Acta Scientiae Veterinariae, 2023. 51(Suppl 1): 855.

CASE REPORT
Pub. 855

ISSN 1679-9216

Mastectomia a campo em ruminantes - aspectos cirúrgicos e clínico-patológicos

Field Mastectomy in Ruminants - Surgical and Clinicopathological Aspects

Kelly Regina Freitas Freire[1], Saulo Andrade Caldas[1], Vivian de Assunção Nogueira[1], Marina Galindo Chenard[2], Catharine Porto Feres[2], Matheus Dias Valle[2], Isabelle Magalhães da Cunha[2] & Michel Abdalla Helayel[2]

ABSTRACT

***Background*:** We report the case of 3 cows, 1 ewe, and 1 doe, with chronic mastitis and which underwent a mastectomy. All animals had a history of mastitis, edema with purulent secretion in the udder region, areas of abscess formation, fibrosis, hypogalactia, and agalactia. The animals had already been treated with systemic antibiotic therapy and anti-inflammatory drugs without response. The objective of this work is to describe the surgical and clinicopathological aspects of performing a radical mastectomy in the field in 3 cows and 1 ewe, and a partial mastectomy in a doe, with both procedures performed successfully and considered efficient to maintain the survival of the affected animals, in addition to being economically viable.
***Cases*:** In all animals reported in the study, a general and a specific clinical examination were performed, where on palpation of the udder were observed an increase in the region of the mammary apparatus, fluid fluctuation, areas of fibrosis with increased stiffness, and loss of udder functionality. In the case of the doe, there was a functional teat, which was preserved during the surgical procedure. Radical mastectomy was performed in 3 cows and 1 ewe, and the doe underwent a partial mastectomy, with preservation of the functional teat. All animals have fasted for food and water for 48 h. In cows, the anesthetic protocol consisted of 2% xylazine hydrochloride [0.15 mg/kg, intramuscularly (IM)], followed by an epidural block in the lumbosacral region with 2% lidocaine hydrochloride [10 mL]. The midazolam hydrochloride [0.1 mg/kg, intravenously (IV)] and 2% xylazine hydrochloride [0.05 mg/kg, IM] were administered to the ewe and the doe, also associated with lumbosacral epidural anesthesia with 2% lidocaine hydrochloride [5 mL]. The animals were positioned in the right lateral decubitus position and the entire abdominal and udder region were shaved and sanitized for the surgical procedures of radical mastectomy and partial mastectomy, with the use of degerming and topical povidone-iodine. The postoperative period consisted of penicillin-based antibiotic therapy associated with streptomycin [24,000 IU/kg, IM, 10 consecutive days] and flunixin meglumine [2 mg/kg, IM, 3 consecutive days] in cows; enrofloxacin [2.5 mg/kg, IM, 7 consecutive days] and flunixin meglumine [0.5 mg/kg, IM, 5 consecutive days] in the ewe; oxytetracycline [10 mg/kg, IM, 5 applications on alternate days] and flunixin meglumine [0.5 mg/kg, IM, 3 consecutive days] in the doe. In all animals, the cleaning of the surgical wound was performed daily with 10% topical Povidone-iodine and Permethrin ointment, for 14 days, when the stitches were removed.
***Discussion*:** The choice of the surgical procedure resulted in improvement of the clinical conditions and increased survival of all animals, and in the case of the doe, partial mastectomy contributed to the preservation of the functional teat, preserving its productive capacity. All anesthetic protocols used and the anatomical positioning of the animals were satisfactory for performing the procedures. Although they are techniques described in the literature with great blood loss, especially in cows, blood transfusion was not required in any of the animals. The stitches were removed 14 days after the surgical procedures, and the surgical wound was completely healed.

Keywords: surgery, radical, partial, mastitis, production, goat, sheep.

DOI: 10.22456/1679-9216.124160

Received: 23 October 2022 Accepted: 25 February 2023 Published: 30 March 2023

[1]Instituto de Veterinária, Universidade Federal Rural do Rio de Janeiro (UFRRJ), Seropédica, RJ, Brazil. [2]Universidade Federal Fluminense (UFF), Niterói, RJ, CORRESPONDENCE: K.R.F. Freire [kfmedvet@gmail.com] & S.A. Caldas [sauloacaldas@hotmail.com]. Instituto de Veterinária - UFRRJ. BR 465, KM 7. CEP 23.890-000 Seropédica, RJ, Brazil.

INTRODUCTION

Among the main diseases that affect the udder, we can highlight mastitis as the disease with the greatest impact and prevalence in production herds, which reduces the quality and quantity of the milk, influences the involuntary discard of matrices, causes great economic losses [9], and poses risks to public health by contamination of milk by microorganisms of zoonotic potential [14].

The disease can be presented in 2 ways, subclinical and clinical mastitis [12], and can be further subdivided into catarrhal, apostemotic, and phlegmonous [5], and can generate irreversible lesions in the glandular parenchyma, with the rapid evolution and often not responsive to drug therapies, requiring the intervention of surgical treatment [4].

Among the surgical techniques, are stands-out radical mastectomy, where all the teats are removed, and partial mastectomy, which can be indicated depending on the udder compromisation, aiming to prolong the life of the animal and preserve functional teats [2].

The objective of this work is to describe the surgical and clinicopathological aspects of performing a radical mastectomy in the field in 3 cows and 1 ewe, and a partial mastectomy in 1 doe, with both procedures performed successfully and considered efficient to maintain the survival of the affected animals, in addition to being economically viable.

CASES

We report 5 cases of chronic mastitis unresponsive to drug treatment that were surgically treated in the field. Three cows and 1 ewe underwent a radical mastectomy, and 1 doe underwent a partial mastectomy, based on clinical, surgical, and economic aspects, to maintain the survival and well-being of the affected animals.

Three crossbred, multiparous cows (V1, V2, V3) were treated, 2 (V1 and V3) between 5 and 7 years of age and 1 (V2) with 12 years of age, all weighing about 500 kg. On examination [3], cow V1 had an enlarged udder, pain, hyperemia, edema, presence of abscesses, and a fistula that continuously drained purulent material with the presence of blood (Figure 1A) and cow V3 had agalactia, incisions in the sides of the udder performed by the owner to drain the purulent content (Figure 1B). The cows received antibiotic, antifungal, and anti-inflammatory drug treatment for about 6 months. It was observed an evolution of the clinical picture, with emaciation, recurrent fever, pale mucous membranes, anorexia, and depression due to the persistent infection.

Regarding the cases of small ruminants: 1 ewe and 1 doe (both mixed breed) with 3 and 2 years old, weighing 40 kg and 30 kg respectively. Both with a history of chronic mastitis, with edema in the udder region, purulent secretion, areas of abscess formation, fibrosis, and hypogalactia (Figure 2A & 2B). Despite undergoing treatment with antibiotics and anti-inflammatories, they did not show clinical improvement. The doe had a compromised teat while the other remained viable.

In the ewe and the V2 cow, it was possible to perform bacterial culture and identification, where

Figure 1. Cows with clinical signs of chronic mastitis. A- Cow V1: udder with swelling, pain, hyperemia, edema, presence of abscesses, and a fistula that continuously drained purulent material with the presence of blood. B- Cow V3: udder with incisions on the sides, made by the owner, to drain the purulent content.

Figure 2. Ruminants with clinical signs of chronic mastitis. A- Ewe with a swollen and pendulous udder, due to chronic mastitis. B- Doe with a swollen udder, due to chronic mastitis.

the isolated agent was *Arcanobacterium pyogenes* and *Arcanobacterium* sp., respectively.

In the ewe, it was possible to collect blood and perform a complete blood count and fibrinogen dosage [14], with no noteworthy changes being observed.

All animals have fasted for food for 48 h and water for 8 h. The previous surgical preparation consisted of extensive trichotomy of the entire abdominal region, the udder and the inner surface of the hind limbs, up to the patellofemoral joint, then antisepsis with degerming and alcoholic povidone to perform the surgical procedures [6].

In cows, the anesthetic protocol consisted of 2% xylazine hydrochloride[1] [Xilazin® - 0.15 mg/kg, IM] and epidural anesthesia in the lumbosacral region, with 2% lidocaine hydrochloride[2] [Lidovet® - 10 mL] [10]. In the doe and ewe, midazolam hydrochloride[3] [Dormire® - 0.1 mg/kg, IV] and 2% xylazine hydrochloride[1] [Xilazin® - 0.05 mg/kg, IM] were administered, associated with lumbosacral epidural anesthesia with 2% Lidocaine Hydrochloride[2] [Lidovet® - 5 mL].

In radical mastectomies, elliptical incisions were made around the mammary glands, preserving the maximum amount of healthy skin, with subsequent divulsion of the subcutaneous tissue and breast tissue, with ligation of the cranial and caudal mammary arteries and veins with chrome absorbable catgut 8 number 2.0 thread in the small ruminants and number 0 thread in the cows, as well as subcutaneous tissue raffia. For the dermorrhaphy, non-absorbable nylon[8] number 0 thread was used in an interrupted pattern in Sultan.

In the doe, a partial mastectomy was performed, preserving the healthy teat with an elliptical incision only around the affected breast, following the surgical technique of mastectomy already described (Figure 3A, 3B & 3C).

The postoperative period consisted of penicillin-based antibiotic therapy associated with streptomycin[5] [Penfort® - 24,000 IU/kg, IM], 10 consecutive days] and flunixin meglumine[6] [Flunexina® - 2 mg/kg, IM, 3 consecutive days] in cows;

Figure 3. Partial mastectomy procedure in a doe performed at UFRRJ. A- Divulsion of subcutaneous tissue to excision of the teat affected by mastitis. B- Removed breast tissue. C- Dermorrhaphy using Nylon-0 suture thread in interrupted X stitches.

Figure 4. The surgical wound of the cow (V3) with stitches removed after the radical mastectomy performed at UFRRJ.

enrofloxacin[7] [Chemitril® - 2.5 mg/kg, IM, 7 consecutive days] and flunixin meglumine[6] [Flunexina® - 0.5 mg/kg, IM, 5 consecutive days] in the ewe; oxytetracycline[1] [Oxitetraciclina LA® - 10 mg/kg, IM, 5 applications on alternate days)] and flunixin meglumine[6] [Flunexina® - 0.5 mg/kg, IM, 3 consecutive days] in the doe. In all animals, the cleaning of the surgical wound was performed daily with 10% topical Povidone-iodine[4] [Riodeine®] and Permethrin [Vansil®] ointment, for 14 days, when the stitches were removed (Figure 4).

DISCUSSION

Mastitis is a common affection in production animals, this evidences a precariousness in the prevention and control procedures, and the lack of guidance from owners and milkers regarding the risk factors for the occurrence of the disease, which corroborates with several studies that report high rates of mastitis [15] where among the predisposing factors are negligence in the hygiene of the property, facilities, and equipment used to carry out the milking and the inadequate sanitary management of the animals [1].

In this study, all the sick animals were crossbred and this leads us to the fact that heterogeneous herds often have less access to preventive and clinical treatments performed by specialized professionals and also have precarious sanitary conditions, which directly reflects on the place and in the milking practice, generating a greater number of mastitis cases [4]. Another fact to be considered is the number of lactations of the animals because the lactation number, as well as the productivity, are also pointed out as risk factors for the occurrence of mastitis [7].

All animals were medicated by the owners without professional guidance, including the use of antibiotic therapy, which drives us to a serious issue, in Brazil the use of antibiotics in animals is a controlled use therapy [8]. Studies report that the main cause of the use of antibiotics in livestock is due to mastitis treatment and that most of them are used erroneously, which can generate milk with antibiotic residue, and also, strains of resistant microorganisms that can be transmitted to humans by ingestion of animal products or contact with animals and loss of teat function due to bacterial resistance and inefficient treatment [16], making surgical treatment the only option for maintaining the animal's life, however with the loss of teat function, as observed in the present study.

Regarding the surgical techniques of radical and partial mastectomy performed at work, both were satisfactory, taking into account the pre, trans and postoperative, in agreement with the techniques practiced in the literature [2,11,16] that performed the classic mastectomy. All the techniques used, both surgical and anesthetic, and their protocols, were performed in the field, without causing harm to the animal, compared to techniques and protocols performed in veterinary hospitals, resulting in long-term survival and low morbidity to the animals, and the observations related to the anesthetic procedure and anatomical positioning used, it was possible to perform all the surgical procedures in agreement with the authors, who also worked with animals in lateral decubitus [13].

Radical mastectomy is the best treatment option due to the smaller number of arteries and veins that had to be ligated and the ease of visualization of these vessels, thus reducing the risk of hemorrhage [17].

Blood loss during radical mastectomy in goats is reported to be minimal, whereas, in cattle, it is significant, as reported in the literature [2]. During the postoperative period, the animals were clinically monitored and the need for blood transfusion was not observed.

In one study [2], general anesthesia was described alone or associated with epidural anesthesia, and it was possible to observe more significant results when associated with a local block of the epidural region, as performed in this study. On the other hand, in a study with goats, reports that after tranquilizing them, he performed an anesthetic block with 2% lidocaine in the inguinal region and around the base of the udder, replacing epidural anesthesia [17].

Another important aspect to be related is the cost of developing the techniques. Based on the materials used and without considering the costs with a Veterinarian, the average value for performing the mastectomy procedures in the cow was estimated at R$ 289.87, considering 10 mL of degerming povidone-iodine (PVPI)[4] [Riodeine®] (R$ 0.40), 10 mL topical (PVPI)[4] [Riodeine®] (R$ 0.40), 1 bottle of anti-inflammatory[6] [Flunexina®] (R$ 60.00), 5 bottles of antibiotic[5] [Penfort® (R$ 175.00), 10 nylon[8] thread (R$ 1.87/each), 5 catgut[8] thread (R$ 1.89), 10 mL lidocaine[2] [Lidovet®] (R$ 5.00), 5 mL of xylazine[1] [Xilazin®] (R$ 10.00), 5 and healing spray[9] [Vansil®] (R$ 1.38). In the ewe and doe, the average value was estimated at R$ 22.30, considering 5 mL of degerming agent[4] [Riodeine®] (R$ 0.20), 5 mL of topical (PVPI)[4] [Riodeine®] (R$ 0.20), and 2 mL of anti-inflammatory[6] [Flunexina®] (R$ 1.92), 8 mL of antibiotic[1,7] [Oxitetraciclina LA®; Chemitril®] (R$ 1.42), 5 nylon[8] thread (R$ 1.87/each), catgut[8] thread (R$ 1.89), 5 mL lidocaine [Lidovet®] (R$ 2.44), 4 mL of midazolam[Dormire®] (R$ 2.90), 0.1 mL of xylazine[1] [Xilazin®] (R$ 0.20) and healing spray[4] [Riodeine®] (R$ 1.38).

It was not observed in the literature, studies that account for the expenses incurred in surgical procedures of mastectomies in the mentioned production animals. The use of surgical techniques is of great importance, considering the low cost and the possible realization in the field, generating the possibility of productivity for the rural producer, when there is the preservation of teats and offering the animal health and well-being conditions, based on in the rules and guidelines for animal husbandry and welfare, as well as what happened with the animals in this work. Based on these aspects, the techniques performed proved to be effective, possible to be carried out in the field, and economically viable.

The surgical procedure of partial mastectomy, as well as the radical mastectomy, proved to be efficient and viable for the treatment of animals even in field conditions, and of fundamental importance for the maintenance of life and their well-being, and in one of the cases still preserving the functional teats, in addition to being economically viable surgical procedures.

MANUFACTURERS

[1]Syntec do Brasil. São Paulo, SP, Brazil.
[2]Laboratório Bravet Ltda. Rio de Janeiro, RJ, Brazil.
[3]Cristália Produtos Químicos Farmacêuticos Ltda. São Paulo, SP, Brazil.
[4]Rioquímica Indústria Farmacêutica. São José do Rio Preto, SP, Brazil.
[5]Ourofino Saúde Animal Ltda. Cravinhos, SP, Brazil.
[6]UCBVET Saúde Animal. Jaboticabal, SP, Brazil.
[7]Chemitec Agro-Veterinária. São Paulo, SP, Brazil.
[8]Shalon Medical. Goiânia, GO, Brazil
[9]Vansil Saúde Animal. Descalvado, SP, Brazil.

Declaration of interest. The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

REFERENCES

1 **Acosta A.C., Silva L.B.G., Medeiros E.S., Pinheiro J.W.J. & Mota R.A. 2016.** Mastitis in ruminants in Brazil. *Brazilian Veterinary Research*. 36(7): 565-573. DOI: 10.1590/S0100-736X2016000700001.

2 **Cable C.S., Peery K. & Fubini S.L. 2004.** Radical mastectomy in 20 ruminants. *Veterinary Surgery*. 33(3): 263-266. DOI:10.1111/j.1532-950X.2004.04038.x

3 **Dirksen G., Grunder H. & Stober M. 1998.** *Clinical Examination of Cattle.* In: Rosenberger G. (Ed). São Paulo: Guanabara Koogan, pp.417-419.

4 **Ferreira J.L., Lins J.L.F.H.A., Cavalcante T.V., Macedo N.A. & Reyes A. 2007.** Prevalence and etiology of bovine mastitis in the city of Teresina, PI. *Brazilian Animal Science*. 8(2): 261-266.

5 **Fonseca L.F.L. & Santos M.V. 2000.** *Milk Quality and Mastitis Control.* São Paulo: Lemos Editorial Press, pp.39-141.

6 **Hendrickson D.A. & Baird A.N. 2013.** *Turner and McIlwraith's Techniques in Large Animal Surgery.* 4th edn. Ames: Wiley-Blackwell, pp.50-185.

7 **Jamali H., Barkema H.W., Jacques M. Lavallée-Bourget E.M., Maloui F., Saini V., Stryhn H. & Dufour S. 2018.** Invited review: Incidence, risk factors, and effects of clinical mastitis recurrence in dairy cows. *Journal of Dairy Science* 101(6): 4729-4746. DOI: https://doi.org/10.3168/jds.2017-13730.

8 **Ministry of Agriculture, Livestock, and Supply (MAPA). 2008.** Normative Instruction No. 56 of 11/06. Disponível em: <https://www.gov.br/agricultura/pt-br/assuntos/sustentabilidade/bem-estar-animal/arquivos/arquivos-legislacao/in-56-de-2008.pdf>].

9 Mesquita A.A., Borges J., Pinto S.M., Lugli F.D.F., Castro A.C.D.O., Oliveira M.R. & Costa G.M. 2018. Total bacterial count and somatic cell count as indicators of milk production losses. *Pubvet*. 12(1): 131. DOI: 10.22256/pubvet.v12n6a119.1-8.

10 Muir W.W., Hubbe J.A.E., Skarda R.T. & Bednarski R.M. 2001. *Manual of Veterinary Anesthesia.* 3.ed. Porto Alegre: Artmed, pp.10-150.

11 Neves P.B., Medeiros E.S., Sá V.V., Camboim E.K., Garino J.F., Mota R.A. & Azevedo S.S. 2010. Microbiological and cellular profile and risk factors associated with subclinical mastitis in goats in the semiarid region of Paraíba. *Brazilian Veterinary Research*. 30(5): 379-384. DOI: 10.1590/S0100-736X2010000500001.

12 Philpot W.N. & Nickerson S.C. 1991. *Mastitis: counter attack.* Naperville: Babson Bros, pp.92-102.

13 Smith M.C. & Roguinsky M. 1977. Mastitis and other diseases of the goat's udder. *Journal of the American Veterinary Medical Association*. 171(12): 1241-1250.

14 Thrall M.N., Weiser G., Allison R.W. & Campbell T.W. 2015. *Veterinary Clinical Hematology and Biochemistry*. 2.ed. São Paulo: Roca, pp.222-225.

15 Winckler J.P.P. 2019. Prevalence of subclinical mastitis in Brazilian herds and the effect on milk composition. 62f. Sao Paulo, SP. Thesis (Doctorate in Veterinary Sciences) – Superior School of Agriculture "Luiz de Queiroz", Universidade of São Paulo.

16 Yeshwantkumar C. & Nirmala G.C. 2008. Surgical management of gangrenous mastitis in a pregnant goat. *Veterinary World*. 1(8): 250.

17 Youssef H.A. 1999. Mastectomy as a radical treatment for prevalent udder affections in goats in Al-Gasseem. *Assuit Veterinary Medical Journal*. 41(82): 30-36.