The prepuce is a tubular sheath of skin (parietal layer) lined with mucosa (inner visceral layer) that covers a portion of the penile shaft (pars longa glandis, bulbus glandis). The mucosa reflects off the bulbus glandis, forming a fornix as the mucosa reflects onto the external penile surface to the urethra orifice. The skin is firmly attached to and continuous with the ventral abdominal skin, creating a sling effect to support and protect the penis from trauma while providing reasonable mobility. The cranial 1 to 3 cm of the prepuce protrudes forward from the skin reflecting off the abdominal wall. The preputial orifice normally permits unimpeded extrusion and retraction of the penile shaft.

The band-like preputial muscle, an extension of the ventral limits of the cutaneous trunci muscle, attaches to the cranial and dorsal aspect of the prepuce. The primary function of this muscle is to draw the prepuce forward to cover the glans penis after erection. The primary sources of circulation to the parietal and visceral layers are the external pudendal artery and dorsal artery of the penis. The visceral layer is also supplied by the artery of the bulb of the penis, albeit to a lesser degree.

The prepuce is susceptible to external injury, most commonly from vehicular trauma and bite wounds. Although uncommon, migrating awns, seeds, or plant fragments may embed in the preputial cavity, causing a purulent or hemorrhagic discharge. Balanoposthitis is common in male dogs and may mask foreign bodies as a cause of preputial discharge. Neoplasia of the prepuce, including mast cell tumors, carcinoma, papillomas, transmissible venereal tumors, melanomas, and perianal gland tumors, is occasionally encountered. Biopsies are a necessary component in diagnosing and managing these conditions.

A small preputial orifice relative to the size of the penis can result in phimosis (inability to extrude the penis from the preputial orifice) or paraphimosis (inability of the penis to retract completely into the prepuce). The most serious condition is paraphimosis with entrapment and strangulation of the penile shaft. Paraphimosis can present as persistent or episodic exposure of the penis; the most serious scenario is acute penile entrapment and circulatory compromise. There are several causes of paraphimosis; management depends on the cause(s) and viability of the penis at the time of presentation.

DIAGNOSTIC CRITERIA

Historical Information

Breed Predisposition: Small dogs may be overrepresented, although the condition can be seen in a variety of breeds.

Age Predisposition: Most patients are younger than 1 year of age at presentation.

Owner Observations

• Owners may notice intermittent or persistent extrusion of the penis with variable degrees of inflammation and edema.

• The mucosal surface of the penis may appear dry secondary to chronic exposure.

Other Historical Considerations

• In some cases, self-stimulation or sexual arousal may initiate paraphimosis. In a natural erection, a decrease in penile intumescence would be expected within a half hour.

• Entrapment with strangulation of the exposed penile shaft can result in significant engorgement. Unless recognized early, circulatory compromise will progress to circulatory stasis and penile necrosis.

• Persistent or intermittent exposure of the penile shaft without entrapment usually allows the owner or attending veterinarian to replace the penis into the preputial sheath, but the penis may repeatedly extrude.

Physical Examination Findings

A complete physical examination should be performed on all patients. The penis can be lubricated with watersoluble gel before an attempt is made to replace it into the prepuce. Patient restraint and sedation may be necessary. Based on examination and manipulation, veterinarians can ascertain the condition of the penis and identify any condition(s) that contribute to paraphimosis.

Paraphimosis with Entrapment and Strangulation

• Entrapment and strangulation of the penis:
  — May result from entanglement of preputial hair located at the margin of the preputial orifice.
  — Most commonly occurs as a result of a small, restrictive preputial orifice relative to penile engorgement.
Causes dramatic swelling and edema of the exposed penis; close examination reveals a “napkin ring” or banding effect created by the preputial orifice. The exposed penile segment can be two or three times its normal size.

- Prolonged entrapment and strangulation causes venous and lymphatic compromise; severe circulatory compromise leads to penile necrosis. The penile shaft may be deep purple to black. Occasionally, early or partial circulatory compromise may result in pale, patchy mucosal discoloration and necrosis of the external penile mucosa.
- Affected patients have pain and may resist manipulation of the area. Patients often lick at the exposed penis constantly.

**Paraphimosis without Entrapment/Strangulation**

- Patients presenting with paraphimosis without entrapment and strangulation may have a history of intermittent or persistent penile extrusion.
- In most cases, the exposed penis may be pushed back into the prepuce, facilitated by the use of a water-soluble lubricant.
- Chronic exposure of the penis results in drying of the mucosal surface and loss of normal mucosal lubrication. A small preputial orifice may impair normal retraction of the penile shaft. When it contacts the neighboring skin around the preputial orifice, the penis will “drag” the skin inward, preventing its normal withdrawal into the prepuce. This may be the sole cause of paraphimosis or a contributing factor secondary to the presence of a small preputial orifice.
- In some cases, intermittent or persistent exposure of the penile shaft may be the result of a penile length disparity relative to the prepuce. The preputial orifice appears normal in diameter with normal elasticity.
- Patients may be uncomfortable but lack the overt signs of pain displayed with penile entrapment and strangulation.
- Paraphimosis may be acquired secondary to pelvic or local abdominal trauma. Although uncommon, regional scar tissue formation can impair preputial mobility. Similarly, injury to the preputial muscles could impair the forward advancement of the prepuce over the penis after erection, but this has not been documented.

**Laboratory Findings**

- There are no laboratory findings specific to paraphimosis.
- A stress leukogram or neutrophilia may be noted with the presence of penile entrapment/strangulation. $ 
- A complete blood count and serum chemistry profile may be advisable for sick patients or as a normal preoperative screen for patients older than 5 years of age. $
- Presurgical screening (hematocrit, total solids, blood glucose, creatinine, total leukocyte count) may be advisable for healthy patients younger than 5 years of age. $

**Summary of Diagnostic Criteria**

- Paraphimosis is most commonly seen in dogs younger than 1 year of age; small-breed dogs may be overrepresented.
- Diagnosis is primarily determined by physical examination of the prepuce and penis at the time of hospitalization.
- Before examination, the patient’s history can help determine whether paraphimosis is intermittent or persistent.
- Paraphimosis with entrapment and strangulation results in dramatic swelling of the exposed penis. Immediate attempts to correct this condition are indicated. Entrapment is most commonly associated with restriction around the penis from a small preputial orifice relative to the diameter of the penile shaft. Although rare, long preputial hair strands also can result in a similar condition.
- Paraphimosis without entrapment or strangulation may be the result of penile mucosal desiccation causing a “friction effect” with the adjacent preputial skin, thereby impeding retraction; a small preputial orifice may contribute to this condition. In some patients, the penis may have insufficient coverage because of a disparity in the length of the prepuce.
- Paraphimosis may be acquired, secondary to regional scarring following surgery, or the result of trauma.

**Differential Diagnosis**

- **Priapism** (persistent erection) unassociated with sexual excitement is usually the result of spinal cord injury, although it has been described in association with constipation or genitourinary infection. Priapism is considered a very rare disorder in small animals.
- **Penile trauma** may result in swelling with exteriorization of variable portions of the shaft. Bite wounds or external abrasions to the penis, prepuce, and lower abdomen secondary to vehicular trauma may be noted. Careful manipulation of the penis with supportive radiography helps determine the presence of a fracture to the os penis. In most cases, the preputial orifice is not involved in penile entrapment.
- **Neoplasia** may result in restriction of the preputial orifice and contribute to the development of paraphimosis. (More commonly, neoplasia restricts extrusion of the penile shaft.)
**Initial Treatment**

**Paraphimosis with Entrapment/Strangulation**

**Emergency tension-relieving (release) incision:** $ With strangulation or entrapment, a tension-release incision is the single most effective technique to immediately relieve circumferential tension on the penile shaft. Thereafter, topical care can be instituted.

The most accessible site for enlarging the preputial orifice is along its ventral border. A #10 or #15 scalpel blade or a sharp pair of blunt-tipped scissors may be used to incise the border sufficiently to relieve the circumferential tension. The lubricated surface of a Bard-Parker scalpel handle may be partially inserted between the prepuce and penis before incising the area to avoid injury to the penile shaft. Bleeding is usually minimal.

- If entanglement of preputial hair is the cause of strangulation, the hair fibers should be cut.
- Sedation or general anesthesia is recommended; no food or water should be provided on admitting the patient if anesthesia is anticipated.
- If feasible, the penis should be replaced into the preputial cavity. Topical ointment should be applied to prevent desiccation of the exposed penile mucosa.
- Analgesics are advisable.
- An Elizabethan collar is likely needed to prevent the dog from licking the exposed penis.
- Although their efficacy in reducing swelling may be controversial, systemic corticosteroids or NSAIDs may be considered.
- If the entrapped penile segment is necrotic, partial penile amputation should be performed. $$$$$

**Paraphimosis without Entrapment/Strangulation**

- The preputial orifice should be examined to determine if the opening restricts normal passage of the penile shaft.
- Water-soluble lubricant should be applied to the exposed penis, which can then be gently manipulated back into the preputial orifice.
- Sedation may be necessary for agitated patients.

**Alternative/Optional Treatments**

**Paraphimosis with Entrapment/Strangulation**

- In conjunction with the preputial release incision, application of 50% dextrose topically, as a hyperosmotic agent, may help to reduce penile edema.
- Gauze soaked with 50% dextrose can be gently wrapped around the penis to maintain contact. Dextrose should be reapplied in small amounts every few hours.
- An Elizabethan collar is likely needed to prevent the dog from licking the exposed penis.
- Although their efficacy in reducing swelling may be controversial, systemic corticosteroids or NSAIDs may be considered.
- If the entrapped penile segment is necrotic, partial penile amputation should be performed. $$$$$
- With successful resolution, permanent enlargement of the preputial orifice can be performed dorsally. (An
• Surgical reduction of the prepuce after penile amputation is unnecessary, based on my clinical experience to date.

**Paraphimosis without Entrapment/Strangulation**

**Topical Antibiotic Ointment**

Topical ointments lubricate the penile shaft and help facilitate its examination and retraction into the prepuce. In some patients, this conservative approach can resolve mild cases of paraphimosis secondary to exposure desiccation with an otherwise normal prepuce.

Topical antibiotic ointment (with a stem-tipped applicator), with or without topical corticosteroids, can be infused in small amounts into the prepuce two or three times daily for 1 month. The prepuce should be massaged lightly to promote distribution. The ointment can maintain moisture and promote healing of the damaged penile mucosal surface. Owners should be instructed to examine the area periodically and replace the penis if it extrudes from the preputial orifice.

**Enlarging the Preputial Orifice**

If a small preputial orifice is a contributing cause, it can be enlarged with a dorsal incision. Hemostats can be inserted and opened in the orifice to ensure that the incision sufficiently enlarges the preputial opening (by releasing the constricting “band”). The skin is apposed to the mucosa with 4-0 absorbable interrupted sutures, thereby creating a permanent V-shaped notch in the orifice.

**Preputial Advancement**

Preputial advancement (see box on page 8) can be performed to correct penile exposure due to a lack of preputial coverage. If additional coverage is required after advancement, the ventral preputial orifice can be partially closed, followed by reciprocal enlargement of the dorsal orifice border. This technique is the preferred method to correct most cases of persistent penile exposure (intermittent or continuous) unresponsive to conservative topical therapy and penile replacement.

The technique can also be used to manage paraphimosis secondary to scarring caused by trauma or surgery. During elevation of the prepuce, scar bands are divided to facilitate relocation of the preputial cranial to its original position.

**Supportive Treatment**

**Paraphimosis with Entrapment/Strangulation**

• Intravenous catheter placement and administration of intravenous fluids.

• Urinary catheter placement or the use of a cystostomy tube in cases of urethral obstruction.

• The exposed penis can be covered with gauze saturated with 50% dextrose solution to facilitate reduction of tissue edema. Cold compresses may be beneficial. Otherwise, any exposed penile segment may be covered with moistened (isotonic solutions) gauze sponges to prevent further tissue desiccation.

• On occasion, pale, patchy areas of mucosal necrosis may be noted over the penile surface. Many of these areas will heal by second intention within 1 month. A topical antibiotic ointment may be used to promote healing, as discussed previously.

• An Elizabethan collar is indicated to prevent licking and self-mutilation.

**Paraphimosis without Entrapment/Strangulation**

• With successful replacement of the penis in a patient with an otherwise normal prepuce, topical ointment (as discussed previously) is used to promote healing of the desiccated penile mucosa.

• Enlargement of the preputial orifice requires no basic postoperative care.

• With preputial advancement surgery, the patient should be hospitalized for at least 24 hours to determine if complete coverage of the penis has been achieved.

• An Elizabethan collar is indicated to prevent licking and self-mutilation.

**Patient Monitoring**

**Paraphimosis with Entrapment/Strangulation**

• The potential viability of the penis should be assessed in the days following initial therapy: The viability of an entrapped penis may not be readily evident at the time of presentation. Necrosis normally is characterized by a deep purple to black appearance of the entrapped penile segment; partial penile amputation is required. $$$$$
Milestones/Recovery Time Frames

- If the penis is viable, penile swelling and edema should subside significantly within a few days after incising the preputial band and instituting medical management.
- Resumption of normal urination.
- Resolution of bleeding after partial penile amputation; healing of the surgical site.
- Healing of external penile mucosal defects in a patient with an otherwise viable penile shaft.
- Ability of the penis to be extruded for examination and then spontaneously retract into the preputial orifice.
- Complete penile coverage following preputial advancement.
- After enlargement of the preputial orifice, healing of the V-shaped notch, located at the dorsal preputial border, should be complete in 10 to 14 days.

Treatment Contraindications
Amputation of an otherwise viable penis is not considered a primary management option for paraphimosis. Corrective preputial surgery normally provides reasonable coverage and restoration of function.

PROGNOSIS

Favorable Criteria
- Viable penile tissue.
- Complete healing of the surgical sites.
- Normal urination.
- Complete penile coverage.
- Normal egress and ingress of the penile shaft with the prepuce.

Unfavorable Criteria
- Complete necrosis of penile tissue; amputation.
- Persistent exposure of the penis or incomplete preputial coverage.
- Wound dehiscence.
- Tissue infection.
- Inability to urinate as a result of urethral compression and/or edema without catheter or cystostomy tube insertion.
- Urinary tract infection.

Recommended Reading
