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## **Surgical Management of Preputial Injuries in Bulls**

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Preputial injuries commonly occur in bulls under pasture breeding conditions. Chronic preputial prolapse predispose bulls to preputial injuries. Factors affecting preputial prolapse include the size of the preputial orifice, length of the sheath (prepuce), hypoplasia or aplasia of the retractor preputial muscles, and hypotonia of the retractor penis muscle. The heritability of each of these factors has not been completely worked out, but some veterinarians suggest culling bulls with chronic preputial prolapse as a method of reducing the incidence of this condition.

### **Surgical Management of Preputial Injuries**

Some confusion has developed in naming or describing surgical techniques used to repair preputial injuries. By definition, any procedure that removes all or part of the prepuce is termed a circumcision. Consequently all the surgical techniques used to repair preputial injuries could technically be termed circumcisions. Circumcision, or partial preputial amputation, are used to denote removal of a full thickness segment of the prepuce and suturing the ends together. Reefing, or preputial resection and anastomosis, are used to describe removal of a partial thickness section of the prepuce and suturing of the epithelial margins together.

The difference between reefing and circumcision is that reefing removes a partial thickness segment of the prepuce and underlying elastic laminae while a circumcision removes a full thickness segment of the prepuce and underlying elastic laminae. The advantages of reefing are: 1) the entire length of the prepuce is visualize eliminating the possibility of missing a lesion that should be removed, 2) the surgeon can determine exactly how much prepuce is remove and have an idea whether it will affect the bull's ability to fully extend its penis during an erection, and 3) stricture formation is rarely a problem because all the elastic lamina are not disrupted during surgery. The disadvantages of the reefing technique are that it requires an assistant to maintain the penis in extension during surgery and one must wait until the injury is healed before initiating surgery. The advantages of a circumcision are a surgical assistant is not required, fibrotic lesions which prevent penile extension without surgical intervention can be removed, and wounds do not need to be completely healed before initiating surgery. Disadvantages of circumcisions are 1) all the elastic lamina of the prepuce are disrupted during surgery which increase the potential for stricture formation, 2) the large vessels that supply the prepuce are transected, therefore hemostasis can be a problem, 3) if the surgeon does not

extend the penis and inspect the entire prepuce prior to surgery, a secondary lesion could be missed, and 4) there is no way to determine if the amount of tissue being removed will affect the bulls ability to extend the penis when erect, unless the surgeon fully extends the penis and prepuce prior to surgery.

Surgery can be performed with the bull under general anesthesia, or sedation and a pudendal nerve block. Surgery is best performed on a table in a clean environment. Feed is withheld for 48 hours and water withheld for at least 24 hours to reduce the potential for regurgitation and aspiration during surgery. Position the bull in right lateral recumbency to reduce the potential for bloat to cause respiratory difficulty and pad the down shoulder to prevent radial paralysis or paresis. Administer perioperative antimicrobial drugs prior to surgery and continue them for at least 72 hours postoperatively. The author routinely uses procaine penicillin G (22,000 U/kg, IM, BID).

### ***Reefing Technique***

To perform a reefing procedure, extend the penis and make one circumferential incision proximal to the lesion, a second circumferential incision distal to the lesion, and connect them with a linear incision. Make all incisions through the epithelium and just into the superficial elastic lamina. Using a combination of sharp and blunt dissection, create a plane of dissection between elastic lamina so the damaged parts of the epithelial covering any damage portion of the elastic lamina are removed in mass. Complete hemostasis is a must and can be accomplished with ligatures or electrocautery. Close the incision site with two layers of interrupted size 0 or 1 absorbable sutures. The first layer apposes the edges of the elastic lamina that were removed and the second layer apposes the epithelial covering. To prevent bunching of the tissue, place the first 4 sutures of each layer at the 12 and 6 then 3 and 9 o'clock positions. Use simple interrupted sutures to fill in the remaining spaces.

Place a purse-string suture at the preputial orifice for 24 hours to retain the penis and prepuce within the sheath and prevent the bull from self inflicted injuries while it recovers from the effects of anesthesia. Remove the purse-string suture the day after surgery and apply a sling until the sutures are removed in 10 to 14 days. Rotate the sling twice daily to help prevent urine scald. Hydrotherapy following surgery is contra-indicated because of the detrimental effect to the sutures and healing of the incision. Failure to keep the bull in a sling after surgery can lead to excessive preputial edema and dehiscence. If the bull develops excessive preputial swelling after sutures and sling removal, replace the sling for an additional 7 to 14 day.

### ***Circumcision***

Circumcision is performed with the penis retracted. Grasp the prolapsed portion of the prepuce with grasping forceps positioned 180° from each other. Elongate the prepuce and hold it open by retracting the grasping forceps away from the bull and each other. Insert two fingers of one hand into the preputial cavity with the palm facing up. Flex the fingers to apply additional tension to half of the prepuce so that any large vessels laying between the internal and external epithelial layers are identified. Make a liner incision, parallel to the long axis of the prepuce and measuring 2-3 cm in length, through the external epithelial layer beginning 2-3 cm proximal to the damaged portion of the prepuce and proceeding distally. Take care to avoid large vessels in the area. Extend the incision through the elastic lamina of the prepuce and the

internal epithelial layer until the preputial cavity is entered. Vessels encountered while incising through the preputial layers should be double ligated and transected between the ligatures. Grasp the external lamina of the preputial epithelium with thumb forceps and rotate it in such a way that any large vessels located in the elastic lamina on either side of the linear incisions can be identified, ligated and transected. Suture the internal epithelial laminae of the prepuce to the external epithelial laminae along each side of the incision, beginning at the proximal aspect and proceeding distally, for approximately 1-2 cm. Beginning on one side of the linear incision, make a circumfrential incision perpendicular to long axis of the prepuce and extend it just through the external epithelial laminae, at the point where the internal and external epithelial lamina are unopposed. Extend the circumfrential incision 3-5 cm and gradually deepen it to expose vessels laying in the elastic laminae of the prepuce. Ligate and transect large vessels as previously described. Increase the depth of the incision until all the elastic laminae and the internal epithelial lamina have been incised. Suture the internal epithelial laminae to the external epithelial laminae. Lengthen the circumfrential incision in increments of 3-5 cm until the entire circumference of the prepuce has been incised and the proximal edges of the internal and external epithelial laminae are sutured together.

### ***Postsurgical Management***

Place a purse-string suture at the preputial orifice at the completion of a reefing or circumcision to retain the penis and prepuce inside the sheath while the bull recovers from anesthesia. Leave the purse-string suture in place for 12-24 hours. Apply a sling to prevent excessive swelling at the surgical site following removal of the purse-string suture. Rotate the sling twice daily and remove it when the sutures are removed at 10-14 days. If preputial swelling develops once the sling is removed, replace the sling for another 3-7 days. Acepromazine, (0.005-0.015 mg/kg IV), can be administered if needed to relax the retractor penis muscle and help partially prolapse the prepuce to facilitate suture removal. Gently massaging the accessory sex glands per rectum may also result in partial prolapse of the prepuce and help facilitate suture removal.

Administer prophylactic antimicrobial drug for a minimum of 72 hours after surgery. The authors prefer procaine penicillin G, 20,000 U/kg q 12 hrs. Oxytetracycline, 9 mg/kg SQ, Q 48 hrs could be used prophylactically as an alternative to procaine penicillin G.

### ***Postsurgical Complications***

Complications following preputial surgery are infrequent. Complications that may occur include abscess formation, dehiscence and stricture formation. Allowing adequate time for healing of the damaged tissues prior to performing surgery lessens the likelihood of dehiscence and abscess formation. Stricture formation is more common following a circumcision than a reefing procedure because the entire thickness of the prepuce is removed. If during the reefing procedure the plane of dissection is carried through all the elastic lamina to the shaft of the penis, the dorsal artery, vein and nerve of the penis could be transected and render the bull nonfunctional due to the loss of the ability to develop and maintain an erection or because of the loss of sensation to the glans penis.

### **“Ring” Technique**

In the author’s opinion, the “ring” technique is a simple “salvage” procedure. It is essentially an inexpensive and simple way of performing a circumcision. While not always the case, one

should expect a high incidence of postoperative stricture formation, especially in *Bos taurus* breeds. To perform the “ring” technique, one needs 2% lidocaine, size 1 or 2 non-absorbable suture, half-curved suture needles and a 5 cm length of plastic pipe of an appropriate diameter to fit with the preputial cavity. Drill holes through the pipe, at 0.5 cm intervals circumferentially around the pipe, equidistant from each end. Infuse 2% lidocaine around the circumference of the sheath 3 - 5 cm proximal to the preputial orifice. Place the section of pipe into the preputial cavity such that the holes are located proximal to the lesions and at least 1 cm distal to the preputial orifice. Thread suture onto the needle. Beginning within the lumen of the pipe, push the needle and suture material through one of the holes and out through the full thickness of the prepuce. Thread the needle on the opposite end of the same piece of suture. As before, pass the needle from within the pipe out through an adjacent hole, and through the entire thickness of the prepuce. Tie the two ends together tightly to provide hemostasis. The same steps are repeated until a series of simple interrupted sutures passing through the holes in the pipe and the prepuce are encircling the circumference of the prepuce. Excise the distal portion of the prepuce beginning 3 - 5 cm distal to the sutures.

### ***Postsurgical Management***

A sling is applied postoperatively to prevent excessive edema. Administer procaine penicillin G, 20,000 IU/Kg, IM, twice daily for a minimum of 72 hours. Rotate the sling twice daily to prevent urine scald. The pipe and sutures should slough off in 10 to 14 days. Maintain complete sexual rest for 45 days.

### ***Postsurgical Complications***

Stricture formation is a common occurrence when using the ring technique, especially in *Bos taurus* breeds. The incidence of strictures is less common in *Bos indicus* breeds, however, it is still quite common. Consequently, the “ring” technique should be viewed as more of a salvage procedure.

### **Surgical management of preputial strictures**

Initially, preputial strictures are managed in much the same fashion as any other preputial injury. The key is to enlarge the stricture so that the penis can be extended through the stricture and the scar tissue removed by reefing or circumcision. The objective when enlarging a strictured area is to incise through the scar tissue causing the stricture, but not create a plane of dissection between the elastic lamina separating the internal and external epithelial layers of the prepuce.

To enlarge a preputial stricture, the following materials may aid the process. 1) 2% lidocaine, 2) a teat cannula, blunt probe, or plastic hypodermic needle case, 3) scalpel blade, and 4) 2 Bachus towel clamps. Infiltrate the prepuce with lidocaine at the stricture. Grasp the end of the prepuce with the Bachus towel clamps and evert. Identify the opening into the preputial cavity. Insert a blunt probe, teat cannula, or disposable hypodermic needle case through the strictured area to aid in identifying the preputial cavity. Make a linear incision through the epithelial lining of the prepuce beginning at the strictured opening into the preputial cavity and move peripherally. It should give the appearance that the prepuce is being bisected into two equal halves. Gradually deepen the incision into the elastic lamina beneath the epithelium. As the opening into the preputial cavity is increased, extend the incision toward the preputial

cavity using the guide to insure that the a plane of dissection is not started between the internal and external epithelial lamina of the prepuce. Gradually extended and deepen the incision toward the preputial cavity until the stricture is large enough to allow full extension of the penis, or passage of 2-3 fingers into the preputial cavity. Remove the stricture portion of the prepuce by reefing, circumcision or the ring technique.

**Abstract**

Les blessures du prépuce sont fréquentes chez le taureau de reproduction au pâturage. Les chirurgies tel que la résection segmentaire, la circoncision et la technique de l'anneau sont utilisées pour traiter ces blessures. Les techniques chirurgicales ainsi que leurs complications possibles sont décrites.