Buccal mucosal urethroplasty for treatment of recurrent hemospermia in a stallion

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Case Description—An 11-year-old Quarter Horse stallion was admitted for intermittent hemospermia of 4 years’ duration.

Clinical Findings—A linear vertical defect had been detected endoscopically following multiple episodes of hemospermia on the caudodorsal convex surface of the urethra at the level of the ischial arch.

Treatment and Outcome—When sexual rest alone did not result in complete healing of the urethral defect, a subschial urethrotomy and buccal mucosal urethroplasty were performed. The surgical site healed without complication. Four months of sexual rest was recommended after surgery. Repeat endoscopy at 4 months allowed inspection of the urethral graft site. Following endoscopic examination, resumption of semen collection was recommended on the basis of the apparent healing at the urethral defect site. Hemospermia did not reoccur following surgical repair.

Clinical Relevance—Buccal mucosal urethroplasty resulted in a favorable outcome in a stallion with recurrent hemospermia. Buccal mucosal urethroplasty may be a useful surgical option in stallions that have hemospermia secondary to a urethral defect and do not heal with sexual rest alone. (J Am Vet Med Assoc 2009;235:1212–1215)

In 2004, a 7-year-old 490-kg (1,078-lb) Quarter Horse stallion was admitted to the Veterinary Medical Center, Colorado State University for evaluation because of hemospermia during semen collection. The stallion developed macroscopic hemospermia on the 14th semen collection of the year after semen had been collected every other day. The stallion was given 10 days of sexual rest, but hemospermia still occurred on subsequent semen collections. At the time of admission, no abnormalities were detected on physical examination, and measurements of vital signs (ie, body temperature, respiratory rate, and heart rate) were within reference ranges. Urethral endoscopy revealed a urethral tear approximately 10 mm in length on the caudodorsal convex surface of the urethra at the level of the ischial arch. A prolonged period of sexual rest was recommended. Two months after endoscopy, semen was collected from the stallion, and because of persistent hemospermia, sexual rest was reinstated. Six months after initial endoscopy, repeat endoscopy revealed that the site of previous urethral injury had healed. The stallion was sexually rested until the following breeding season, and semen was collected without incident several times that season.

In 2006, 2 years after initial evaluation, the stallion was reevaluated for hemospermia following its ninth semen collection of the season. Urethral endoscopy revealed a small defect approximately 5 mm in length in the same location as its original urethral injury. The stallion was sexually rested until the following breeding season. In 2007, the stallion was reevaluated (year 3) when hemospermia was found on 2 consecutive semen collections. An approximately 10-mm urethral defect was again observed in a similar site on endoscopic examination. As this was the fourth breeding season interrupted by hemospermia infertility since the initial injury, multiple surgical treatment options were discussed. The stallion was sexually rested for 7 months and was returned in December for surgical correction of the urethral defect.

At the time of admission for surgery, the stallion was healthy on the basis of findings on physical examination. Urethral endoscopy was performed, and the area of the urethral defect was not evident. The stallion then underwent semen collection twice daily for 5 days, and on the morning of the fifth day, hemospermia developed. Subsequent endoscopic examination revealed a urethral defect (Figure 1). The stallion was then sexually rested for 4 days prior to surgery.

The stallion was restrained in stocks and sedated with xylazine (0.3 mg/kg [0.14 mg/lb]) administered via a 14-gauge × 2-inch temporary IV catheter placed in a jugular vein. Detomidine (40 µg/kg [18.2 µg/lb]) was administered epidurally between the first and second coccygeal vertebrae by use of a 20-gauge, 6.35-cm-long spinal needle. The tail was wrapped and tied dorsally, and the perineum and penis were aseptically prepared. A 1-mm-long, 9-mm-diameter flexible endoscope, sterilized by 20-minute immersion in 0.55% ortho-phthalaldehyde solution and rinsed with sterile saline (0.9% NaCl) solution, was lubricated and introduced into the penile urethra and advanced to the level of the urethra adjacent to the urethral defect. Two 20-gauge, 6.35-cm-long spinal needles were placed transcutaneously via the perineum into the urethra.
under endoscopic control to guide the incision. Once the needles were placed at the proximal and distal aspects of the urethral injury site, the endoscope was removed and replaced with a stallion urethral catheter. An 8-cm-long vertical perineal incision was then created sharply with a No. 10 scalpel blade through skin, subcutaneous tissues, retractor penis muscle, bulbospongiosus muscle, corpus spongiosum urethra, and urethral mucosa, and the urethral catheter was removed. A 26-F sterile Foley catheter was then lubricated and advanced from the urethral incision into the bladder and the cuff inflated with 4 mL of sterile saline solution.

Following perineal urethrotomy, the buccal mucosa was prepared with dilute betadine solution irrigation on the lower lip. By use of a 25-gauge needle and 6-mL syringe, 4 mL of a 2% solution of lidocaine hydrochloride was infiltrated submucosally at the lateral borders of the graft site, and a 1 × 3-cm segment of buccal mucosa was harvested by use of a No. 10 scalpel blade. In transport, the buccal mucosal segment was maintained in an autologous blood-soaked gauze sponge; blood was obtained from the IV catheter that had been placed in the jugular vein. The buccal mucosa was trimmed in a hemi-elliptical shape and sutured into the proximal aspect of the urethral defect with 3-0 synthetic absorbable monofilament suture by use of a continuous pattern on both the right and left side of the graft. Sutures were placed approximately 1 mm from the tissue edge, with 2 mm spacing. The graft was applied such that the mucosal surface faced the interior of the urethral lumen. The ventral edge of the graft above the urinary catheter was not sutured. The retractor penis muscles and subcutaneous tissues were partially apposed dorsally in a simple continuous pattern with 2-0 synthetic absorbable monofilament suture to cover the grafted area. An intradermal pattern with 3-0 synthetic absorbable monofilament suture was used to appose the skin. The ventral 4 cm of the incision was left open, allowing exit of the urinary catheter. The site of buccal graft harvest was closed with 3-0 synthetic absorbable monofilament suture. Perioperatively, a single dose of flunixin meglumine (1 mg/kg [0.45 mg/lb]) was administered IV. Antimicrobials and tetanus prophylaxis were not administered.

The perineal surgical site was cleaned twice daily with dilute betadine solution and sterile gauze sponges. The urinary catheter was removed 3 days after surgery immediately prior to hospital discharge. The stallion was able to urinate normally after removal of the catheter, and the incision healed within 3 weeks with an excellent cosmetic outcome. No complications occurred relative to the surgery or hospitalization. Following 4 months of sexual rest, the stallion was readmitted for repeat urethral endoscopy. The site of buccal graft appeared to be well healed (Figure 2). At this time, it was recommended to resume semen collection. Semen was collected from the stallion 15 times over the next 60 days without evidence of hemospermia. Hemospermia did not reoccur throughout the duration of the breeding season.

**Discussion**

Urethral defects are common in male horses and most often occur on the caudodorsal convex surface of the urethra at the level of the ischial arch. Hemorrhage into the urine or ejaculate occurs secondary to urethral defects as a result of the communication that develops between the urethral lumen and under-
lying vascular corpus spongiosum. In geldings with urethral defects, hematuria is typically the complaint. Conversely, in stallions with urethral defects, hemospermia is the typical complaint, and hematuria is usually not observed. Anatomic differences between stallions and geldings may account for these differences in clinical signs. The corpus spongiosum is less developed and less elastic in geldings in the absence of testosterone hormonal stimulation. This results in high corpus spongiosum pressure (27.5 mm Hg) during micturition. In stallions, the corpus spongiosum is more developed and elastic and high corpus spongiosum pressures do not occur with urination (15.3 mm Hg). However, during ejaculation, extremely high pressures develop within the corpus spongiosum (762 mm Hg). This high pressure may predispose stallions to traumatic urethral injury and re-injury during repeated ejaculation.

Hemospermia is associated with infertility in stallions, despite otherwise normal semen quality. The condition affects all breeds of stallions and occurs at a mean age of 7.1 years. The mechanism by which hemospermia results in infertility is unknown. One potential etiology is that blood contamination causes direct spermatozoa injury. When autogenous blood is added to stallion semen under laboratory conditions, a proportional decrease in sperm motility and membrane integrity is seen relative to the amount of blood added. Addition of serum alone to semen has not been shown to negatively impact pregnancy rate of inseminated mares as greatly as addition of whole blood. A second potential etiology is that inflammation and secondary infection negatively affect the ejaculate. This is particularly relevant when considering conditions at the stallion resulting in hemospermia, such as primary urethritis, seminal vesiculitis, and poorly healed urethral defects. Multiple factors may play a role in hemospermia and resulting infertility.

Common first-line treatments of hemospermia in stallions include sexual rest and treatment with antimicrobials and anti-inflammatory drugs. If sexual rest and medical treatment are not successful, a temporary subischial urethrostomy surgical procedure has been used in the management of urethral defects in stallions with hemospermia. Subischial urethrostomy is thought to facilitate urethral defect healing through reduction in corpus spongiosum pressure. Successful treatment of a stallion with hemospermia by subischial urethrostomy was reported in 1995. This surgical procedure, however, was unsuccessful in a second stallion in the same report. Further development of urethral surgical procedures for breeding stallions with urethral defects is warranted.

The stallion of the present report was unable to completely heal its urethral defect with sexual rest alone, instituted on several occasions over a 4-year period. Surgery was subsequently discussed as an option to preserve fertility. Buccal mucosal urethroplasty was chosen in this stallion to augment currently available urethral repair techniques and potentially improve success. Although none occurred in the stallion of this report, complications of urethroplasty in male horses have been reported. These complications include excessive postsurgical bleeding, urethral fistula, urethral diverticulum, dysuria, tenesmus, and orchitis from ascending infection. In the stallion of our report, a urinary catheter was maintained for 3 days in an effort to protect the surgical site from shear forces during urination and promote graft inosculation. Our goal was to return the stallion to full breeding soundness after surgery.

Buccal mucosal grafting is commonly performed in people with urethral defects. Favorable results have been reported in free graft buccal mucosal urethroplasty in humans, with reported success rates of 90% or greater. Complication rates of surgical sites, both graft harvest and urethroplasty, are low. Beneficial qualities of buccal mucosa as a graft choice are thick epithelium and high elastin content.

Bovine pericardium grafts and fascia lata autografts have been evaluated for use in experimental urethral defects in dogs with mixed results. In a recent clinical report, a goat with repeated failure of traditional perineal urethrostomy reversal was grafted successfully by use of a buccal mucosal graft. When applied to stallion urethroplasty, the buccal mucosa harvest was simple and handling properties were excellent. A combination of subischial urethrostomy and buccal mucosal urethral grafting procedures was successful in this stallion to relieve recurrent hemospermia.

References


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**Selected abstract for JAVMA readers from the American Journal of Veterinary Research**

Effects of dietary lysine supplementation on upper respiratory and ocular disease and detection of infectious organisms in cats within an animal shelter

Tracy L. Drazenovich et al

**Objective**—To determine within a cat shelter effects of dietary lysine supplementation on nasal and ocular disease and detection of nucleic acids of *Chlamydophila felis*, feline calicivirus (FCV), and feline herpesvirus (FHV-1).

**Animals**—261 adult cats.

**Procedures**—Cats were fed a diet containing 1.7% (basal diet; control cats) or 5.7% (supplemented diet; treated cats) lysine for 4 weeks. Plasma concentrations of lysine and arginine were assessed at the beginning (baseline) and end of the study. Three times a week, cats were assigned a clinical score based on evidence of nasal and ocular disease. Conjunctival and oropharyngeal swab specimens were tested for FHV-1, FCV, and *C. felis* nucleic acids once a week.

**Results**—Data were collected from 123, 74, 59, and 47 cats during study weeks 1, 2, 3, and 4, respectively. By study end, plasma lysine concentration in treated cats was greater than that in control cats and had increased from baseline. There was no difference between dietary groups in the proportion of cats developing mild disease. However, more treated cats than control cats developed moderate to severe disease during week 4. During week 2, FHV-1 DNA was detected more commonly in swab specimens from treated versus control cats.

**Conclusions and Clinical Relevance**—Dietary lysine supplementation in the amount used in our study was not a successful means of controlling infectious upper respiratory disease within a cat shelter. Rather, it led to increases in disease severity and the incidence of detection of FHV-1 DNA in oropharyngeal or conjunctival mucosal swab specimens at certain time points. (*Am J Vet Res* 2009;70:1391–1400)

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