

MASTECTOMY IN RUMINANTS
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Key Points

- Mastectomy can be a life saving procedure in patients with toxic or gangrenous mastitis.
- Although complications are possible, with the proper knowledge and technical skill, mastectomy can be a very successful and rewarding procedure.

Mastectomy is occasionally employed in ruminants to treat conditions involving the mammary gland and associated structures. Cases of toxic, gangrenous or chronic unresponsive mastitis, large udder abscesses, neoplastic conditions, precocious udder, or severe breakdown of the udder's support are indications for mastectomy. Mastectomy in ruminants typically is either a radical mastectomy (removal of the entire gland) or hemi-mastectomy where half of the gland is removed. Removal of one quarter in a cow is typically not recommended because there is not a clear division between cranial and caudal mammary glands on a given side, however there is a case report of a successful removal of one quarter in a cow for management of gangrenous mastitis.¹

The decision to perform a mastectomy must be well thought out before surgery. As with any surgical procedure, general complications such as surgical site infection are possible. Mastectomy also carries with it unique complications such as permanently decreased (or absent) milk production, and potentially shock due to removal of a large vascular organ. Significant hemorrhage is also a possible complication from either failure to adequately ligate the major mammary vasculature or inadequate hemostasis of the numerous small vessels of the udder.

Animals in which mastectomy is indicated are usually sick and compromised. General anesthesia and potential fluid losses during mastectomy can further compromise the patient. Surgeons should work as quickly as possible to expedite the procedure; however surgical mistakes can result in death of the patient. The surgeon(s) should be familiar with the procedure and the anatomy before embarking on mastectomy. This is especially important in bovine patients with very large mammary glands.

Udder Anatomy

The udder is supported by the medial and lateral lamina. The medial lamina is comprised of 2 sheets intimately apposed to each other and is termed the medial suspensory ligament. Failure of this structure results in ventral deviation of the medial aspect of the udder. The double sheet of suspensory lamina on the medial aspect permits unilateral mastectomy.

In cattle, the blood supply to and from the udder is via the external pudendal arteries and veins. Additionally the subcutaneous abdominal (milk) vein is formed by the confluence of the cranial and caudal superficial epigastric veins and also provides significant venous drainage to the udder. The mammary branch of the ventral perineal artery and the ventral labial vein also provide minimal contribution to the circulation of the udder. The superficial inguinal (mammary) lymph nodes are located at the caudoproximal aspect of and provide lymphatic drainage to the udder. Nervous innervation to the udder is provided by the iliohypogastric (L2), ilioinguinal(L3), and the genitofemoral (L3) nerves. The mammary branch of the pudendal nerve (Sacral nn. 2-4) provides innervation to the caudal part of the udder.

Anesthesia

Mastectomy in ruminants is most commonly performed under general anesthesia. General anesthesia is ideal for restraint; however the associated cardiopulmonary depression can be life threatening to an animal that is already compromised. General anesthesia also adds expense to the procedure. A high dose epidural or local anesthesia can be used to achieve anesthesia of the area but the restraint is less than that achieved with general anesthesia.

Surgical Procedure

The animal is placed in dorsal recumbency and the legs are tied to the table in an abducted position. The area around the udder is surgically prepared. The prepped area should extend from the umbilicus to the perineal area.

Mastectomy is typically performed as an en-bloc resection of mammary tissue. Skin should be conserved so that the skin can be easily closed without tension. An elliptical incision is made around the udder. The skin incision may need to be placed distally on the udder (toward the teats) so that enough skin remains for closure. The skin incision is made from 6-8 inches cranial to the udder to the perineal skin. Following the skin incision, a combination of blunt and sharp dissection is used to separate the skin from the mammary tissue. The skin is retracted proximally, and the junction of mammary gland and abdominal wall should be identified on the lateral aspect of the gland. Blunt dissection is usually sufficient to separate the mammary gland from the body wall and is superior to sharp dissection because hemorrhage is less. However multiple small vessels are inadvertently encountered and electrocautery or another method of hemostasis should be employed to decrease blood loss. As dissection is continued, attention should be paid to identification of the external pudendal vasculature to avoid inadvertent transection.

Dissection is continued until the external pudendal arteries and veins are encountered passing through the inguinal rings. These vessels are bluntly (and gently) separated from the surrounding tissue so that they may be ligated. Double or triple ligations are performed. The author routinely uses #2 or #3 chromic gut with 2 proximal circumferential sutures and a transfixation suture distal. Other surgeons have had success using non-absorbable sutures such as cotton umbilical tape for these ligations. A clamp or another ligature is placed on the udder's side of these vessels and the vessel is transected. The pudendal artery and vein should be ligated separately. Dissection is continued cranially and the subcutaneous abdominal vein is ligated in a similar manner. The perineal vessels are also ligated as they are encountered at the caudal aspect of the mammary gland.

Near the medial aspect of the mammary gland, the median suspensory ligament requires sharp transection. The suspensory ligament should be transected at approximately 1 cm from the body wall. Transection of the ligament too close to the body wall may inadvertently incise through the body wall or create weakness in the ventral body wall support. If a hemimastectomy is desired, complete transection through this ligament is not performed in order that the remaining mammary tissues has medial support.

Complete mastectomy involves creation of considerable dead space. A Penrose drain should be placed for 3 days following surgery to decrease fluid accumulation. The drain should exit at the most ventral (dependent) aspect of the dead space pocket. If possible, dead space should be ablated with sutures prior to skin closure. The skin incision is closed routinely. Tension relieving sutures should be used as needed if the skin is under a lot of tension when closed. Adducting the legs is also useful to help appose the skin margins. The animal should be

placed in hobbles to prevent abduction of the legs which increases tension on the skin. This is especially important during recovery when the animal is likely ataxic and likely to fall.

Physiologic Mastectomy

Physiologic mastectomy has been described as an approach to mastectomy that does not involve surgical removal of the udder^{2,3}. This technique involves making a laparotomy incision in the paralumbar fossa ipsilateral to the side that has udder pathology. If the ipsilateral side cannot be used, this procedure can be performed successfully from the contralateral side². The external pudental artery and vein are palpated as they course through the inguinal rings (approximately 10 cm ventral and lateral to the pubic symphysis). The vessel should be approximately 1-2 cm in diameter. Blunt dissection is used to separate the vessel from the surrounding tissue so that ligation can be performed. Vessel ligation has been described with large non-absorbable suture or sterilized cable ties. The presence of an arterial pulse distal to the ligation is indication for a second ligation. Abdominal ligation of the external pudental vessels via a colpotomy incision has also been reported.³ Physiologic mastectomy has been described with external pudental vasculature ligation alone² or in combination with subcutaneous abdominal and perineal vasculature ligation.³ Atrophy of the gland is expected from 10 days to 8 weeks post operatively.

1. Phiri AM, Muleya W, Mwape KE: Management of chronic gangrenous mastitis in a 3-year-old cow using partial (quarter) mastectomy. *Trop Anim Health Prod* 42:1057-1061, 2010
2. Allen AJ, Barrington GM, Parish SM: Physiologic mastectomy via flank laparotomy. *Vet Clin North Am Food Anim Pract* 24:511-516, vii, 2008
3. Noordsy JL, Ames NK: *Food animal surgery* (ed 4th). [Trenton, N.J.], Veterinary Learning Systems, 2006, pp xi, 331 p.