

Chad's Problematic Conundrum

By

Jacob A. Kay

Mississippi State University

College of Veterinary Medicine

Class of 2022

Advisor: Darcie Sidelinger, DVM

Introduction:

Common injuries in breeding bulls consist of preputial lacerations, penile hematomas, avulsion of the penis from the prepuce, preputial abscess, paraphimosis, phimosis, and inability to achieve intromission. *Bos indicus* breeds have a pendulous sheath, redundant preputial tissue, and a large preputial orifice increasing their risk of trauma during.^{1,2,4} Prolapse of the prepuce is more frequent in polled bulls due to the aplastic or hypoplastic retractor penis muscle³. These injuries are often secondary to the compressive forces at breeding. Preputial abscesses more common in *Bos taurus* breeds due to the ability to fully retract the penis into the preputial cavity²

History and Presentation:

Chad, a 22-month-old, black, Angus bull, presented to Mississippi State University College of Veterinary Medicine Theriogenology service for swelling of the sheath cranial to the scrotum and preputial lacerations. The referring veterinarian noticed several small lacerations on the prolapsed preputial mucosa, but was more concerned about the swelling cranial to the scrotum. Based on ultrasonography of the swelling, an abscess or hematoma was suspected. It was decided amongst the referring veterinarian and owners to send Chad to Mississippi State for further evaluation. Prior to referral, Chad received 6.6 mg/kg Ceftiofur crystalline free acid (Excede 200 mg/mL, Zoetis, Kalamazoo, MI) and 3.3 mg/kg transdermal flunixin meglumine (Banamine Transdermal 50mg/mL, Merck Animal Health, Madison, NJ).

On presentation, Chad's vital parameters were within normal limits. He had a rectal temperature of 102.1 Fahrenheit, a heart rate of 48 beats per minute, and respiratory rate of 24 breaths per minute. He weighed 1,500 pounds. On cardiopulmonary auscultation, no abnormalities were noted. The prepuce was mildly prolapsed and several small lacerations were

palpable just inside the preputial orifice. There was swelling of the entire sheath from the preputial orifice to the scrotum. The swelling was worst just cranial to the scrotum. The remainder of his physical exam was within normal limits.

Diagnostic Approach:

Chad's injury was evaluated using palpation and examination. A thorough physical exam is the number one diagnostic tool for breeding bull injuries. Most treatment plans are based on examination alone. Chad's swelling was severe enough that it prevented penile extension. This condition, known as phimosis, is the result of strictures of the preputial mucosa or swelling of the sheath causing a functional stricture. Ultrasonography was used to further evaluate the swelling. Substantial edema of the soft tissues surrounding the penis was appreciate. The nature of the edema was unable to be defined as there was not an appreciable amount of fluid noted within the swollen tissues. Unfortunately, ultrasonography does not always allow differentiation between an abscess and hematoma.

Several small lacerations were found just inside the preputial orifice. These lacerations were superficial and less than 1 cm in length. It was likely these lacerations were secondary to the mild prolapse of preputial mucosa. They were not considered a primary lesion. Lacerations can usually be appreciated on palpation; however, *Bos taurus* breeds may retract their lesions into the sheath making them difficult to appreciate on examination. Given Chad's swelling and phimosis, any deeper lacerations could not be appreciated at presentation.

The free portion of Chad's penis was not completely retracted, and the glans penis could be felt just inside the preputial orifice. An attempt was made to extend the penis by grasping the glans penis with a 4x4 dry gauze; however, the swelling made extension impossible. The owners

reported that the referring veterinarian tried to extend Chad's penis using an electroejaculator without success. Given that, the extent of Chad's swelling on presentation, and that manual extension was not possible, an electroejaculator was not used at presentation to extend Chad's penis.

Treatment and Management:

At this time, abscess and/or penile hematoma were the most likely differential diagnoses for the soft tissue swelling of the preputial mucosa. Both conditions warrant a conservative medical management approach. Medical management consists of hydrotherapy, antibiotics, anti-inflammatories, emollient ointments, and sexual rest. Hydrotherapy of the swelling with a shower head, started on December 11, 2020, for two hours, twice daily. After hydrotherapy, the preputial cavity was lavaged with a hypertonic solution of water, betadine, salt, and sugar twice daily. Ichthammol was applied topically over the swelling after hydrotherapy on the first afternoon to act as a drawing salve to further reduce edema and cellulitis. On December 12, 2020, the ichthammol was replaced with Epsom salt gel applied topically following the afternoon hydrotherapy session. Cephapirin Sodium (Today 20 mg/mL, Boehringer Ingelheim, St. Joseph, MO) was applied topically to the preputial lacerations twice daily to function as an antimicrobial ointment. A 500 mL honey solution was infused in to the prepuce once daily to act as an osmotic agent. A sweat wrap was made using the Epsom salt gel applied topically to the swelling of the sheath along with saran wrap and a quilt attached to a support sling (bull diaper). The bull diaper was used to suspend the edematous tissue and aid in the reduction of swelling through elevation and slight compression⁴. It also held the sweat wrap in place over the swelling. This was applied every afternoon following hydrotherapy and left on overnight. On December 13, 2020, Chad received a second dose of 6.6 mg/kg Ceftiofur crystalline free acid (Excede 200 mg/mL, Zoetis,

Kalamazoo, MI). Upon removing the sweat wrap support sling the morning of December 15, 2020, there was purulent discharge noted on the bandage. On further evaluation, it was found that a small opening just inside the preputial orifice was draining pus. The opening was suspected to be a draining tract from the swelling of the caudal sheath. A polypropylene catheter was used to probe the tract and was able to be inserted to the level of the swelling. Lavaging of the preputial cavity was discontinued. Also, the sweat wrap was discontinued. A 10 French, 22-inch-long, polypropylene catheter was inserted into the draining tract and reached the swelling cranial to the scrotum. A lavage system was setup using a 10 Liter carboy and a sterile fluid line. The carboy was filled with an isotonic, 0.05% betadine solution. The carboy was suspended approximately 6 feet above the preputial orifice and allowed to flow by gravity into the draining tract. The preputial orifice was monitored to ensure outflow of the solution. A silver sulfadiazine solution was made using 0.9% normal saline and infused into the draining tract following the high-volume lavage. A 5-day course of Procaine penicillin G 44,000 IU/kg (PenOne Pro 300,000 IU/mL, Norbrook, Newry, Northern Ireland) started on December 18, 2020. A dose of flunixin meglumine 1.1 mg/kg (Banamine 50 mg/mL, Merck Animal Health, Madison, NJ) was also administered that day. On December 21, 2020, an attempt was made to extend the penis. This attempt was not completely successful as the penis only extended approximately one inch from the preputial orifice. The infusion of the silver sulfadiazine solution was discontinued on December 23, 2020 in order to assess if it was impeding wound healing. One week later, on December 30, 2020, manual massage of the sheath revealed approximately 5 mL of purulent material, both morning and evening. On December 31, 2020, the abscess ruptured again through the draining tract. The frequency of the high-volume 0.05% betadine lavage was decreased to every other day to allow for wound healing. On January 5, 2021, the draining tract was

noticeably smaller, and the catheter was more difficult to pass. The purulent drainage was drastically decreased. On January 7, 2021, the catheter was unable to be passed into the draining tract and the high-volume lavage had to be discontinued. The amount of swelling had drastically decreased and was almost resolved. On January 10, 2021, hydrotherapy was discontinued, and a twice daily application of ice for 15-20 minutes was used in its place to decrease swelling.

Pathophysiology

Preputial injuries are more common in *Bos indicus* influenced breeds due to the characteristics pendulous sheath, excess preputial skin, and a large preputial orifice². However, *Bos taurus* bulls are not immune to injury. Because of their anatomy, they are better at hiding their injuries. Their more streamlined, non-pendulous, preputial orifice allows them the ability to retract their injured tissue into the sheath where it goes unnoticed until a more significant problem arises. Abscess formation is a common sequela of preputial injuries⁵. This is particularly true of *Bos taurus* influenced breeds as they retract the injured tissue into the preputial cavity where bacteria can be found amongst the smegma.

Prognosis of a bull with a laceration depends on the severity, presence of infection, and development of adhesions⁵. Medical management must include the application of topical antimicrobials, systemic antimicrobials, emollient ointments, systemic anti-inflammatories, hydrotherapy/soaking of the injured tissue, and sexual rest. Lavage of the injured area should be used to decrease infection and break down any adhesions formed, thereby preventing permanent strictures. Surgical removal of adhesions is often classified as ineffective as the preputial tissue contains tremendous vascularization and reformation of adhesions occurs quickly⁵. Bulls affected by phimosis are normally culled due to most treatments being shown ineffective⁴.

Preputial laceration occurs during the breeding act with the initial injury originating longitudinally to the bull's body⁴. With the retraction back into the sheath the injury then becomes oriented transversely. The trauma and disruption of the preputial epithelium and elastic tissues results in inflammation and edema, and leaves the bull at risk of sepsis of the open wound.⁴ Usually in severe cases, phimosis will occur due to the swelling creating a functional stricture, resulting in the inability to extend the penis.²

Retropreputial abscesses are more common in *Bos taurus* breeds due to the lack of redundant skin and generally tighter sheath conformation.⁴ Bulls that have formed an abscess present with swelling of the overlying skin of the sheath and presence of pus or blood at the preputial orifice.⁴ This condition usually has nonsymmetrical swelling and is located distal to the sigmoid flexure, closer to the level of the preputial orifice.⁴ Abscess formation carries a poor prognosis due to the destruction and impairment of tissues, along with the risk of adhesion formation and compromise of the diameter of the preputial lumen which can prevent the extension of the penis.⁴

In young bulls, a tear in the epithelial attachment could lead to the formation of a hematoma or abscess.⁴ A hematoma occurs when the tunica albuginea is ruptured. Ruminants are able to withstand a high pressure in the peri-penile tissue.⁴ Pressures of greater than 70,000 mmHg are required to rupture the tunica albuginea.⁴ To reach these pressures during breeding, a couple scenarios are likely including collapse during coitus of the heifer or cow, or an ill-timed breeding lunge that increases the angle of the penile shaft against the escutcheon.⁴ Once the rupture of the tunica albuginea occurs the erect penis is only filled with approximately 150-250 ml of blood per erection.⁴ During a breeding season the repeated sexual stimulation allows for continuous leakage of blood to accumulate within the peri-penile tissue.⁴ To diagnose a penile

hematoma the location and symmetry of the swelling are important.⁴ The swelling associated with hematoma formation is characteristically located just cranial to the scrotum at the distal portion of the sigmoid flexure. The rupture of the tunica albuginea is seldom life-threatening. The complications that follow result in abscess formation at the site of the hematoma, formation of adhesions between the penis and peri-penile tissue, development of vascular shunts, injury to prolapsed preputial tissue, and damage to the dorsal nerve of the penis.⁴

These conditions in *Bos taurus* influenced breeds lead to functional phimosis compromising the bull's ability to breed. It is important in these instances to isolate a bull for sexual rest for 60-90 days.⁴ The administration of broad-spectrum antibiotics is then used to minimize further complications. Therapy should focus on the reduction of swelling and medical management to prevent the formation of adhesions and strictures which will further decrease the prognosis.⁴

In summary, the prognosis for a preputial laceration, abscess, and phimosis are all individually poor. Due to cost and lack of good surgical outcomes, most bulls will be culled.

Case Outcome:

On January 12, 2021, the draining tract opening could no longer be appreciated, and all treatments were discontinued. On January 15th, Chad was discharged with instructions to be sexually rested and return in 6-8 weeks for recheck. On March 7, 2021, Chad presented back to MSU-CVM Theriogenology service for a recheck of his phimosis, cellulitis, preputial laceration, and abscess.

A breeding soundness examination was used to evaluate his potential to breed. In response to electroejaculation, Chad was able to achieve erection, protrusion, and ejaculation. On

semen analysis, he had 70% individual motility and 83% normal morphology. There was thickening of the preputial mucosa at the level of what was suspected to be the site of the previous abscess; however, he was able to gain an erection, protrude his penis, and ejaculate on examination. He was cleared for breeding with a note that he should be observed breeding to ensure that intromission is possible. He was collected twice and his semen was frozen. A total of 205 straws were frozen with a post-thaw motility of 50%. Along with the breeding soundness exam, a Tritrichomonas PCR was performed with negative results. In April of 2021, he was collected at another facility and approximately 500 straws were frozen. Two months later, in June of 2021, Chad returned to pasture breeding. He has been observed breeding and the group is reported to have not returned to cyclicity. They have not yet been examined for pregnancy.

References

- 1.Desrochers, A., St-Jean, G., & Anderson, D. E. (1995). Surgical management of preputial injuries in bulls: 51 cases (1986-1994). *The Canadian veterinary journal = La revue veterinaire canadienne*, 36(9), 553–556.
- 2.Devi, K.S., Gangwar, A., Waghaye, J., & Singh, H. (2010). Preputial prolapse and its surgical correction in a crossbred bull.
- 3.F. Wolfe,Review: Abnormalities of the bull – occurrence, diagnosis and treatment of abnormalities of the bull, including structural soundness, *Animal*, Volume 12, Supplement 1,2018, Pages s148-s157, ISSN 1751-7311,
- 4.Maxwell H: Inability to breed due to injury or abnormality of the external genitalia of bulls. In: Hopper RM, editor. *Bovine reproduction*. Ames: Wiley; 2015. p. 113-127.
- 5.Neal, Fred C. (1960) "Surgical Problems of the Penis and Prepuce of Bulls, Part II," *Iowa State University Veterinarian*: Vol. 22 : Iss. 3 , Article 5.