

How to Construct and Apply a Penile Repulsion Device (Probang) to Manage Paraphimosis

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1. Introduction

Paraphimosis is the inability of the stallion or gelding to retract the penis into the prepuce. This condition most frequently develops as a sequelae to genital trauma and the associated edema and or hematoma formation.¹⁻⁶ It may also result from penile paralysis, which can be sedative induced (phenothiazine tranquilizers), found in association with severe debilitation, equine herpes virus-1 (EHV 1), and rabies infections, or may develop as a sequelae to priapism.^{2-4,7} Less commonly, it may be a manifestation of disease processes that result in extensive ventral and preputial edema, for example, dourine (*Trypanosoma equiperdum*) or purpura hemorrhagica.²

Penile and preputial injury or prolonged prolapse of the penis leads to the rapid development of edema, usually within 6–24 h. Impaired venous and lymphatic drainage contributes to the formation of a large edematous cuff at the preputial ring that prevents withdrawal of the penis into the prepuce (Fig. 1).⁵ The weight of the edema causes muscle fatigue, resulting in further protrusion of the organ

and stretching of the pudendal nerves at the ischial arch. Several days of exposure results in excoriation and trauma to the exposed penile epithelium, which cracks and begins to ooze serum. Bacterial invasion of the tissues results in inflammation of the deeper tissue planes of the penis and prepuce, cellulitis, and eventual fibrosis of the tissues. Management of the condition should be directed at reducing or controlling edema formation and preventing further trauma to the exteriorized penis.¹ This is best achieved by returning and retaining the exposed penis to the warm and protected environment of the external preputial fold. Edematous swelling may be reduced by hand massage, hydrotherapy, and the application of tight bandages (Fig. 2).^{2,6} The topical application of a hydrophilic agent such as glycerine may additionally help to reduce the swelling. If treatment has been delayed, edema formation may have progressed to the point that it is impossible to replace the penis within the external preputial fold, and it may be necessary to support the prolapse against the ventral abdomen until the swelling has decreased. Once the penis has been

NOTES



Fig. 1. Trauma-induced paraphimosis with marked edema of the internal preputial fold.

forced back into the prepuce, it should be temporarily retained there, to break the circle of edema formation and resultant trauma. This can be accomplished by closing the preputial orifice or preputial ring with towel clamps or purse string suture of sufficiently large diameter that it will not tear through the edematous tissue.^{1,5} Both methods further traumatize an area that is usually compromised or friable because of edema and inadequate blood perfusion. Alternatively, the penis can be supported at the preputial orifice by means of a nylon net or hosiery suspended by a crupper and surcingle made of rubber tubing.^{1,7} Most external support devices are less effective and require specialized equipment and intensive nursing care to avoid further damage to the penile and preputial tissues.

Ancillary treatments to control inflammation and edema may include continued hydrotherapy, limited exercise, (non-)steroidal anti-inflammatory drugs, and topical dimethyl sulfoxide (DMSO).^{2,6} Local and/or systemic antimicrobials may be indicated to control infection, because lacerations or erosive lesions are often present concurrently.^{2,6}

In the following, we describe a simple, atraumatic, and effective way of managing paraphimosis and report on the outcome of seven cases that were treated with a repulsion device, the probang.

2. Materials and Methods

The medical records of all cases treated for paraphimosis during their hospitalization at our Veterinary Medical Teaching Hospital between January 2004 and September 2008 were reviewed. For each patient, the following information was extracted from the medical record: treatment method, sex (stallion or gelding), etiology of the paraphimosis, duration of paraphimosis before treatment, duration of treatment with the repulsion device, ancillary treatments, complications encountered, and short-term outcome.

Considerations Before Application of the Repulsion Device
A complete history and physical examination should be performed to determine, if possible, the cause of the paraphimosis and reveal any underlying condition requiring surgical attention, e.g., rupture or laceration of the tunica albuginea of the penis.^{1,6} The anamnesis may provide information about the duration and inciting cause of the paraphimosis and whether or not normal urination had been observed. Close inspection, palpation, and possibly ultrasonographic examination of the penis and prepuce are used to identify the anatomical structures involved.¹ Depending on patient compliance, sedation with detomidine hydrochloride^a (0.007–0.01 mg/kg, IV) alone or in combination with butorphanol tartrate^b (0.007–0.02 mg/kg, IV) may be necessary for chemical restraint. The prepuce and penis are carefully cleaned with warm water, a mild soap, and cotton or gauze sponges to facilitate a thorough examination. Once completed, efforts are made to reduce the swelling of the prolapsed structures and return these into the external preputial fold. Such measures include manual compression and massage, followed if necessary, by the application of an elastic bandage or broad rubber tourniquet to the shaft of the penis, from the glans to the proximal extent of the swelling (Fig. 2). Care is taken to avoid further trauma to the penis and inner fold of the prepuce, and the use of lubricants is advisable.

Assembly and Application of the Repulsion Device

All materials needed to assemble a penile repulsion device are readily available to veterinarians.

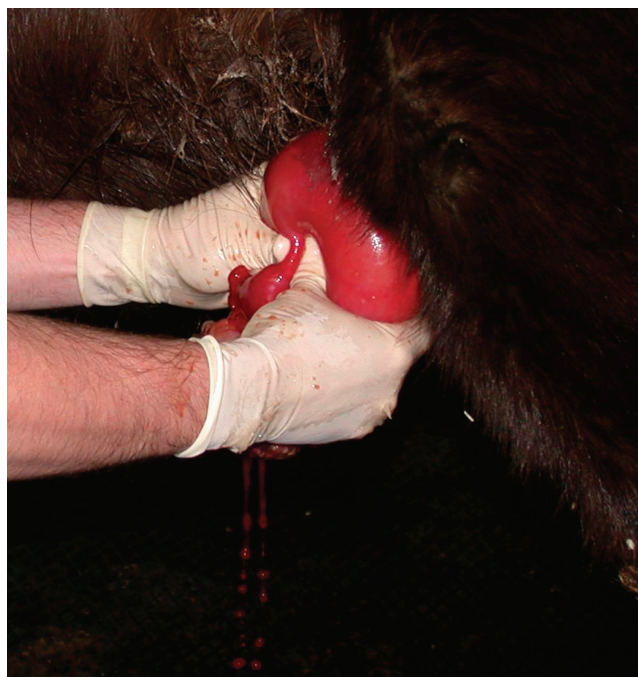


Fig. 2. Manual compression/massage and reduction of prolapsed penis and the edematous internal preputial fold.

These include 2-in outer-diameter PVC tubing pre-cut to an approximate length of 15–25 in, depending on the size of the animal, roll cotton,^c one pair of clean, disposable latex gloves (size 8–9), nitrofurazone ointment,^d four to six rolls of elastic adhesive bandaging tape,^e and one roll of adhesive white tape^f or duct tape (Fig. 3). To assemble the probang, roll cotton is placed around one end of the PVC tubing and held in place with white adhesive tape to create a swollen, protected end, similar to a button mushroom. The amount of cotton used is varied according to the size of the preputial orifice. A latex rubber glove is then turned inside out, so that finger outpouchings are retained, placed over the cotton, and similarly held in place with white adhesive tape (Fig. 4). A thick layer of nitrofurazone ointment is applied to the padded end of the probang. The penis and internal preputial fold are gently pressed into the external prepuce and manually retained in this position until introduction of the probang into the preputial orifice. This is usually well tolerated by the unsedated patient. The device is held in position by securing the protruding portion of PVC pipe against the ventral abdominal wall with adhesive elasticated bandage tape,^e wrapped circumferentially around the abdomen (Fig. 5). An option is to impact a section of appropriately sized endotracheal tube into the end of the PVC piping that is pointing cranially. The inherent curvature and malleable nature of this extension permits the device to conform better to the ventral abdomen of the horse, thereby giving the construct improved fit and stability (Fig. 5). Urination is unimpeded and occurs without apparent resistance around the repulsion device.

3. Results

The medical records of seven horses treated for paraphimosis with the described penile repulsion device



Fig. 3. Materials needed to assemble and apply the probang penile repulsion device.



Fig. 4. Assembly of the probang.

during the time period were available for evaluation. Of the seven horses, there were three stallions and four geldings. It was suspected that paraphimosis developed subsequent to direct trauma to the penis and/or prepuce in six cases and after cryptorchidectomy in one case. At the time of initial presentation to our teaching hospital, the duration of paraphimosis was <6 h in one case, >6 but <24 h in three cases, and >24 h in three cases. After 30–60 min of hydrotherapy and manual massage, the penis was returned to the preputial orifice in six cases. This was facilitated with the use of a compressive bandage in the remaining case. The repulsion device was applied in each case for a minimum of 24 h and a maximum of 7 days, with a mean application of 3 days (one case, 24 h; three cases, 48 h; two cases, 72 h; one case, 7 days). The repulsion device was removed when the animal was able to maintain the

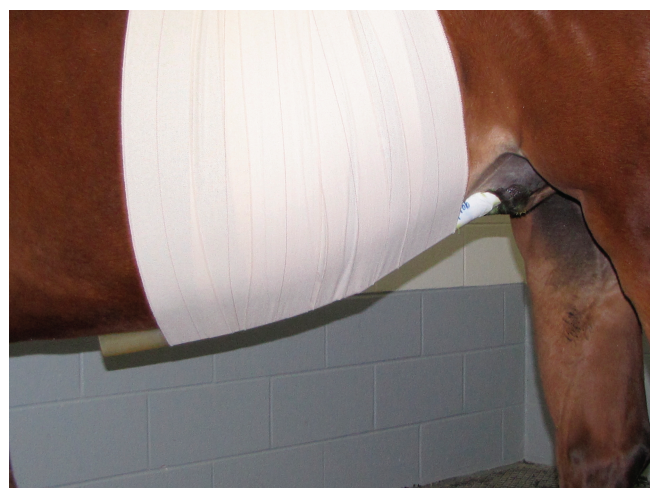


Fig. 5. The probang secured in proper position with a belly bandage. Note how the device conforms to the convex shape of the ventral abdomen.

penis within the prepuce or withdraw the penis spontaneously after minimal tactile stimulation by flicking a finger against the glans of the prolapsed penis. When the device was first removed, these horses would often drop the glans of the penis from 15 to 20 cm from the preputial orifice when relaxed, but were able to fully retract when stimulated. This tendency usually subsided within 24–48 h. Horses were only discharged from the hospital when the penis remained fully retained within the sheath. Light exercise, in the form of in-hand walking and or lunging, was added to the treatment regimen once this occurred. Ancillary treatments included oral trimethoprim sulfamethoxazole^g (20 mg/kg, PO, q 12 h) and phenylbutazone^h (2.2 mg/kg, PO, q 12 h) for 14 and 5 days, respectively. All cases, with the exclusion of the animal that had recently undergone cryptorchidectomy, received a single dose of dexamethasoneⁱ (0.1 mg/kg, IV).

Complications encountered during hospitalization and treatment of these horses included one case of mild abdominal discomfort that responded to medical treatment. In one case, we were initially unable to maintain the repulsion device within the prepuce for 24 h, because it frequently slipped out and had to be replaced. It was unclear why this was the case. Mild swelling of the preputial fold remained at the time of discharge in a single case.

4. Discussion

Application of the above-described repulsion device was very effective in resolving the paraphimosis in the cases described here and seems to offer several advantages over the more commonly described techniques: It is easy to apply, is less hazardous to personnel, and is significantly less traumatic than the application of a purse-string suture or of towel clamps to close the preputial orifice. It is cheap and quick to assemble with readily available materials, can easily be removed, and can be adjusted or changed to allow reassessment of the penis and prepuce at frequent intervals. Urine is easily voided around the probang, with no evidence of urine scalding within the sheath.

Supporting the penis in the region of the preputial orifice, or as is frequently the case, against the ventral wall of the abdomen, can be extremely challenging. Applying sufficient pressure to maintain the organ as far proximal as possible to counteract the effects of gravity and edema formation often results in abrasions to the shaft of the penis, drying and cracking of the epithelium from exposure, or scalding from prolonged contact with urine. Choosing a porous, non-abrasive, and quick-drying fabric that

can be fitted and maintained as an appropriate support device is extremely challenging.

In the cases presented here, the elapsed time between onset of paraphimosis and initiation of treatment with the repulsion device had no effect on the short-term outcome. This is consistent with previously reported observations.⁶ Nonetheless; it is our belief that early intervention will facilitate a more rapid response to treatment if administered before the development of balanoposthitis, irreversible nerve damage, and fibrosis of the penile integument.

The successful outcome, as with any other conservative management method, is highly dependent on the underlying disease process. If the initiating cause can be identified, an accurate prognosis and effective treatment of the underlying disease process is possible. If paraphimosis does not resolve within a few days of initiating conservative treatment with the described repulsion device, the clinician should be prompted to investigate further and ensure there is no underlying condition that requires additional treatment. We conclude that managing paraphimosis with the described penile repulsion device is easily accomplished, safe, and effective, while causing no additional trauma to the penis and prepuce.

References and Footnotes

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^aDormosedan, Orion Corp., Espoo, Finland 02200.

^bTorbugesic, Fort Dodge Animal Health, Fort Dodge, IA 50501.

^cCurity Practical Cotton, Kendall-Tyco Healthcare Group, Mansfield, MA 02048.

^dFura-Zone, Squire Laboratories Inc., Revere, MA 02151-5339.

^eElastikon, Johnson and Johnson, New Brunswick, NJ 08933.

^fWet-Pruf 1-inch tape, Kendall-Tyco Healthcare Group, Mansfield, MA 02048.

^gOral trimethoprim sulfamethoxazole tablets, Amneal Pharmaceuticals NY, Hauppauge, NY 11788.

^hPhenylbutazone tablets, First Priority Inc., Elgin, IL 60123.

ⁱDexium™, Bimeda Inc., Le Sueur, MN 56058.