

Case Report

Clinical Characteristics and Surgical Outcomes of Suspected Congenital Type II Phimosis in Two Cats

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Abstract

Phimosis is rarely reported in cats and involves the inability to exteriorize the penis through an absent or abnormally narrowed preputial orifice. This case report describes the clinical presentation, surgical management, and outcome of two male domestic shorthair kittens with suspected congenital type II phimosis. Both cats presented with recurrent stranguria and dysuria, preputial swelling, urine pooling or dribbling, a markedly stenotic preputial orifice, and penile–preputial adhesions. In Case 1, cystic struvite urolithiasis was also identified; treatment included cystotomy and ventrally performed modified preputial urethrostomy because of extensive adhesions, penile hypoplasia, and limited penile mobility. In Case 2, adhesions were limited to the distal penis and were released, allowing circumferential preputioplasty. No postoperative complications occurred. Clinical signs resolved, and normal urination was recorded during available follow-up, which was 12 months in Case 1 and 2 months in Case 2. The congenital origin was suspected based on early onset of clinical signs but could not be definitively confirmed. These cases suggest that selected feline type II phimosis cases can be managed successfully by tailoring surgery to anatomical abnormalities, using ventral-modified preputial urethrostomy when adhesions and penile hypoplasia restrict mobilization, or circumferential preputioplasty when adhesions are limited distally.

Keywords: congenital; feline; phimosis; preputioplasty; preputial urethrostomy

1. Introduction

Phimosis is characterized as the inability to extrude the penis through the prepuce due to an absent or an abnormally small preputial orifice [1–3]. The condition can be congenital or acquired in both dogs and cats [3–10]. Clinical signs vary from asymptomatic stenosis of the preputial orifice to complete occlusion associated with pollakiuria, stranguria, urine dribbling, excessive preputial licking, vocalization, preputial swelling, balanoposthitis, and skin ulceration [3–10]. In cats, phimosis has been classified into two types based on their macroscopic abnormalities [8]. Type I is defined as a narrowed preputial orifice with generalized swelling of the prepuce due to urine pooling, without adhesions between the penis and the prepuce. Type II is defined as a narrowed preputial orifice, with a focal preputial swelling and urine pooling, with penile–preputial adhesions [8]. A diagnosis of phimosis is made based on the identification of a narrow preputial orifice, which prevents the exteriorization of the penis from the prepuce.



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Surgical correction aims to enlarge the preputial orifice [11]. Selection of the appropriate surgical technique depends on the type of phimosis. Surgical techniques for Type I phimosis include a wedge resection of the dorsal prepuce followed by apposition of the ipsilateral mucocutaneous edges, a wedge resection or a single ventral releasing incision on the ventral aspect of the prepuce followed by apposition of the ipsilateral mucocutaneous edges, a single ventral releasing incision left to heal by second intention, and a circumferential preputioplasty [4,5,7,8,11]. Surgical techniques for Type II phimosis include preputial urethrostomy, modified preputial urethrostomy and perineal urethrostomy [8,12–14].

Phimosis is scarcely reported in kittens and adult cats [4,5,7,8,11,12]. This report adds to the limited literature on feline type II phimosis by describing two kittens with suspected congenital type II phimosis managed successfully with individualized surgical techniques: a ventrally performed modified preputial urethrostomy in a kitten with extensive penile–preputial adhesions, penile hypoplasia, and restricted penile mobility, and circumferential preputioplasty in a kitten with adhesions limited to the distal penis.

2. Case Presentation

2.1. Medical Records Review

For the two kittens in this study, data retrieved from the medical records included signalment, history, age at the time of surgery, clinical signs, physical examination findings (particularly for the penis and prepuce), information regarding trauma to the preputial area, treatments administered, surgical procedure performed, postoperative complications, and outcome. Follow-up information was obtained at recheck examinations at 10, 20, and 30 days postoperatively for both cats and at later follow-up timepoints when available (2 months in both cats and 6 and 12 months in Case 1). Table 1 provides a summary of both cases, including clinical presentation, diagnostic findings, surgical management, and postoperative outcomes.

Table 1. Timeline of clinical presentation, diagnostic findings, surgical management, and outcome in two cats with suspected congenital type II phimosis.

Timepoint	Case 1	Case 2
Pre-referral history	Clinical signs since adoption at 3 months of age; 3-month history of stranguria and dysuria; No response to antibiotics/NSAIDs; Repeated urethral catheterizations; Attempted mechanical dilation of the preputial orifice; Castrated at 5 months of age	4.5-month history of stranguria and dysuria; No response to antibiotics/NSAIDs; Urethral catheterization was not possible; Castrated at 6 months of age
Presentation	6-month-old male domestic shorthair cat; Swollen prepuce; Urine dribbling from the preputial cavity; Markedly stenotic preputial orifice; Penis could not be exteriorized; Erythematous, thickened penile mucosa; Penile hypoplasia	7-month-old male domestic shorthair cat; Swollen prepuce; Urine pooling within the preputial cavity; Markedly stenotic preputial orifice; Penis could not be exteriorized; Erythematous, thickened penile mucosa
Diagnostic findings	CBC and serum biochemistry within reference intervals; Urinalysis: USG 1.053; struvite crystals; Urine culture negative; Radiography unremarkable; Ultrasonography: thickened urinary bladder and urolithiasis; Urolith analysis: struvite	CBC, serum biochemistry, and urinalysis within reference intervals; Urine culture negative; Radiography unremarkable; Ultrasonography unremarkable

Table 1. *Cont.*

Timepoint	Case 1	Case 2
Surgical findings and decision-making	Urethral catheterization not possible initially; Extensive penile-preputial adhesions; Hypoplastic penis; Limited penile mobilization after adhesiolysis; Modified preputial urethrostomy selected	Urethral catheterization not possible initially; Circumferential adhesions confined distally; Penis adequately mobilized after blunt adhesiolysis; Circumferential preputioplasty selected
Surgical procedure	Ventral cystotomy and urolith removal; Normograde urethral catheterization; Modified preputial urethrostomy; Reconstructed opening allowed passage of a 1.3-mm Tomcat catheter; Normal urine stream observed intraoperatively	Dorsal preputial incision; Blunt release of distal circumferential adhesions; Circumferential resection around the preputial opening; Mucocutaneous apposition; Penis fully exteriorized at completion of surgery
Immediate postoperative period	Hospitalized for 24 h; Analgesia and topical antibiotic ointment prescribed; Elizabethan collar and paper litter for 21 days; No stranguria or hematuria before discharge; Normal urine stream	Hospitalized for 24 h; Analgesia and topical antibiotic ointment prescribed; Elizabethan collar and paper litter for 21 days; No stranguria or hematuria after surgery
Rechecks: days 10, 20, and 30	Healing satisfactory; No urine pooling; No restenosis of the preputial orifice	Healing satisfactory; No urine pooling; No restenosis of the preputial orifice
2-month follow-up	Clinically normal; No urinary abnormalities reported	Clinically normal; No urinary abnormalities reported
Long-term follow-up	Clinically normal at 6 and 12 months; No recurrence of urinary signs	Not available beyond 2 months

2.1.1. Case 1

A 6-month-old male domestic shorthair cat, weighing 3.5 kg, was referred for evaluation of phimosis. The owner reported that the cat showed difficulty in passing urine and prolonged sitting in the litter tray since adoption of the cat at the age of 3 months. For the last 3 months, the cat had recurrent episodes of stranguria and dysuria, treated by antibiotics and NSAIDs without improvement. The referring veterinarian had also placed urethral catheters three times in this 3-month period and had unsuccessfully tried to mechanically dilate the preputial orifice with hemostats in order to alleviate symptoms. The cat was castrated at the age of 5 months. On physical examination, a swollen prepuce and urine dribbling from the preputial cavity were noted. The preputial orifice was stenotic (approximately 0.5 mm diameter), and the penis could not be extruded from the prepuce while the penile mucosa was erythematous and thickened (Figure 1). A 1 mm Tomcat catheter with stylet (Buster Cat Catheters, Buster, England) could not be introduced due to the swollen external urethral orifice. A urine sample was obtained by cystocentesis. Serum biochemical analysis and complete blood count were within reference intervals. Urinalysis revealed a specific gravity of 1.053 and struvite crystals. Urine culture was negative. Abdominal radiography was unremarkable, and ultrasonography showed a thickened urinary bladder with presence of urolithiasis.

The patient was premedicated for surgery with dexmedetomidine (15 µg/kg, IM; Dexdomitor 0.5 mg/mL; OrionPharma, Espoo, Finland) and buprenorphine (20 µg/kg, IM), followed by anesthetic induction with propofol (1 mg/kg, IV to effect; Propofol; Fresenius Kabi, Athens, Greece). Anesthesia was maintained, after intubation, with isoflurane (Isoflo; Abbott Laboratories, Berkshire, UK) in oxygen. Cefuroxime (Zinacef; GlaxoSmithKline, Athens, Greece) at 20 mg/kg IV was administered at induction. A lactate Ringer's solution at 3 mL/kg/h was administered intravenously until completion of the surgical

procedure. Urethral catheterization was still not possible. A midline laparotomy was performed followed by a ventral cystotomy. Several small uroliths (<1 mm) were removed, the bladder and urethra were flushed and normograde catheterization of the urethra was performed. Cystotomy and laparotomy were closed routinely. Due to the presence of extensive penile–preputial adhesions, phimosis was managed with a modified preputial urethrostomy [8,12]. An elliptical-shaped incision, approximately 7 mm in length, was made at the ventral aspect of the prepuce so that the distal aspect of the penis could be visualized (Figure 2a). The penis was hypoplastic. The penile–preputial adhesions were bluntly dissected and, after the penis was partially mobilized, an incision was made in the ventral midline of the penile urethra that extended from the urethral opening proximally for approximately 0.5 cm (Figure 2b). The urethral mucosa was sutured ventrally to the preputial skin by using simple interrupted sutures of 5-0 polyglecaprone (Monocryl, Ethicon, New Jersey, NJ, USA) (Figure 2c,d). An increased luminal diameter of the reconstructed urethra and preputial orifice was suggested due to the ease of catheterization with a 1.3 mm Tomcat catheter and the presence of a normal urine stream. Postoperative treatment included administration of lactate Ringer’s solution at 3 mL/kg/h intravenously for 24 h, meloxicam (Meloxidyl; CEVA, Lenexa, KA, USA) at 0.05 mg/kg orally (PO) once daily for 5 days and buprenorphine (Bupaq; 0.3 mg/mL, VetViva Richter GmbH, Wels, Austria) at 0.02 mg/kg PO three times daily for 2 days. Antibiotic ointment (Fucidin 20 mg/g Leo Pharmaceutical, Athens, Greece) was topically applied to the prepuce for 7 days. The patient was also discharged with an Elizabethan collar and use of paper litter for 21 days after surgery. Chemical analysis of uroliths identified struvite. Following surgery, no evidence of stranguria and hematuria was noted and, before discharge, urine stream was normal. On reexaminations at 10, 20 and 30 days postoperatively, no evidence of small preputial orifice and urine pooling was noted. Patient follow-up performed at 6 and 12 months after surgery revealed that the patient was clinically normal, physically active, and exhibited no evidence of urination abnormalities (Figure 3a,b) (Table 1).



Figure 1. Preoperative appearance of the stenotic preputial orifice and preputial swelling in Case 1. Cat in dorsal recumbency.

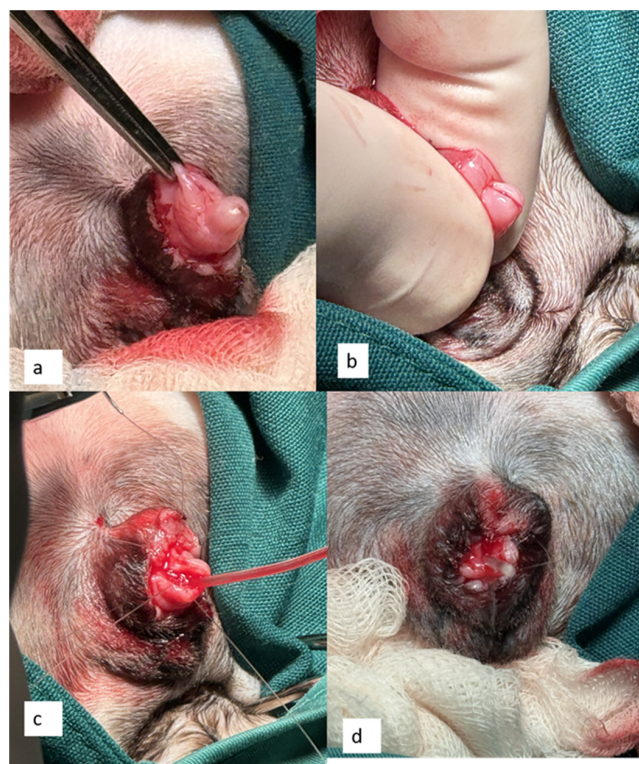


Figure 2. Surgical steps of modified preputial urethrostomy in Case 1. (a) An approximately 7 mm elliptical incision was made on the ventral aspect of the prepuce, allowing visualization of the distal portion of the hypoplastic penis. (b) Penile–preputial adhesions were dissected, the penis was partially mobilized, and an incision was made on the ventral midline of the penile urethra. (c) The urethral mucosa was sutured to the preputial skin using simple interrupted sutures. (d) Final postoperative appearance.

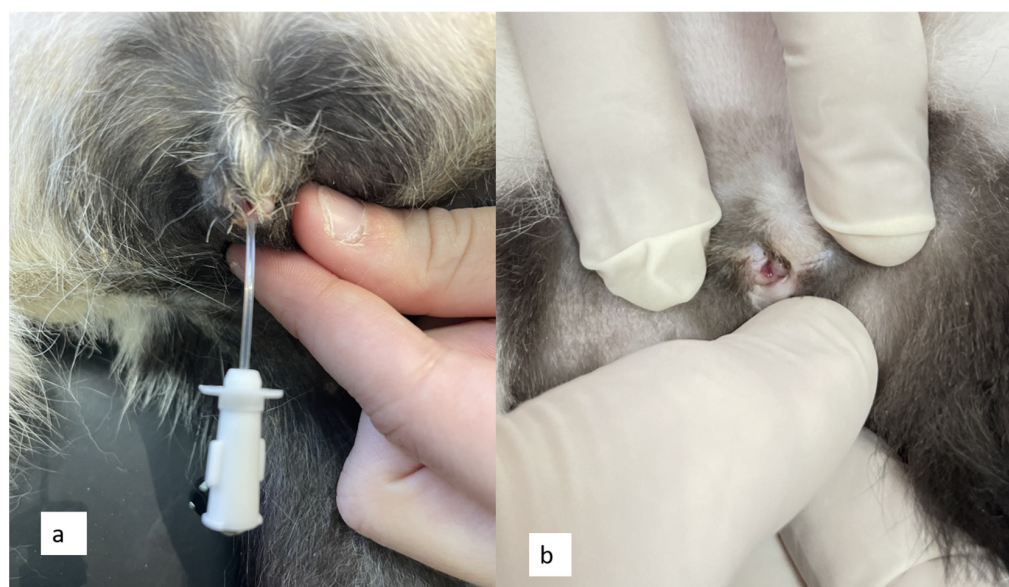


Figure 3. Postoperative appearance of Case 1 at 2 months (a) and 12 months (b) after modified preputial urethrostomy.

2.1.2. Case 2

A 7-month-old male domestic shorthair cat, weighing 2.5 kg, was referred for evaluation of phimosis. The owner reported that for the last 4.5 months, the cat had recurrent episodes of stranguria and dysuria, and was treated with antibiotics without improvement.

The referring veterinarian claimed that passing a urethral catheter was not possible. The cat was castrated at the age of 6 months. On physical examination, a swollen prepuce and urine pooling in the preputial cavity were noted. The preputial orifice was stenotic (approximately 0.5 mm diameter), and the penis could not be extruded from the prepuce, while the penile mucosa was erythematous and thickened (Figure 4). A 1 mm Tomcat catheter with stylet (Buster Cat Catheters, Buster, London, England) could not be introduced due to the swollen external urethral orifice. A urine sample was obtained via cystocentesis. Urinalysis, serum biochemical analysis and complete blood count were within reference intervals. Urine culture was negative. Abdominal radiography and ultrasonography were unremarkable.



Figure 4. Preoperative appearance of the stenotic preputial orifice and preputial swelling in Case 2. Cat in dorsal recumbency.

The patient was anesthetized following the same protocol as in Case 1. Cefuroxime (Zinacef; GlaxoSmithKline, Athens, Greece) at 20 mg/kg IV was administered at induction. A lactate Ringer's solution at 3 mL/kg/h was administered intravenously until completion of the surgical procedure. Urethral catheterization was still not possible. A 5 mm full-thickness incision was made on the dorsal midline of the prepuce, and a pair of small hemostats was used to break down all the circumferential adhesions which were confined distally. After this, the penis was adequately mobilized, without any mucosal trauma, so a preputioplasty was elected (Figure 5a). A round-shaped area was resected around the circumference of the preputial opening. The preputial mucosa was sutured to the skin with simple interrupted sutures of 5-0 polyglecaprone (Monocryl, Ethicon, Cincinnati, OH, USA) (Figure 5b). The initial dorsal incision was incorporated into the final circumferential reconstruction. At the end of surgery, the penis could be fully exteriorized.

Postoperative treatment included administration of lactate Ringer's solution at 3 mL/kg/h intravenously for 24 h, meloxicam (Meloxidyl; CEVA, Lenexa, KA, USA) at 0.05 mg/kg orally (PO) once daily for 5 days and buprenorphine (Bupaq; 0.3mg/mL, VetViva Richter GmbH, Wels, Austria) at 0.02 mg/kg PO three times daily for 2 days.

Antibiotic ointment (Fucidin 20 mg/g Leo Pharmaceutical, Athens, Greece) was topically applied to the prepuce for 7 days. The patient was also discharged with an Elizabethan collar and use of paper litter for 21 days after surgery. Following surgery, no evidence of stranguria and hematuria was noted. On reexaminations at 10, 20 and 30 days post-operatively, no evidence of small preputial orifice and urine pooling was noted. Patient follow-up performed 2 months after surgery revealed that the patient was clinically normal, physically active, and exhibited no evidence of urination abnormalities (Figure 6). No additional follow-up examinations were performed beyond this timepoint (Table 1).

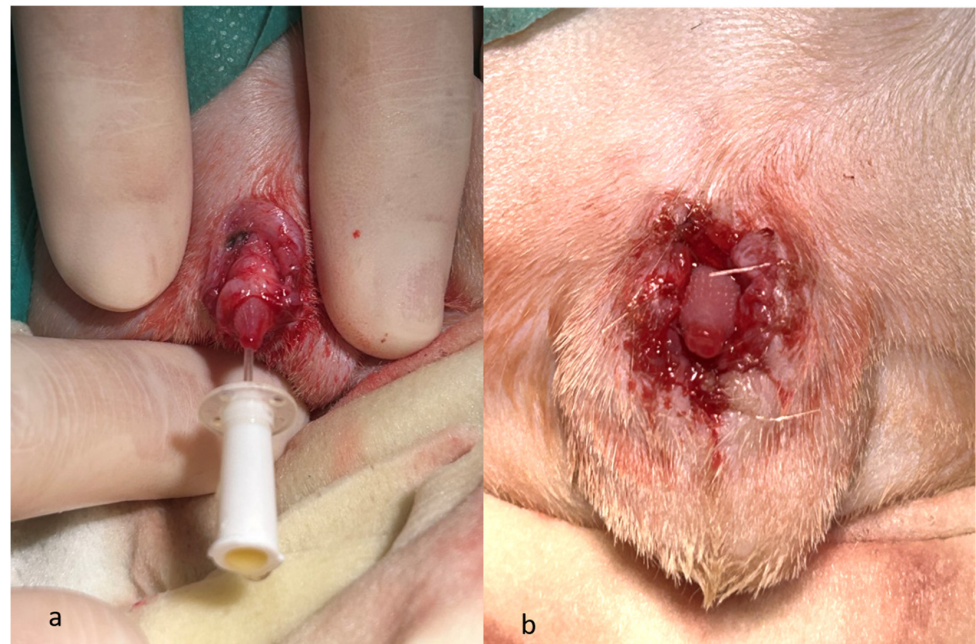


Figure 5. Intraoperative appearance in Case 2. (a) A 5 mm full-thickness incision was made on the dorsal midline of the prepuce, adhesions were bluntly disrupted, the penis was exteriorized, and the urethra was catheterized. (b) A circumferential area around the preputial opening was resected, and the preputial mucosa was sutured to the skin using simple interrupted sutures.



Figure 6. Postoperative appearance of Case 2 showing a healed, enlarged preputial opening 2 months after circumferential preputioplasty.

3. Discussion

In the present report, the clinical characteristics and surgical outcomes were described for two kittens with suspected congenital type II phimosis. Type II phimosis is characterized by the presence of penile–preputial adhesions, preputial swelling and urine pooling [8].

Causes of phimosis include acquired trauma, usually caused by aberrant suckling of the prepuce or excessive grooming by the queen, lower urinary tract infection, neoplasia and cellulitis with resultant fibrosis leading to stenosis of the preputial orifice or some type of heritable congenital etiology, including small or absent preputial orifice, penile hypoplasia and persistent connective tissue bands adhering the penis to the preputial mucosa [1–4,6–10]. In the present study, the early onset of clinical signs (2.5–3 months of age) may support a congenital origin, although an acquired cause cannot be excluded.

The classification system of the two types of phimosis in cats facilitates appropriate surgical management. In cats with type II phimosis, the presence of extensive adhesions is reported to leave insufficient preputial mucosa available for performing a preputioplasty. Therefore, in type II phimosis, a preputial or a modified preputial urethrostomy is recommended [8,10,12].

Although preputioplasty is usually associated with type I phimosis, Case 2 fulfilled the macroscopic criteria for type II phimosis because penile–preputial adhesions were present. However, these adhesions were limited to the distal penis and could be released completely, leaving sufficient mucosa and mobility for circumferential preputioplasty. This anatomical difference justified the selection of circumferential preputioplasty rather than urethrostomy. In contrast to cases with extensive adhesions, in which urethrostomy may be required because insufficient preputial mucosa remains for reconstruction, this finding suggests that the location and extent of adhesions, and the degree of penile mobility after adhesiolysis, may be more important for surgical planning than the mere presence of adhesions. This anatomical difference justified the selection of circumferential preputioplasty rather than urethrostomy. In this technique, edematous and abundant preputial mucosa and skin are removed, allowing the reconstruction of a preputial orifice of increased diameter [7,8,11]. In the present case, this allowed adequate extrusion of the penis. Circumferential preputioplasty allows for 360° enlargement of the preputial orifice [7,8,11]. Conversely, a ventral or dorsal wedge resection offers a more limited increase in the orifice’s size [4,5]. In the present case, absence of urinary abnormalities at 2 months postoperatively supports short-term clinical success; however, follow-up was not available beyond this timepoint, and late recurrence or other complications cannot be excluded. Therefore, this outcome should be interpreted cautiously and does not establish the long-term reliability of circumferential preputioplasty for type II phimosis.

In Case 1, a ventrally performed modified preputial urethrostomy was performed due to the presence of extensive adhesions and penile hypoplasia. Even after dissection of adhesions, the penis was partially mobilized. This, along with the hypoplastic penis, led to the decision for the modified preputial urethrostomy. The ventral approach was selected because the feline penile urethra contains longitudinally oriented muscle fibers ventrally, whereas the corpus cavernosum is located dorsally in the terminal penile urethra [15]. Therefore, a ventral urethral incision was considered appropriate to enlarge the distal urethral lumen while preserving the dorsal erectile tissue and maintaining the preputial orifice as the natural external opening. Although objective measurements of the newly formed urethral lumen and preputial orifice were not obtained, increased lumen diameter was suggested due to ease of catheterization with a Tomcat 1.3 mm catheter and the presence of a normal urine stream. Moreover, absence of urinary abnormalities 12 months postoperatively suggests that enlargement of the urethral and preputial orifice was clinically effective.

There are scarce reports in cats with congenital rudimentary penis and, to our knowledge, only one reported case of a cat with type 1 phimosis and penile hypoplasia [4,16–21]. This cat was managed with sutured ventral releasing incisions, which continued to dribble urine and died shortly after the surgery, of an unknown cause [4]. In the present case of a young animal, we elected this modified preputial urethrostomy along with the enlargement of the preputial orifice in order to avoid a perineal or preputial urethrostomy. If stenosis had developed, perineal or preputial urethrostomy could have been considered as alternative options.

A perineal urethrostomy might be an option for cats with type II phimosis, although it is more invasive and has more potential postoperative complications [13,14].

In both present cases, selection of the surgical techniques took into consideration the young age of the cats. Both techniques were considered less invasive and required less mobilization of the penis. If recurrence or strictures were formed, then a perineal or a preputial urethrostomy could be used.

Both cats in the present report had ineffectively received various medical treatments, including attempts for catheterization and mechanical dilation with hemostats, for 1 to 3 months prior to surgical intervention. It is reported that mechanical dilation alone can further decrease preputial orifice size due to stricture formation. This complication is also reported following ventral releasing incisions to expand the preputial orifice without suturing of the preputial mucosa to the skin [4,8]. Therefore, these techniques should not be recommended.

In the present report, no postoperative complications were recorded in both cats. In Case 2, which underwent circumferential preputioplasty, penile exposure was present immediately after surgery, which had resolved by 10 days postoperatively. An antibiotic ointment was recommended for both cats in the present study but was not needed long term, even in the case with penile exposure. Development of preputial strictures following preputioplasty was not reported for any of the cats in the present study; however, long-term follow-up was available only in one (12 months).

In Case 1, phimosis may have contributed to urinary retention or urine pooling, which could have been associated with lower urinary tract changes; however, a causal relationship with struvite urolithiasis cannot be confirmed. There are scarce reports on struvite uroliths in cats <1 year of age, although, to our knowledge, there are no reported cases in cats with phimosis [22–24]. Struvite uroliths in pediatric cats are usually reported as a sequela of UTI caused by urease-producing bacteria [25,26]. Urinary tract infection (UTI) may be caused by phimosis but should also be considered as a potential postoperative complication for preputioplasty and preputial urethrostomy [4,8,11]. The entrapment of the penis in the prepuce causes urine pooling, which might lead to an ascending bacterial urinary tract infection [5]. Any cat that undergoes surgical modification of the urethral opening is at increased risk for developing UTIs, as lower urinary tract function might be altered by iatrogenic trauma to the nerve fibers and the decreased length of the urethral mucosal barrier [4,8]. Although no UTIs were reported in the present study, the small number of cats evaluated made it difficult to confirm UTI as a possible postoperative complication.

The results of the present report suggest that cats with type II phimosis can be successfully managed with a circumferential preputioplasty or a modified preputial urethrostomy depending on the lesions present and the concurrent pathologies. The main limitations of this report include the small number of cases, the retrospective nature of data collection, and the limited follow-up period in Case 2. In addition, objective postoperative measurements, such as final preputial opening diameter or quantitative assessment of urethral lumen size, were not performed, and postoperative assessment relied on catheter passage, visual assessment of the urine stream, and absence of urinary signs during follow-up. Finally, the

congenital origin of the condition was suspected based on the early onset of clinical signs but could not be definitively confirmed, and acquired causes cannot be excluded.

4. Conclusions

A congenital origin of type II phimosis should be suspected in young male cats presenting with recurrent stranguria, dysuria, preputial swelling, urine pooling, and inability to exteriorize the penis through a stenotic preputial orifice. In the two cats described here, surgical correction resulted in the resolution of clinical signs and satisfactory postoperative outcomes during the available follow-up period. A ventrally performed modified preputial urethrostomy may be considered when extensive penile–preputial adhesions, penile hypoplasia, or restricted penile mobility prevent adequate exteriorization of the penis, whereas circumferential preputioplasty may be considered in selected type II cases when adhesions are limited distally and adequate penile mobilization is possible. These observations should be interpreted cautiously because the congenital nature was not confirmed, objective postoperative measurements were not available, and long-term follow-up was available for only one cat. Longer follow-up and additional cases are required before broader recommendations can be made.

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Institutional Review Board Statement: The work described in this manuscript involved the use of non-experimental owned animals. Established internationally recognized high standards (‘best practice’) of veterinary clinical care for the individual patient were always followed. Ethical approval from a committee was, therefore, not specifically required as the procedures described were clinically indicated and were not performed for research purposes.

Informed Consent Statement: Informed consent was obtained from the owners for the use of clinical data and images for publication.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Conflicts of Interest: The authors declare no conflicts of interest.

Abbreviations

The following abbreviations are used in this manuscript:

NSAIDs	Non-steroidal anti-inflammatory drugs
IM	Intramuscularly
IV	Intravenously
PO	Orally

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