

Preputial damage and lateral penile displacement during castration in a degu

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Case Description—A 2-month-old male degu was treated for preputial damage and lateral penile displacement that occurred during attempted castration.

Clinical Findings—Bruising and swelling of the prepuce and severe edema to the left of the prepuce were evident. The penis could not be extruded from the prepuce. Radiography revealed a large bladder. Contrast medium injected into the prepuce filled the peripreputial subcutaneous tissues.

Treatment and Outcome—During surgical exploration through a peripreputial approach, the penis was found to be completely separated from the prepuce and located in the adjacent subcutaneous tissue. The penis was repositioned in the prepuce and anchored with a suture at its base. The following day, the preputial orifice was crusted over, urine was leaking from the incision, and the penis could not be extruded from the prepuce. The anchoring suture was removed, and the tip of the penis was sutured to the preputial orifice so that the penis protruded slightly from the prepuce. Urination was normal after the second surgery. Two years later, the preputial orifice remained adhered to the distal portion of the penis and the exposed penile tissue was healthy.

Clinical Relevance—Penile displacement from the prepuce is an unusual complication of castration in degus. The surgical technique used in this animal may be an effective means of repair. Permanent exposure of the tip of the penis may be well-tolerated in degus. (*J Am Vet Med Assoc* 2008;232:1013–1015)

The prepuce and penis of an anesthetized 2-month-old sexually intact male pet degu (*Octodon degus*) were inadvertently traumatized during attempted removal of the right testicle for routine castration, and the procedure was aborted. When no urination was evident for several hours after anesthetic recovery, the degu was referred to the Washington State University Teaching Hospital for evaluation. The degu weighed 210 g (7.4 oz); was in good body condition with good hydration; and was bright, alert, and responsive. Physical examination findings were marked bruising and swelling of the prepuce and severe edema to the left of the prepuce. A skin incision to the right of the caudal portion of the prepuce was closed with tissue adhesive. The penis could not be extruded from or palpated in the prepuce.

General inhalant anesthesia with isoflurane and oxygen delivered by mask was used. Radiography revealed an enlarged urinary bladder and air in the subcutaneous tissues surrounding the castration site. A 25-gauge catheter was inserted into the preputial orifice, and 0.5 to 1 mL of ioxilan^a (300 mg/mL) was injected. The prepuce and surrounding subcutaneous tissue filled with contrast medium, but no contrast medium was seen in the urethra or urinary bladder.

The peripreputial area was explored through the previous right inguinal incision. A moderate amount of yellow fluid (presumed to be urine and serum) was detected. The penis, which was completely separated from

its preputial attachments, was located in the subcutaneous tissue caudally and to the left of the prepuce. It was oriented at a 45° angle to the long axis of the prepuce and was freely moveable. The penis was maneuvered into the incision with gentle manipulation, including external finger pressure on the left inguinal area. The penile urethra was catheterized with a 25-gauge catheter, and urine flowed from the catheter. The urinary catheter was temporarily removed from the penile urethra, passed through the preputial orifice in a retrograde fashion, and replaced in the penile urethra. An attempt to lever the penis back into the prepuce with the catheter was unsuccessful. A mosquito forceps was then passed in a retrograde manner through the preputial orifice, the tip of the penis was gently grasped (avoiding the urethral orifice), and the penis was successfully placed back into the prepuce. A small amount of exposed erythematous tissue at the tip of the penis was removed with tenotomy scissors. The base of the penis was sutured to the base of the prepuce with a 4-0 polydioxanone^b suture, and the surgery site was lavaged. The incision was closed with tissue glue. Castration was not performed at this time because of the already long duration of anesthesia. After surgery, the degu received replacement crystalloid fluids (19 mL/kg [8.6 mL/lb], SC, once), butorphanol (0.20 mg/kg [0.09 mg/lb], SC, once), and enrofloxacin^c (4.4 mg/kg [2.0 mg/lb], SC, q 24 h for 7 days). An Elizabethan collar made from radiographic film was placed around the degu's neck. Recovery from anesthesia was without complications.

The following morning, the degu was bright, alert, and active. The Elizabethan collar was off. The caudal inguinal region was bruised and erythematous bilaterally.

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ally, and a small piece of desiccated material was adhered to the preputial opening. The right caudal aspect of the prepuce was dark. Urine was leaking out of the incision, which had partially dehisced. It was unclear on palpation if the penis was still located in the prepuce.

The degu was anesthetized, and the previous surgery site was reentered. The penis was still in the prepuce but could not be exteriorized, even after removing the dried tissue that was adhered to the preputial opening. The suture placed from the base of the penis to the prepuce during the previous surgery was removed. A mosquito forceps was inserted into the preputial orifice, the tip of the penis was gently grasped, and the penis was positioned such that the tip protruded slightly beyond the preputial opening. The tip of the penis was sutured to the edge of the preputial orifice with 4 simple interrupted sutures of 4-0 polydioxanone,^b taking care to avoid the urethra. Orchiectomy was performed by exteriorizing the right testicle through the incision, placing 2 encircling ligatures of 3-0 polyglactin 910^d on the spermatic cord, and transecting the cord distal to the ligatures. This procedure was repeated on the opposite side after making a left peripreputial incision. The left incision was closed with tissue adhesive. The right inguinal region was lavaged with 20 mL of sterile saline (0.9% NaCl) solution, and the caudal half was closed with tissue adhesive; the cranial half was left open to allow drainage. The Elizabethan collar was sutured to the neck. After surgery, the degu received fluids and butorphanol as before.

The degu was briefly anesthetized via mask administration of isoflurane and oxygen for daily evaluation until suture removal. During this time, the bladder was no longer palpable and the penis remained positioned as it had been at the conclusion of surgery. Daily treatments included lubrication of the tip of the penis with petrolatum ophthalmic ointment^e and enrofloxacin injection. The right peripreputial incision closed 4 days after the last surgery. Preputial and inguinal swellings

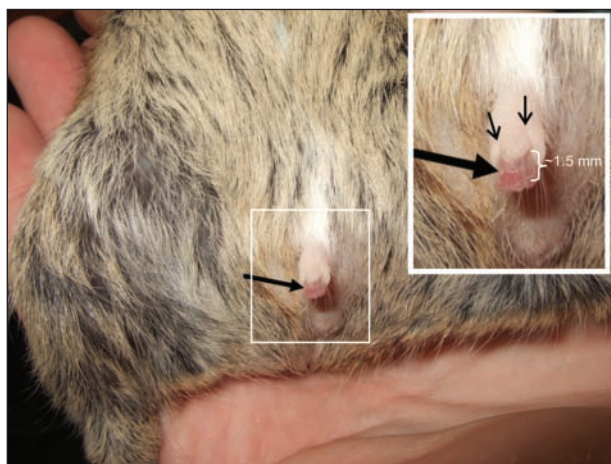


Figure 1—Photograph of the caudoventral portion of the abdomen of a neutered male degu 2 years after surgical repair of penile displacement from the prepuce. Inset: close-up of boxed area. Approximately 1.5 mm of the distal portion of the penis (large arrow) is permanently exposed beyond the preputial orifice. The penile tissue appears moist, pink, and healthy. Indentations from the sutures used to maintain the penis in the prepuce are visible in the skin surrounding the preputial orifice (small arrows).

gradually resolved. The sutures at the tip of the penis were removed 6 days after surgery via general anesthesia. The Elizabethan collar was removed 1 day later. A 3 × 3-mm region of the right preputial skin sloughed 8 days after the initial surgery; this area was treated with topical collagen hydrolysate^f and healed by second intention. The degu was urinating from the penis normally. Two years later, the degu underwent a routine examination (Figure 1). The prepuce and penis appeared healthy, although the penis could not be moved relative to the preputial orifice. The degu was urinating normally and did not require any treatment of the 1.5 mm of exposed penis.

Discussion

Degus are diurnal, social rodents native to the foothills of the Andes Mountains.¹ As hystricomorphs, they are in the same Rodentia suborder as porcupines, guinea pigs, and chinchillas. Degus have been used as laboratory animals in studies of diabetes mellitus, cataracts, Alzheimer's disease, and circadian rhythms and are becoming increasingly popular pets.^{2,3} Castration is most commonly performed to prevent breeding in degus because it is an easier procedure with less complications than ovariectomy in this species.⁴

Hystricomorphs do not have a true scrotum; instead, the testes lie caudolateral to the penis in the subcutaneous tissue.⁵ The testes can move freely in and out of the abdominal cavity. The prepuce and penis are directed caudally, and the penis can be exposed by retracting the prepuce proximally.⁶ Closed castration, open castration with closure of the inguinal ring, and open castration with preservation of the epididymal fat pad are all acceptable procedures in hystricomorphs.⁴

Complications of castration reported in rodents include hematoma, infection, and self-trauma.⁷ Because the inguinal rings are large, visceral herniation is another potential complication, although the actual frequency is low, likely because the epididymal fat pad blocks egress of abdominal organs.⁴ In the degu of this report, the penis was completely separated from the prepuce and redirected into the subcutaneous tissues during attempted castration. Clinical signs included inguinal edema, anuria, and the inability to manually extrude the penis from the prepuce. No other reports of penile separation from the prepuce secondary to castration were found in the literature.

In preparation for hystricomorph orchiectomy, the testis is palpated and stabilized in the peripreputial area. Care must be taken during palpation because the penis can be mistaken for a testis.⁴ The penis is on midline and cannot be pushed into the abdomen, whereas the testes are wider, rounder, and more mobile.⁴ Abdominal testes can be moved to the inguinal area with gentle caudoventral pressure.⁴ Bilateral incisions are made 2 to 3 mm lateral to the prepuce, over the testes.⁵ It is suspected that during attempts to properly position the right testis in the degu of this report, the preputial sheath as well as the attachments of the prepuce to the penis at the junction of the penile glans and body were torn. Because the veterinarian's fingers were probing for the right testis, the penis was

likely pushed to the left through the defect in the preputial sheath.

The referring veterinarian, who was experienced with degu castrations, recognized that a problem had occurred during surgery, observed the lack of urination during close postoperative monitoring, and referred the case promptly, which likely contributed to the successful outcome in this patient. In dogs, prolonged contact of extravasated urine with surrounding tissues can induce severe cellulitis and infection.⁸ Degu urine is naturally thick,¹ so it may not spread through tissues as readily as canine urine, but it may also be more difficult to drain. In the first repair surgery, the right inguinal area was lavaged and closed because it was performed on the day of injury and the presence of a large bladder suggested that relatively little leakage of urine had occurred. During the second repair surgery, the right inguinal area was lavaged and left partially open to heal by second intention because urine had been leaking out of this incision before surgery. Because of the small patient size and the existing connection between the left and right inguinal areas, it appeared that any drainage from the left would readily exit the right incision; thus, the left incision was closed. Additional steps taken to promote healing were placement of an Elizabethan collar to prevent self-mutilation, a 7-day course of enrofloxacin, and hospitalizing the degu until suture removal so it could be monitored and housed separately from other degus. Enrofloxacin was selected because it provides relatively broad coverage against aerobic bacteria without compromising intestinal flora in rodents and could be administered by a single daily SC injection while the degu was briefly anesthetized^{9,10}; this patient did not tolerate manual restraint well and was not amenable to oral administration. Because the susceptibility of degus to fluoroquinolone-induced cartilage damage is unknown, selection of a different class of antimicrobial would have been prudent to avoid the risk for chondrotoxicosis in this immature animal.

The goal of surgery was to restore the normal relationship of the penis and prepuce. The approach was made through the preexisting right inguinal incision because disruption of the preputial and penile attachments had occurred in association with this surgical approach, further trauma to the bruised tissue on the left side would be avoided, and the actual location of the penis was not known before surgery. The mobility of the penis was such that it could be adequately accessed through the right inguinal incision. Because the penile urethra was patent at the first repair surgery, amputation of the abnormal tissue at the end of the penis may not have been necessary. Exudate produced by this lesion likely blocked the preputial orifice after the first surgery, forcing urine to take the path of least resistance into the previously disrupted subcutaneous tissues and out of the right inguinal incision. In the absence of this penile lesion, placement of a single proximal suture at the apparent site of normal attachment of penis to pre-

puce may have satisfactorily resolved the displacement of the penis from the prepuce. However, anchoring of the penis too deeply within the prepuce may have also contributed to redirection of urine flow. Successful repair was achieved when sutures were placed from the tip of the penis to the preputial orifice to ensure that urine would exit the body, allowing the inguinal region to heal. A smaller suture size (which was not available at the time) may have resulted in a more cosmetic appearance. Although approximately 1.5 mm of the distal portion of the penis remained permanently exposed, potential complications such as excoriation, tissue dehydration, and self-trauma did not occur in this patient.

Penile separation from the prepuce is an unusual complication of castration in degus. Other hystricomorphs and perhaps some nonhystricomorph rodents may be susceptible to this complication. Gentle reinsertion of the penis into the prepuce via a peripreputial approach, aided by passage of forceps retrograde through the preputial orifice and placement of tacking sutures from the distal penis to the preputial orifice, was an effective means of repair in the degu of this report. Permanent exposure of the tip of the penis was well-tolerated.

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- a. Oxilan 300, Guerbet LLC, Bloomington, Ind.
 - b. PDS II, Ethicon Inc, Somerville, NJ.
 - c. Baytril, Bayer HealthCare LLC, Shawnee Mission, Kan.
 - d. Vicryl, Ethicon Inc, Somerville, NJ.
 - e. Paralube Vet Ointment, Pharmaderm, Melville, NY.
 - f. Collasate, PRN Pharmacal, Pensacola, Fla.
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