urinalysis was unremarkable. Radiographic evaluation revealed no abnormal findings.

Figure 1. Penile protrusion from the prepuce and secondary paraphimosis at the initial presentation to the referring veterinarian.



Penile amputation and preputial urethrostomy were performed. The dog was premedicated with buprenorphine [0.02 mg/kg intravenously (IV)] and midazolam (0.3 mg/kg IV). Anesthesia was induced with propofol (4 mg/kg IV to effect) and maintained with sevoflurane in 60% oxygen. A balanced electrolyte solution (lactated Ringer's solution, 10 ml/kg/h) was administered. Antibiotics (cefmetazole sodium, 25 mg/kg IV) were administered at anesthetic induction and 2 hours later. The penis and prepuce were thoroughly rinsed with scrub shampoo containing 0.5% chlorhexidine acetate (Nolvasan® shampoo 0.5; Huves, Saitama, Japan). The caudal abdomen was clipped and prepared for surgery.

With the patient in dorsal recumbency, penile amputation was performed immediately proximal to the os penis. The dorsal artery and vein of the penis were ligated with 3-0 multifilament absorbable sutures (Vicryl®, Ethicon, Japan) and divided. A large part of the preputial mucosa was removed with the necrotic penis because of severe inflammation. A small round incision was made on the preputial mucosa using a disposable biopsy punch (BP-40F; Kai Industries, Tokyo, Japan), and the end of the terminal portion of the urethra was spatulated. The urethra was anastomosed to the preputial mucosa using simple interrupted 5-0 monofilament absorbable sutures (PDS® II; Ethicon, Tokyo, Japan) in an end-to-site fashion (Figure 3). A V-shaped incision was made cranial to the preputial orifice to facilitate

Figure 2. Necrotic penis 2 weeks after longitudinal incision of the prepuce for the release of a stenotic preputial orifice.



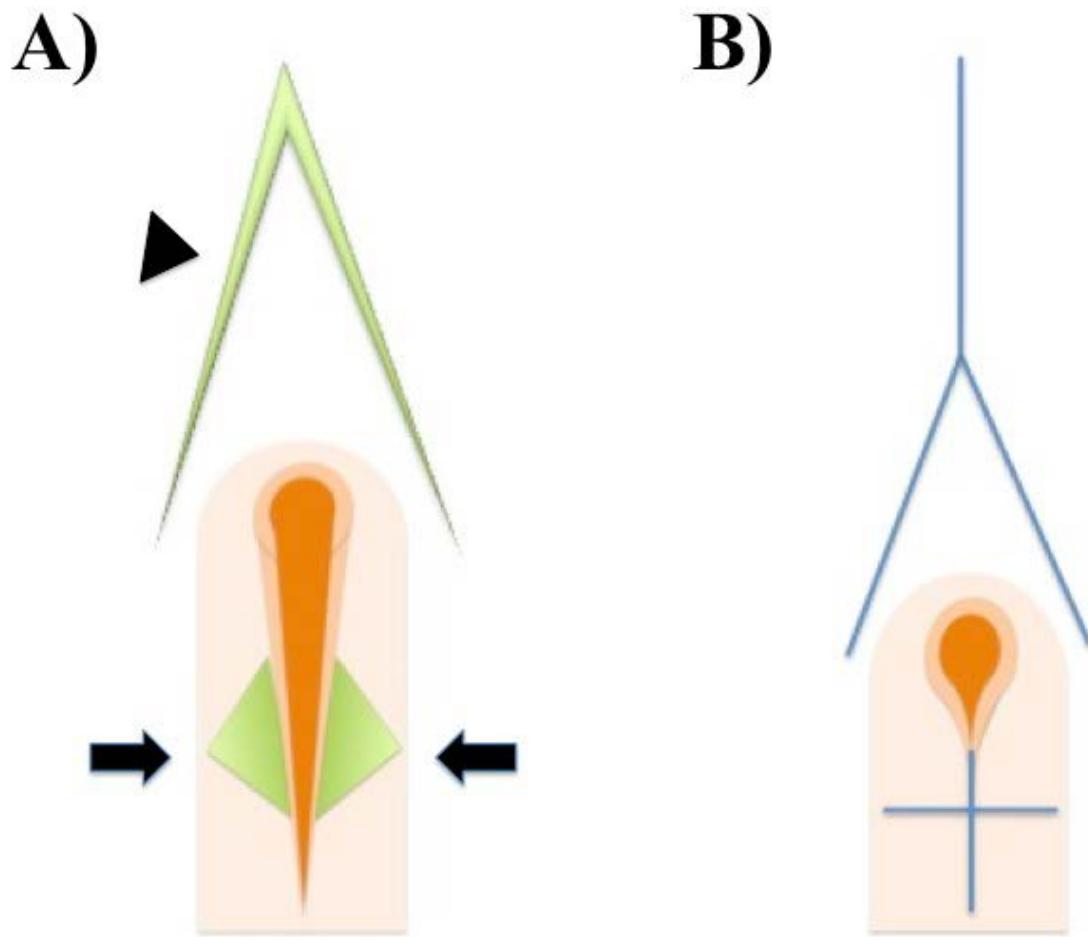


Figure 3. (A) Diagram of the V incision made proximal to the preputial orifice (arrow head) and the bilateral triangular resections of the preputial skin (arrows), (B) Caudal transposition of the prepuce by the V-Y skin plasty and preputial shortening.

caudal retraction of the preputial mucosa and to prevent undue tension on the urethrostomy site (Figure 4). The V-Y skin plasty resulted in an approximately 5-cm caudal transposition of the entire prepuce (Figure 4). The two triangles of preputial skin in the middle of the prepuce were removed bilaterally to shorten the prepuce (Figure 4). The mucosa and skin were reapposed separately in a simple interrupted pattern with 4-0 monofilament absorbable suture (PDS® II; Ethicon) and a 3-0 nylon suture, respectively (Figure 5). A 6-Fr catheter was placed through the urethrostomy to prevent stricture formation at the urethral stoma and to divert urine during initial healing. The catheter was secured to the skin with a Chinese finger trap suture and was removed 9 days after surgery (Figure 5).

The dog recovered uneventfully from anesthesia and

surgery. Buprenorphine (0.02 mg/kg) was administered intravenously to control pain. Cefmetazole sodium (25 mg/kg, IV, BID) was administered postoperatively for 7 days and prednisolone (0.5 mg/kg, SC, q 24) was administered for 5 days to reduce inflammation at the anastomosis site. After removal of the urinary catheter on postoperative day 9, the dog was able to urinate through the reconstructed preputial orifice. No histological findings of neoplastic lesions were observed in the amputated penis.

Six months after surgery, the dog could urinate normally from the preputial orifice in a slow, steady stream without dribbling to the adjacent skin (Figure 6). The owner was very satisfied with the dog's functional and cosmetic outcomes.

DISCUSSION

Priapism is defined as persistent penile erection without sexual stimulation (Lavely, 2009). Owing to penile erection, the penis can no longer be maintained within the preputial sheath, and secondary paraphimosis is a frequent complication. Paraphimosis is different from priapism and is defined as the inability to retract the penis into the preputial cavity, mainly resulting from an abnormally small preputial orifice, weakened preputial muscle, and a hypoplastic prepuce (Papazoglou, 2001; Papazoglou and Kazakos, 2002). Priapism is an uncommon penile condition in dogs and has been attributed to idiopathic causes (Lavely, 2009), spinal cord injury (Lavely, 2009; Orima et al., 1989; Payan-Carreira et al., 2013), multifocal distemper encephalomyelitis (Guilford et al., 1990), penile metastasis (Rogers et al., 2002), and perineal abscess (Martins-Bessa et al., 2010). In this report, no neurological abnormalities, neoplastic lesions, or perineal abnormalities were identified, which strongly suggested idiopathic priapism. Guidelines for therapy in humans have been established, but have not been adopted in dogs because of the infrequent reports of priapism, which hinders evaluation of treatment options. Veterinary patients seem to have a longer duration of priapism before initial presentation compared with human patients. If significant tissue damage has occurred, penile amputation and urethrostomy may be required.

Extensive penile lesions may necessitate aggressive penile amputation with excision of the prepuce. In general, a prescrotal, scrotal, or perineal urethrostomy is indicated for a severely damaged penile shaft in dogs and this depends on the actual site of penile amputation (Smeak, 2000). Burrow et al. (2011) reported successful outcomes after a scrotal urethrostomy and penile amputation in four dogs with priapism. However, complications are common with these surgical procedures, including severe hemorrhage of the urethral opening, stricture formation and unacceptable urine scald dermatitis (Bilbrey et al., 1991; Newton et al., 1996; Smeak, 2000). Additionally, the appearance of the external stoma after these types of urethrostomy have been employed is different from that of the normal urethral opening. Therefore, an alternative surgical procedure should be investigated to prevent these complications.

In the present report, preputial urethrostomy was performed in a toy poodle as a salvage procedure for penile necrosis that resulted from idiopathic priapism. Preputial urethrostomy has been reported as an effective procedure in dogs requiring a prescrotal or scrotal urethrostomy due to penile necrosis (Pavletic and O'Bell, 2007). In this technique, the preputial cavity is used as a site for the urethral anastomosis. Therefore, the dog can urinate through a natural orifice, avoiding the potential for urine scald dermatitis associated with placement of the urethral anastomosis to the adjacent skin. Amputation of the necrotic penis just proximal to the os penis required extensive removal of the preputial mucosa because of severe inflammation. In the present case, a V-Y skin plasty technique was performed cranial to the prepuce to facilitate caudal displacement of the prepuce and anastomosis of the urethra to the preputial mucosa without undue tension. This technique required complete dissection of the preputial muscles, making the cranial free end of the prepuce hang loosely and slope downwards. Additionally, a preputial skin shortening with two triangular incisions was performed to adjust the size of the prepuce. Urine dribbling immediately after urination caused by temporal pooling of small amounts of urine in the preputial cavity is a possible postsurgical complication of preputial urethrostomy (Papazoglou and Kazakos, 2002). This was not observed in the present case; therefore, reconstruction to retract caudally and shorten the entire prepuce may have effectively prevented urine pooling within the cavity.

The blood supply to the preputial mucosa depends on branches of the external pudendal artery and the dorsal artery of the penis (Evans and de Lahunta, 2013). In addition, the preputial skin is supplied primarily by the caudal superficial epigastric arteries. Most of the preputial vessels lie immediately subcutaneously on both sites of the prepuce. Therefore, a ventral midline incision, such as that used for the preputial splitting technique, would include the least vascular part of the prepuce and can be safely performed (Hayes et al., 1994). In the present study, the major preputial vessels were identified and preserved with careful dissection. The procedures in the present study may not have affected these blood supplies adversely.

Placing a urethral catheter increases the risk of an

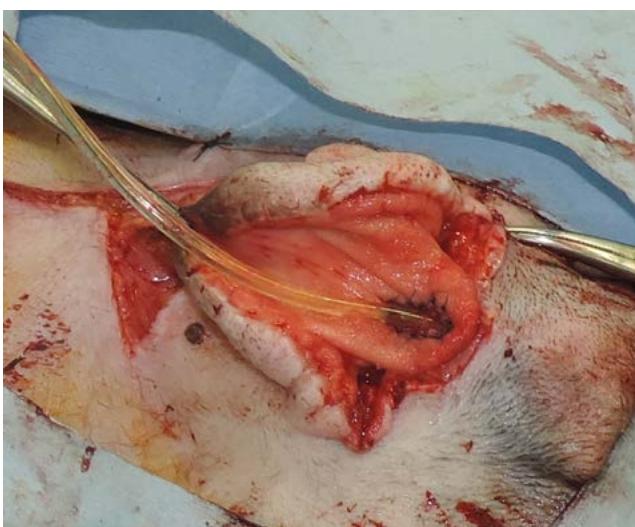


Figure 4. Urethral anastomosis to the preputial mucosa after caudal retraction of the prepuce.



Figure 5. Post-surgical appearance of the reconstructed prepuce, which was transposed approximately 5 cm caudally.



Figure 6. Urination from the preputial orifice in a steady stream without urine dribbling six months after surgery.

ascending bacterial infection of the urinary tract and stricture formation at the injured urethral site. A 3–5-day catheterization is thought to allow uroepithelium to bridge minor wound defects (Singh and Blandy, 1999). In the present study, a urethral catheter was placed for 9 days after surgery in order to divert urine during initial healing. However, a shorter duration of catheterization may be appropriate for healing of the urethral anastomosis site on the preputial mucosa. In this study, postoperative anti-inflammatory prednisolone therapy may not have been needed. Generally, urethrostomy does not require postoperative glucocorticoid therapy.

CONCLUSION

In conclusion, a preputial urethrostomy following penile amputation provided a more normal urination route and prevented postoperative urine scalding. Reconstruction to shorten the prepuce and dissection of the preputial muscles may prevent the post-surgical urine dribbling due to the accumulation of small amounts of urine in the preputial cavity. This series of procedures may be considered a surgical alternative to prescrotal or scrotal urethrostomy for priapism that does not respond to medical therapy. ■

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