Radiological diagnosis of phimosis in a dog and cat.

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Abstract

Phimosis in juvenile cats and dogs has been infrequently reported in veterinary literature. A novel contrast radiographic technique of the preputial cavity, termed a preputiogram, can be utilized in the diagnosis and surgical planning of correction of phimosis in dogs and cats.

1. INTRODUCTION

Phimosis is the inability of the penis to be extruded beyond the preputial orifice.^{1,2} The condition has been infrequently reported in juvenile cats and comprises only 0.5% of canine penile and preputial lesions according to one study.^{3,4} In both species, phimosis is described as being either congenital or acquired. Congenital causes of phimosis include an abnormally small or absent preputial orifice, inadequate penile length as seen with penile hypoplasia, and persistent connective tissue bands adhering the penis to the preputial mucosa.² Acquired causes of phimosis are those that result in fibrosis and subsequent stenosis of the preputial orifice.² Trauma from excessive grooming of the perineum, by either the dam or littermates, is believed to be the most common cause, but it is also postulated to occur secondary to infection (UTI, balanoposthitis) and neoplasia.^{1,5} Clinical signs usually include excessive licking of the prepuce, dribbling urine after urination, stranguria and preputial swelling.^{1,2,3,4,5} Diagnosis has previously been limited to physical examination with an inability to extrude the penis and a visibly small preputial opening, with the exception of one study that described the use of contrast abdominal radiography in a dog with congenital stenosis of the preputial orifice.⁶ We present two cases describing the use of a novel contrast radiographic technique termed a preputiogram (contrast radiography of the preputial cavity) and ultrasound to diagnose phimosis with or without penile-preputial adhesions and therefore allow for proper surgical planning to optimize patient outcomes.

2. CASE PRESENTATION

2.1 Case 1 – Feline phimosis

A thirteen-month old, male neutered, client-owned, domestic shorthair cat presented with a seven-month history of prolonged urination with a high-pressure stream and dribbling of urine for some tome afterwards. Physical examination revealed a pinpoint preputial opening and inability to extrude the penis. The cat was sedated with methadone (0.3 mg/kg IM) and medetomidine ($10 \mu \text{g/kg IM}$). An intravenous 22G catheter was placed in the right cephalic vein and general anaesthesia was induced with alfaxalone intravenously. Cephazolin 22mg/kg was administered intravenously at induction and repeated every 2 hours throughout the procedure. Intravenous fluid therapy consisted of Hartmann's solution delivered at 3 ml/kg/hr. The prepuce was clipped and aseptically prepared. A plain, right lateral, caudal abdominal radiograph was performed initially (Fig. 1). A preputiogram (contrast radiography of the preputial cavity) was performed by inserting a 5French x 6inch Tomcat catheter into the preputial orifice and injecting 3ml of diluted contrast medium (2.5ml iohexol 330mg/ml diluted in 2.5ml 0.9%NaCl) to distend the preputium. Ventrodorsal oblique and lateral contrast radiographs were performed (Fig. 2,3). The preputial cavity was dilated measuring 1.6cm x 1.0cm, with a 0.4cm penile length and no evidence of adhesions. Ultrasound of the penis and prepuce were performed using a 12MegaHz linear transducer (Esaote - MyLabTwice) revealing similar findings, with the penis measuring 0.45cm x 0.31cm and no evidence of adhesions. Surgical correction of phimosis was then performed via a preputioplasty. The cat was positioned in dorsal recumbency with the hind-limbs pulled cranially. The prepuce, perineum and caudoventral abdomen were clipped and aseptically prepared with chlorhexidine gluconate 4% scrub solution and alcohol. A 24G IV catheter was inserted into the preputial orifice. The ventral surface of the prepuce was incised 6mm with a No. 15 scalpel blade, using the catheter as a guide. An ellipse of skin was resected from one edge of the incision. The mucosa was then sutured to the skin using 4-0, non-absorbable suture (nylon) in a simple-interrupted pattern to create a new preputial opening. The penis was able to be extruded post-operatively through the new preputial orifice. Post-operative analgesia included methadone (0.2mg/kg IM q4-6hrs) according to the short-form Glasgow composite measure pain scale and oral meloxicam (0.1 mg/kg).⁷ The cat was discharged from hospital the following day with ongoing oral meloxicam 0.05mg/kg q24hrs for five days. At the fourteen-day follow up examination carried out by the operating surgeon, the owner reported the cat had normal urination habits at home. The preputial region appeared clean and dry and the preputial opening appeared adequate. The incision had healed and sutures were removed. A six-month follow up phone conversation with the owner was conducted. The owner reported complete resolution of clinical signs.

2.2 Case 2 – Canine phimosis

A five-month old, male entire, client-owned, Golden Retriever dog presented for a one-month history of prolonged dribbling of urine after urination. Preputial examination revealed congenital phimosis with a preputial orifice diameter of 1mm. A pre-anaesthetic biochemistry blood test revealed no abnormalities. The dog was pre-medicated with medetomidine (3ug/kg IM) and methadone (0.3mg/kg IM). An intravenous catheter was placed in the left cephalic vein. General anaeshesia was induced with intravenous alfaxalone and maintained on isoflurane gaseous anaesthesia. Cephazolin 22mg/kg IV was given at induction and repeated every 2hrs and intravenous fluid therapy (Hartmann's solution) was delivered at 6ml/kg/hr throughout the anaesthesia. A 50ug/hr transfermal patch was applied to the metatarsal skin pre-operatively and a fentanyl constant-rate infusion (CRI) was administered intra-operatively. A plain lateral abdominal radiograph (Fig. 4) and preputiogram were performed as described in Case 1, however 8ml of diluted contrast solution was injected into the preputial cavity. The lateral abdominal radiograph post-contrast revealed a small preputial orifice and normal penis and prepuce with no adhesions (Fig. 5). Surgery (preputioplasty) was then performed with the dog in dorsal recumbency. The prepuce and caudal abdomen were clipped and aseptically prepared as described above. A 24G IV catheter was introduced into the preputial orifice. The preputial cavity was entered dorsally by making a 8mm incision along the catheter. A 3mm wedge of skin and preputial mucosa was resected on either side of the incision. The skin was sutured circumferentially to the mucosa using 4-0, non-absorbable suture (nylon) in a simple interrupted pattern. The penis was extruded post-operatively confirming adequate preputial orifice diameter with no penile abnormalities present. A single injection of meloxicam 0.2mg/kg was given subcutaneously and the fentanyl CRI was weaned appropriately according to the short-form Glasgow composite measure pain scale.⁷ The dog was discharged from hospital the following day with five days of oral meloxicam (0.1 mg/kg q24 hrs). At the fourteen-day follow up examination with the operating surgeon, the owner reported the dog had been able to urinate normally without any difficulties and they had not noticed any discolouration of the urine. Examination revealed the incision had fully healed and sutures were removed. The penis was easily extruded with no signs of discomfort or inflammation present. A six-month follow up report with the owner could not be conducted as the owner was not able to be contacted. however the owner has not reported any concerns to the clinic since the 14 day follow up consultation in the meantime.

3. DISCUSSION

Phimosis is a rare condition in juvenile dogs and cats that has infrequently been reported in the veterinary literature. One study reported that 0.5% of cases of canine penile and preputial lesions were due to phimosis.^{3,4} The condition has largely been diagnosed by physical exam alone, with inability to extrude the penis and an abnormally small preputial opening present.^{1,2}To our knowledge, the gross features of phimosis as well as surgical techniques have been described, however there is only one study in the literature describing radiological examination of this condition in dogs.⁶ The purpose of the present case series was to describe radiographic protocols for diagnosing phimosis in both the dog and cat. A novel term, preputiogram, has been proposed to define contrast radiographs of the preputial cavity. In both cases, a preputiogram using diluted iohexol yielded radiographs of diagnostic quality, revealing a dilated prepuce and no penile abnormalities. Whilst physical exam is sufficient to make a diagnosis of phimosis, it cannot always identify the presence of underlying adhesions between the preputial mucosa and the penis. Vlaming et. al 2019, developed a classification system for phimosis based on the gross and pathological lesions, with type I defined as generalized preputial swelling and urine pooling without adhesions and type II as focal preputial swelling and urine pooling in the presence of penile-preputial adhesions.⁵ The surgical technique was different depending on the type of phimosis present, attributing to whether or not adhesions were present. Penile-preputial adhesions limit visual assessment of the penis and may limit the available preputial mucosa to perform a preputioplasty. Therefore, it was deemed a preputioplasty is appropriate for type I phimosis whereas a modified preputial utrethrostomy is proposed for type II phimosis. The use of a preputiogram is therefore important in identifying presence of penile-preputial adhesions prior to surgery to allow appropriate surgical planning. The preputiograms performed in the two cases presented here did not identify any preputial adhesions. A limitation therefore of this study was the inability to compare radiographic appearance of cases with and without preputial adhesions. The use of ultrasound confirmed the findings of the radiographs (normal penile length and absence of adhesions) in Case 1, however poor resolution was a limitation in such a small patient when using a 12MHz probe. Whilst ultrasound was used for completeness of the study, the author does not believe it adds more information for surgical planning than performing a preputiogram alone. In conclusion, the study defines a novel radiographic technique for diagnosing phimosis and suggests a preputiogram should be incorporated into the diagnostic investigation of phimosis in the dog and cat to allow for surgical planning and therefore improve patient outcomes.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

AS initiated the preparation of this manuscript. All authors contributed to the diagnostic investigations of both cases. CB performed surgical treatment in both cases.

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ETHICS

This animals involved in this work were non-experimental animals only (client owned) who were managed with high standards of veterinary patient care. Ethical approval from a committee was not necessarily required.

INFORMED CONSENT

Written informed consent was obtained from both owners of the animals described in this work for the procedures undertaken. No animals are identifiable in this publication and therefore additional informed consent for the publication was not required.

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Figure 1. Lateral view of the caudal abdomen pre-contrast (cat).

- Figure 2. Lateral view of preputiogram (cat).
- Figure 3. Ventrodorsal, oblique view of preputiogram (cat).
- Figure 4. Lateral view of the caudal abdomen pre-contrast (dog).
- Figure 5. Lateral view of preputiogram (dog).









