

# Physiologic Mastectomy via Flank Laparotomy

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## KEYWORDS

- Mastectomy • Gangrenous mastitis • Mastitis
- Mammary gland • Physiologic mastectomy

## INDICATIONS FOR USE

The external pudendal arteries provide the primary blood supply to the mammary glands, with a minor contribution provided by the ventral perineal arteries (**Fig. 1**). After emerging from the inguinal ring, the external pudendal artery branches to form the cranial mammary and caudal mammary arteries. Physiologic mastectomy (mastatroph) involves reduction of the vascular supply to the mammary gland provided by the external pudendal artery, which causes tissue atrophy and possibly decreased systemic absorption of toxins liberated by affected glands. Indications include chronic suppurative mastitis, gangrenous mastitis, and chronic, severe mastitis associated with organisms that liberate endotoxin (eg, *Escherichia coli*, *Klebsiella* spp) or exotoxin (eg, *Staphylococcus* spp). Physiologic mastectomy via flank laparotomy is strictly a salvage procedure. Improved survival rates and decreased convalescence time have been reported with similar mammary vessel ligation procedures.<sup>1</sup> The procedure can be performed rapidly and is significantly less complicated and traumatic than a complete or hemi-mastectomy.

## ANESTHESIA AND SURGICAL PREPARATION

The procedure is performed with the animal standing. The surgical approach is typically via the side ipsilateral to the mastitic or affected gland; however, it can be performed from the contralateral side if adhesions from previous surgeries are present. The paralumbar fossa is clipped and a routine surgical preparation is performed. Local anesthesia is administered in a routine manner using an “inverted L,” distal parvertebral, or line block.

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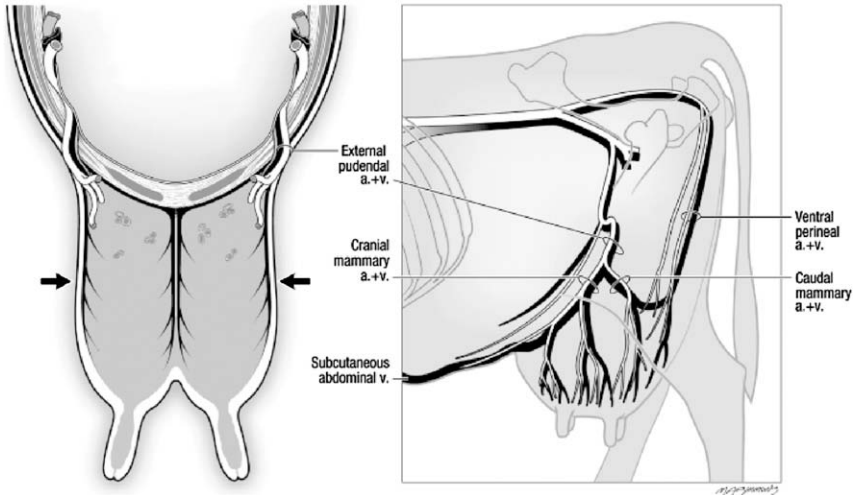


Fig. 1. Blood supply to the bovine mammary gland.

### SURGICAL TECHNIQUE

An approximately 20-cm incision is made in the mid-paralumbar fossa beginning approximately 8 cm ventral to the lumbar transverse processes. Sharp dissection through all muscle layers or a grid approach can be used, depending on the surgeon's preference. A brief exploration of abdominal structures is suggested to rule out other conditions that may affect prognosis.

The external pudendal artery is a branch of the pudendoepigastric trunk, which in turn is a branch of the internal iliac artery. The external pudendal artery and vein are located by palpating along the internal abdominal wall caudal to the incision as they enter the internal inguinal ring (approximately 10 cm ventral and lateral to the pubic symphysis). The pulse and size of the artery (1–2 cm diameter) are easily recognized as the vessel penetrates the internal inguinal ring exiting the abdominal cavity (Fig. 2). The external pudendal artery and vein are isolated immediately proximal to the internal inguinal ring via blunt dissection to separate the vessels from the peritoneal

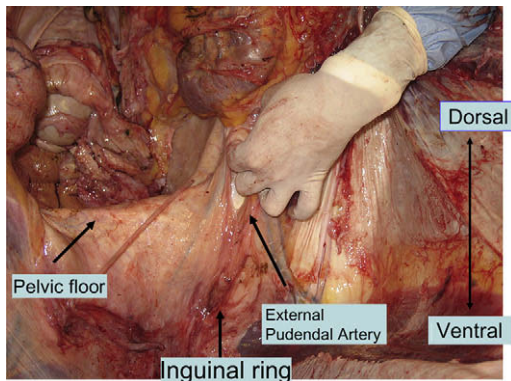
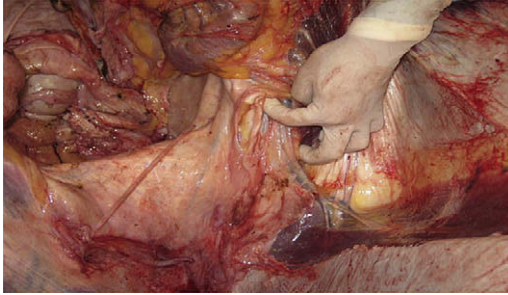


Fig. 2. Find the external pudendal artery as it transveres through the inguinal ring.

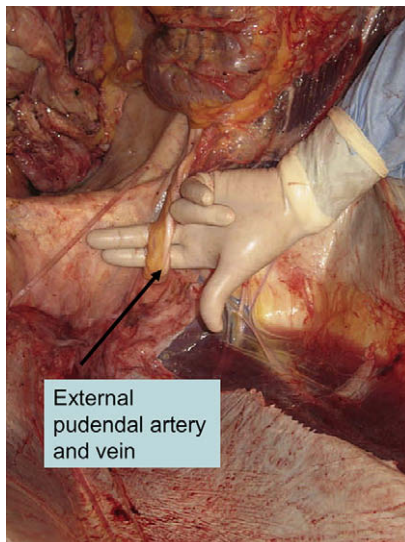


**Fig. 3.** Bluntly dissect the vessels from the body wall with tips of fingers and thumb.

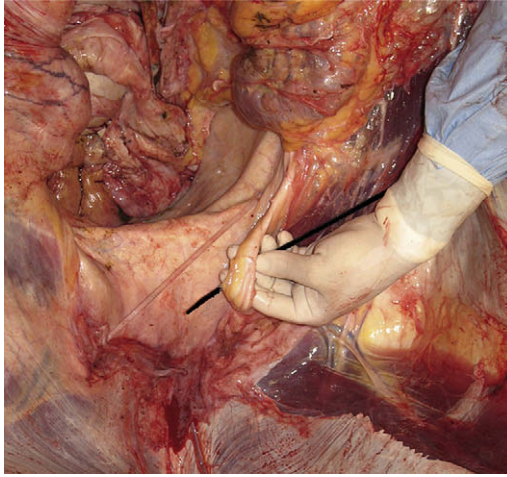
membrane, fat, and connective tissue (**Fig. 3**). It is important to free the vessels from most of the surrounding connective tissue to allow for proper ligation. Adequate dissection is achieved when the operator can insert two fingers completely around the vessels (**Fig. 4**). Ligation can be achieved using any large, nonabsorbable suture material. We have found that the use of a sterilized cable tie in place of suture material greatly aids in the speed and ease of ligation (**Figs. 5–7**).

Once the cable tie is placed, the artery distal is palpated to detect any remnant pulse. If a pulse is present, the tie is further tightened. Once ligation is deemed successful, the tie can be trimmed short or left untrimmed, and the abdomen is closed in a routine manner. In concurrence with other authors,<sup>2,3</sup> we consider the contribution of the ventral perineal artery and vein to be insignificant and do not ligate it in this procedure.

If a cow is systemically compromised, postoperative antibiotics and anti-inflammatory drugs can be administered. Cases of chronic, suppurative mastitis may benefit from drainage of the quarter by concurrent teat amputation. In most



**Fig. 4.** Dissect the vessels until you can get two fingers between the vessels and the body wall.

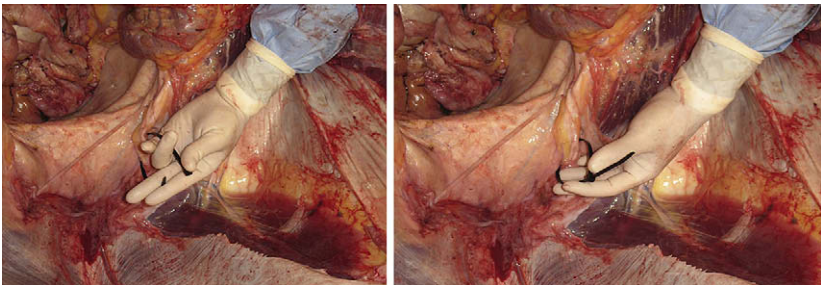


**Fig. 5.** Insert cable tie under vessels.

cases, the noticeable atrophy of the gland does not occur for 6 to 8 weeks after surgery. Frequently, we observe resumption of eating within 1 to 2 days after surgery in animals that were anorectic preoperatively.

## DISCUSSION

Other techniques for physical or physiologic mastectomy in the cow have been described, including ligation of the external pudendal artery via a transvaginal approach or an external inguinal approach and a complete mastectomy.<sup>1-4</sup> Advantages of the physiologic mastectomy procedure described herein include decreased operative time, a more simplified and standard approach, and completion of the procedure using local anesthesia while the animal is standing. Disadvantages include the need to enter the abdominal cavity, the blind approach, and occlusion of the blood supply to an entire half of the gland. The procedure is a simple yet effective alternative to radical mastectomy for cases of unresponsive mastitis in genetically valuable or otherwise valued cattle. The procedure also may be an effective salvage option in decreasing mortality and convalescence with cattle that suffer severe gangrenous or toxin-producing mastitis and would typically be euthanized.



**Fig. 6.** Insert cable tie into ratchet case and tighten.

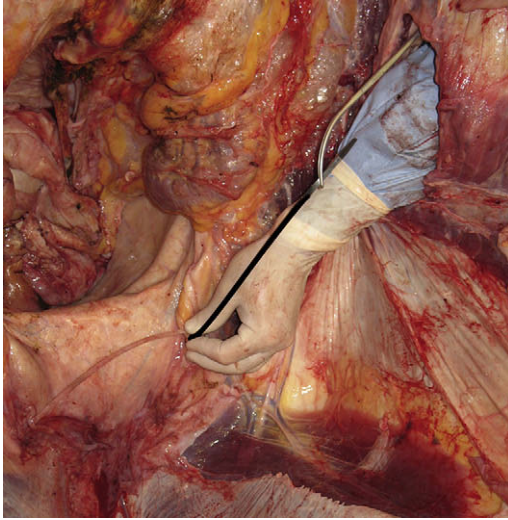


Fig. 7. Long-handled carmalt forceps can assist in tightening the cable tie.

The long-term effects of physiologic mastectomy are less well described and are likely to depend on the severity and etiology of the original mastitic episode. Anecdotal evidence in beef cattle suggests a good prognosis for the life of the cow and her ability to raise a calf on the functional half of the original mammary tissue. The procedure in dairy cattle is clearly recommended for salvage purposes and to prolong the life of genetically valuable individuals because milk production is affected significantly. In humans, incomplete ligation can result in the formation of thrombi.<sup>5</sup> On limited occasions, we have observed thrombosis of the external pudendal artery and suspected the cause to be related to an incomplete ligation (Fig. 8). Finally, one could assume an increased risk for aneurysm formation proximal to the ligature; however, this complication has not been observed to date.

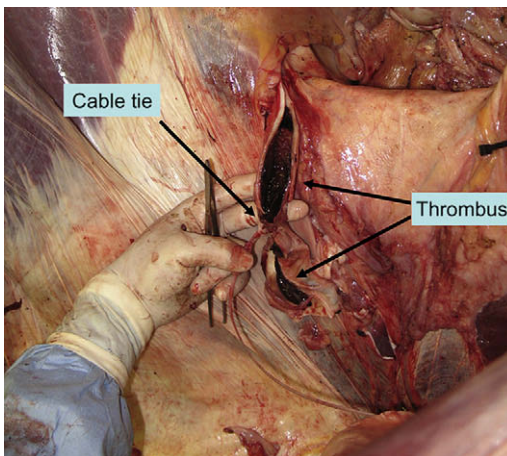


Fig. 8. Thrombosed vessel opened with cable tie in the center.

**REFERENCES**

1. Brewer RL. Mammary vessel ligation for gangrenous mastitis. *J Am Vet Med Assoc* 1963;143:44–5.
2. El-Maghraby HM. Comparison of two surgical techniques for mastectomy of goats. *Small Rumin Res* 2001;40(3):215–21.
3. Noordsy JL. Food animal surgery. Lenexa (KS): Veterinary Medicine Publishing Company; 1989. p. 238–43.
4. Cable CS, Peery K, Fubini SL. Radical mastectomy in 20 ruminants. *Vet Surg* 2004; 33(3):263–6.
5. Oneglia C, Muneretto C, Rusconi C. Transesophageal investigation of surgically ligated left atrial appendage. *Echocardiography* 2004;21(7):617–9.