“Breeding Injuries in the Bull”

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Introduction:

Preputial injuries often occur in bulls as a result of breeding activities. Prognosis depends on type or severity of injury. The ultimate goal of treatment is return to breeding function. Preputial injury is more common in *Bos indicus* influenced breeds due to their tendency to have redundant preputial tissue, pendulous sheath, and large preputial orifice (2,3,6). The most common breeding injury associated with the penis is a penile hematoma. Penile hematomas can predispose bulls to other conditions, such as a prolapsed prepuce (2). Common breeding injuries to the prepuce include lacerations, preputial abscesses, contusions, or prolapse. The injuries usually occur on the ventral aspect of the prepuce, due to breeding anatomy. During the early stages of injuries, bulls can attempt to continue breeding, potentially worsening the injury. In *Bos taurus* influenced cattle, the injured bull tends to retract the damaged prepuce into the preputial cavity, which tends to disguise the damage until it progresses to a more severe presentation such as cellulitis, abscess, or fibrosis. There seems to be a correlation between naturally polled breeds and more severe injuries, as they often lack the preputial retractor muscle (6,8).

History and Presentation

Signs of a problem in bulls include reluctance to breed, infertile breedings, or decreased libido. Physical examination is vital to evaluate penile and preputial injuries. The external genitalia should be palpated from sigmoid flexure to glands penis in attempt to recognize any abnormalities. This is accomplished by first safely restraining the bull in a squeeze chute for examination. Manual extension of the penis can be achieved by electroejaculation, applying pressure caudal to the sigmoid flexure, or manual transrectal massage of seminal vesicles, resulting in extension of the sigmoid flexure. The glans penis should then be grasped with a dry gauze sponge to allow full extension. Extensive digital palpation and examination should be

performed. Any isolated bulges or decreased locomotion of the penis and its surrounding tissue should be considered atypical. In fractious or uncooperative patients, a pudendal nerve block may be useful. A successful pudendal nerve block relaxes the retractor penis muscle for easier extension and examination of the penis (1,3,8).

Pathophysiology

Preputial Laceration (and subsequent Prolapse)

Most traumatic events are associated with the ejaculatory lunge. As the penis enters the vagina during the act of breeding, the skin of the prepuce moves caudally along the shaft of the penis near the abdomen of the bull. It becomes folded and accumulates at the preputial orifice. In normal coitus, this is uneventful. But, there are times when the folded mass of preputial skin becomes entrapped between the abdomen of the bull and the pelvis of the cow. The entrapped preputial tissue can directly receive the forces associated with the ejaculatory lunge. Lacerations usually occur on the ventral aspect of the prepuce, due to breeding anatomy. Once injured, fluid accumulation occurs in the damaged tissue and prolapse can occur. During the early stages of injuries, bulls can attempt to continue breeding, potentially worsening the injury (9).

In advanced injuries to the prepuce, significant edema occurs which prevents the retraction of the penis back into the sheath. The longer the injured tissue remains prolapsed, the greater chance that secondary injuries such as necrosis, frostbite, extensive lacerations, and destruction of tissue. Abscess of the prolapsed tissue occurs regularly due to infection of the initial injury site or secondary injuries (6,7). There have been four classes of preputial injuries established by Wolfe and Carson: (8)

Class I	“Simple, preputial prolapse with slight-to-moderate edema without laceration, necrosis, or fibrosis. These respond well to either conservative or surgical treatment with good prognosis for return to service”

Class II	" The prolapsed prepuce has moderate-to-severe edema, may have superficial lacerations or slight necrosis, but has no evidence of fibrosis. Surgery is the usual course of therapy with a good to guarded prognosis."
Class II	" There is severe edema of the prolapsed prepuce with deep lacerations, moderate necrosis, and slight fibrosis. Surgery is indicated and prognosis is guarded."
Class IV	" The prolapsed prepuce has been exposed for quite sometime and has severe edema, deep lacerations, deep necrosis, fibrosis, and often abscess. Surgery and salvage by slaughter are the only options, and a guarded to poor prognosis follows surgery."

Retropreputial Abscess

In contrast to *Bos indicus* influenced breeds, *Bos taurus* influenced cattle's injured prepuce often result in phimosis, rather than prolapse due to the absence of redundant preputial skin and more snug sheath formation. These lesions normally present as a noticeable swelling over the skin of the sheath that may or may not be accompanied by blood or pus at the preputial opening. They are normally asymmetric and present distal to the sigmoid flexure. Loss of elastic tissue of the prepuce often results in adhesion formation within the prepuce, which can interfere with extension of the penis (8,9).

Phimosis is defined as the inability to extend the penis. Phimosis often occurs as a result of stenosis of the preputial opening, adhesions within the elastic layers of the prepuce, or congenital penile abnormalities (8).

Stenosis of the preputial opening is a result of scar tissue replacing damaged elastic tissue of the prepuce. Stricture can also interfere with the voidance of urine from the preputial cavity. Adhesions in the elastic portion of the prepuce can result in the bull's inability to extend his penis. Occasionally, the site of adhesion is readily identifiable by visualization of a defect in the overlying preputial skin (6).

Paraphimosis is characterized by inability to retract the penis. The most common cause of paraphimosis is preputial trauma, especially in *Bos taurus* bulls. Damage to the prepuce, as discussed earlier, can lead to a large amount of edema. The presence of such large amounts of

edema can prevent the penis from being withdrawn into the sheath. When the penis is left exposed for long periods of time, the exposed skin becomes dry and necrotic. It may eventually slough (8).

Penile Hematoma

In breeding bulls, the term penile hematoma usually refers to an injury that occurs during the act of coitus, which results in rupture of the tunica albuginea. The penis of the bull is designed to withstand the high pressures of increased blood flow associated with an erection. In the act of breeding, if a cow changes positions, or any event that causes the penis of the bull to miss his intended target, damage can occur. Often, the penis becomes pressed against the escutcheon of the cow and abnormal angulation of the penis occurs, resulting in increased intrapenile pressure. Increases in intrapenile pressure above 70,000-mmHg results in rupture of the tunica albuginea, which most often occurs on the dorsum of the penis perpendicular to the attachment of the retractor penis muscle on the sigmoid flexure (3). Rupture of the tunica albuginea allows blood to influx and subsequent hematoma formation. Repeated attempted breedings following hematoma formation can result in continued accumulation of blood (4).

Diagnostic Approach

Preputial injuries are best diagnosed by a thorough history and detailed physical exam. Preputial injuries (which include lacerations and abscesses) are characterized by a bulge or swelling in the cranial segment of the prepuce and sheath. Penile hematomas often present at the distal sigmoid flexure and produce swelling dorsal and cranial to the base of the scrotum. Ultrasound may be useful in differentiating between penile hematoma and abscesses, as they can present similarly. Ultrasound images of a penile abscess will show a well-demarcated capsule filled with mixed

echogenicity tissue. Ultrasound images of a hematoma will show no apparent capsule with homogeneous tissue (1).

Treatment/Management

Preputial Lacerations/Prolapse

Preputial Prolapses may be managed medically or surgically, based on the grade of the injury. As previously mentioned, Grade 1 injuries may be successfully medically managed. Before medical intervention, the wounds should be washed and cleaned and an attempt should be made to replace the prolapsed tissue. Measures such as hydrotherapy, soaking in hypertonic solutions, and application of medicated ointments may be helpful in replacing the damaged tissue. For bandaging, a 6-10 inch rigid plastic hose should be placed within the prepuce to insure a patent route of urination. The prepuce is then wrapped with elastic tape. Bandages should be changed as needed until the swelling has ceded (2,8).

Surgical correction is preferred for injury grades 2-4. Several techniques have been described, but the treatment of choice for return to breeding is circumcision or “reefing” technique (2,8). This procedure may be performed under light sedation and appropriate regional anesthesia, specifically, a Pudendal nerve block is recommended (2,6). The bull should be placed in right lateral recumbency and the hair of the prepuce should be clipped and the area aseptically prepped. The penis should be extended and kept in extension with towel forceps that contact the apical ligament. The penis should then be prepped for surgery and draped. A tourniquet should be applied proximal to the intended surgical site. Once a decision has been made on how much tissue is to be resected, marker sutures should be placed, and two circumferential incisions made. The circumferential incisions should remain superficial, as to spare underlying vessels and nerves. The targeted area of fibrosis should then be removed. Once hemostasis is achieved, the

surgical area should be lavaged with sterile saline. The incision should be closed with a simple continuous subcuticular pattern. Caution should be give to not perform a single line of continuous suture, as this can lead to stricture formation. Three stages of continuous pattern should be used to encircle the penis. Dead space should not be closed. Skin staples should be used to secure the outer tissue layer. A Penrose drain should then be sutured into the end of the penis. Antibiotic ointment should then be applied and the penis and prepuce carefully replaced in the sheath. A bandage should be applied, with a 6-10 inch rigid tube and elastic tape. The bandage should be left on for a few days (up to 1 week) and the staples can be removed in 14 days. Often, a support wrap (bull diaper) can aid in protecting the surgically repaired prepuce and to prevent further swelling (1,2,3,7,8).

Phimosis

As previously mentioned, *Bos taurus* influenced breeds are prone to phimosis following preputial injury. Often, these bulls do not have enough preputial tissue for a reefing technique correction. The preferred surgical method is a scar revision. A Pudendal block is to be performed and preparation for surgery is to be made. An elliptical incision is to be made (including the scar). Once the incised tissue is removed, closure is to be made in a longitudinal plane. A “bootlace” pattern is used, beginning at the distal end of the incision and continued proximally. The penis should be released and returned to the prepuce before the suture ends of the pattern are tied. Failure to do this can result in inability to retract the penis. A Penrose drain should then be sutured at the end of the penis to aid in drainage. Sutures can be removed in two weeks. Careful examination of the surgical site and repeated extension and retraction should be performed prior to return to service. The bull should receive three months of sexual rest prior to return to service (6,8).

Paraphimosis

The goal of treating paraphimosis is for the bull to regain ability to retract the penis into the sheath. This can be accomplished by applying salves, antibacterial ointments, and covering the swollen penis with a stockinette to prevent further contamination. This process should continue until the bull is able to retract the penis. Once that is achieved, infusion of the preputial cavity with salve and antibiotic ointment for 7-10 days is indicated. Bulls recovering from paraphimosis should have at least 30 days sexual rest (8).

Retropreputial abscesses

Treatment of retropreputial abscesses is dependent on administration of systemic antibiotics and regional wound management. Routine cleansing of the damaged tissue with dilute antiseptic solutions and hydrotherapy with cold water helps in resolution of cellulitis. If possible, drainage of retropreputial abscesses into the preputial lumen may aid recovery. Multiple sources recommend that drainage of the abscess through the preputial skin should not be attempted (6,8).

Penile Hematoma

Several treatment modalities are present for penile hematomas, depending on the owner's preference and the value of the bull. Treatment options include salvage for slaughter, surgical removal of the blood clot (with repair of the rent), and medical management. For injuries that are identified early, surgical drainage and repair of the rent increases the likelihood to return to breeding function (3,4). Surgical correction is characterized by placing the bull in right lateral recumbency on a tilt table. The injured area is surgically prepped and an incision is made just cranial to the rudimentary teat. With Fine dissection, and caution to hemostasis, removal of the blood clot can be achieved. The incision is then to be lavaged with a warm saline povidone iodine solution. Once the clot is removed and the incision is lavaged, blunt dissection is to be

performed with careful attention given to avoid injury to vasculature and nerves. Once the rent is visualized, the edges of the rent can be debrided very carefully to conserve the necessary tissue for closure. The traditional method for closure includes a bootlace pattern with number 1 polyglycolic acid (PGA) suture. This method is preferred, due to the increased level of tension following closure. The elastic layers of the prepuce should be closed in a continuous pattern using 3-0 chromic catgut suture. The skin should then be closed with 6mm synthetic non-absorbable suture in a Ford Interlocking pattern. Following surgery, Bulls should receive 60-90 days of sexual rest (2,6).

Medical management is based on broad-spectrum antibiotic administration, cold water hydrotherapy, and strict sexual rest for 60-90 days. For injuries that go un-noticed initially, medical management is recommended (2).

Conclusion

Injuries to the reproductive tract of bulls serve as a source for significant financial loss for beef producers. Breeding injuries in bulls can be successfully managed with both surgical and medical methods, depending on the extent of the injury. Owners should base their treatment selection on value of the animal, extent of the injury, and prognosis for recovery. Thorough examination of the bull's reproductive tract is essential at the time of breeding soundness exam to recognize these injuries early and provide the best chance for return to service.

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