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Case Report

Surgical management of gangrenous mastitis in a 3-year-old red Sokoto doe: A case report

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ABSTRACT: Gangrenous mastitis was managed in a 3-year-old lactating doe by partial mastectomy following unsuccessful medical management. The patient had progressive swelling, hardened and dark discolouration of its left half udder. There was left supra-mammary lymphadenopathy and an open wound at the proximal portion of the affected gland. The right half of the udder appeared normal and was warm to touch. Culture and sensitivity test of a swab sample from the open wound at the base of the affected mammary gland revealed *Staphylococcus* and *Streptococcus* species which were sensitive to amoxicillin, cloxicillin, gentamicin and chlortetracycline, but resistant to penicillin and streptomycin. Mastectomy was indicated because of the chronic nature of the disease and the presence of gangrene. The procedure was carried out using a standard sterile technique, and a fenestrated drainage tube was placed. The patient recovered uneventfully and was discharged 14 days post-surgery. The management protocol used in this case demonstrated that unilateral mastectomy with good post-surgical management could be used for effective management of gangrenous mastitis without complications while still preserving the unaffected gland for future lactation.

Keywords: Gangrene, mastectomy, mastitis, red Sokoto doe.

INTRODUCTION

Goat husbandry is becoming increasingly important due to its meat and milk products. Furthermore, goat milk provides much-needed animal protein supplement, particularly in developing countries such as Nigeria whose goat milk consumption is gaining importance in some parts of the country (Egwu et al., 1999; Shittu et al., 2008). The population of goats in Nigeria is estimated at about 76 million (FAO, 2019), the majority (about 70%) of which was located in the northern region of the country (World Bank, 2017). However, management and disease problems, particularly mastitis, constitute major constraints for effective dairy goat husbandry in Nigeria (Garba et al., 2019).

Mastitis is an inflammation of the mammary gland (Radostits et al., 2006). Many cases of mastitis in goats are subclinical thus allowing cases of mastitis to go undiagnosed and untreated (Starbird, 2015). Animals with puerperal metritis may also develop mastitis, particularly if they are recumbent, in which case concurrent hypocalcaemia is an important pathologic finding. Poor management and hygiene practices, teat injuries, and faulty milking machines are some predisposing factors that hasten the entry of the infectious agents and the course of the disease (Zenebe et al., 2014). Enterobacteriaceae such as coagulase negative Staphylococci (Bourabah et al., 2013), mycoplasma such as *Mycoplasma mycoides subspecies capri* (Egwu et al., 1999; Kumar et al., 2013), yeast, and other fungi such as *Aspergillus niger* (Al-Muhna, 2014) have been reported to be responsible for mastitis in animals.

Clinical mastitis is characterized by visible abnormalities in the udder or milk. These may vary greatly in severity during the course of the disease. Clinical cases can manifest as subacute (mildly clinical) when symptoms

include only minor alterations in the milk and the affected quarter such as clots, flakes, or discoloured secretion. The quarter may also be slightly swollen and tender (Khan and Khan, 2006). Acute mastitis cases are characterized by sudden onset, pain, heat, swelling, redness and reduced milk quantity as well as altered milk secretion from affected halves. Abnormal secretion in the form of clots, flakes, or watery milk is the clinical sign most consistently observed (Shearer and Harris, 2003). Depending upon the severity and the causative agent, acute mastitis cases may have significant systemic involvement characterized by fever, depression, weakness and in its most severe form, it could be fatal and hence requires urgent attention.

Clinical mastitis is often associated with *Staphylococcus aureus, Streptococcus* species and *Mannheimia heamolytica,* but most cases in small ruminants are reported to be as a result of Staphylococci infections (Bergonier and Berthelot, 2003; Al Salihi, 2018). Gangrenous mastitis is a per-acute form of mastitis, characterized by necrosis of the udder tissue, caused by alpha-toxins (Smith and Sherman, 2009). Mastitis if left untreated can lead to a decline in the overall health of the patient and eventually death (Hazlett et al., 1984).

Gangrenous mastitis is one of the most difficult forms of mastitis to be treated (Bloway, 1993), in severe cases, the gangrene may lead to toxaemia and loss of animal life (Ribeiro et al., 2007). Caprine mastitis is a very serious problem leading to a decline in the overall health of the animal (Marogna et al., 2010). It is common in older goats that have developed saggy udder which is more prone to injury and exposure to bacteria (Smith, 2010). Thus, this clinical case report describes the surgical management of gangrenous mastitis in a doe.

CASE REPORT

A 3-year-old multiparous red Sokoto doe weighing 27 kg was referred to the Veterinary Teaching Hospital of Usmanu Danfodiyo University, Sokoto with complaints of hardened and swollen left half of its udder. The doe kidded a set of twins 36 days prior to its presentation to the hospital. The owner first observed absence of milk let down 3 days after kidding and the condition was treated with a combination of oxytocin, penicillin and streptomycin at a veterinary outlet. The swelling and hardening progressed with discolouration of the skin of the left half udder was noticed which prompted the referral to the Veterinary Teaching Hospital for further management.

On clinical examination, the patient was alert with enlargement of the left half of its udder which was firm, gangrenous and cold to touch. An open wound was observed around the cranio-medial aspect of the affected gland and the gangrenous tissue was observed to be supported only by mammary ligaments (Plate 1). There was also ipsilateral supra-mammary lymphadenopathy. The patient resented upon palpation of the mammary gland. However, the right half of the udder appeared

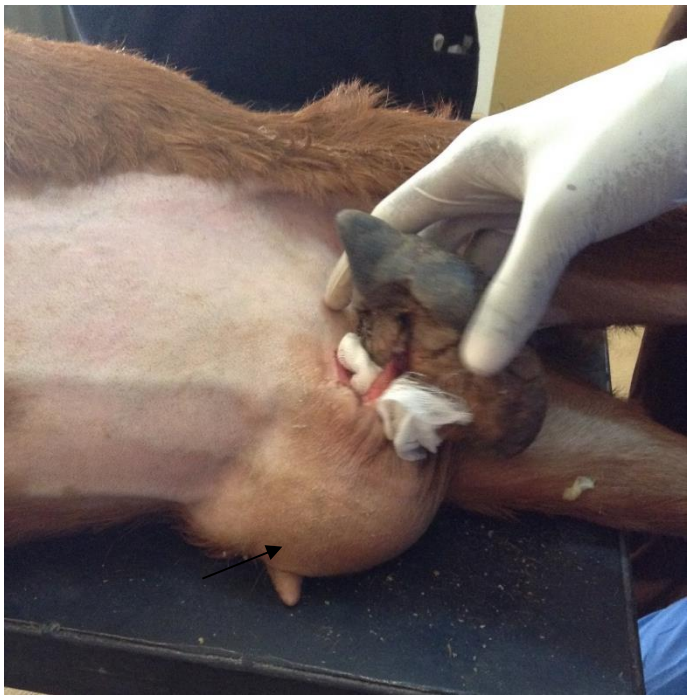

Plate 1. Gangrenous left half (held by the clinician) and normal right half (arrow) udder of red Sokoto doe.

apparently normal and warm to touch. The capillary refill time was less than 2 seconds. The ocular and oral mucosae were pinkish. The temperature, pulse and respiratory rates were 38.5°C, 86 beats/min and 25 cycles/min respectively.

Based on the clinical observations, gangrenous mastitis was diagnosed. Blood sample was collected from the jugular vein into a vial containing Potassium ethylene diamine tetraacetate (K3-EDTA) and sent to the clinical pathology laboratory for complete hemogram. A swab sample was taken from the open wound at the base of the affected mammary gland for culture and sensitivity test. Left unilateral mastectomy was indicated because of the gangrenous and chronic nature of the mastitis.

Laboratory investigations

Culture of the swab sample from the open wound around the infected udder yielded *Staphylococcus aureus* and *E. coli* which were sensitive to amoxicillin, cloxacillin, enrofloxacin, gentamicin and chlortetracycline but resistant to penicillin and streptomycin. Haematology revealed neutrophilia and monocytosis. All other parameters were within normal physiological limits (Table 1).

Management

Pre-surgical antibiotic therapy was instituted using 5% Enrofloxacin (Animal Care limited, Nigeria) at 2.5 mg/kg

Table 1. Haematological parameters of red Sokoto doe presented with gangrenous mastitis.

Parameters	Value	Normal range*
Packed cell volume (%)	25.00	22.00-38.00
Red blood cells (×10^6cells/mm^3)	10.23	8.00-18.00
White blood cells (×10^3cells/mm^3)	12.70	4.00-13.00
Neutrophils (×10^3cells/mm^3)	6.86	0.20-3.20
Lymphocytes (×10^3cells/mm^3)	5.08	2.00-9.00
Basophils (×10^3cells/mm^3)	0.00	0.00-0.00
Eosinophils (×10^3cells/mm^3)	0.13	0.00-0.70
Monocytes (×10^3cells/mm^3)	0.76	0.00-0.60

*Gyang (1990).

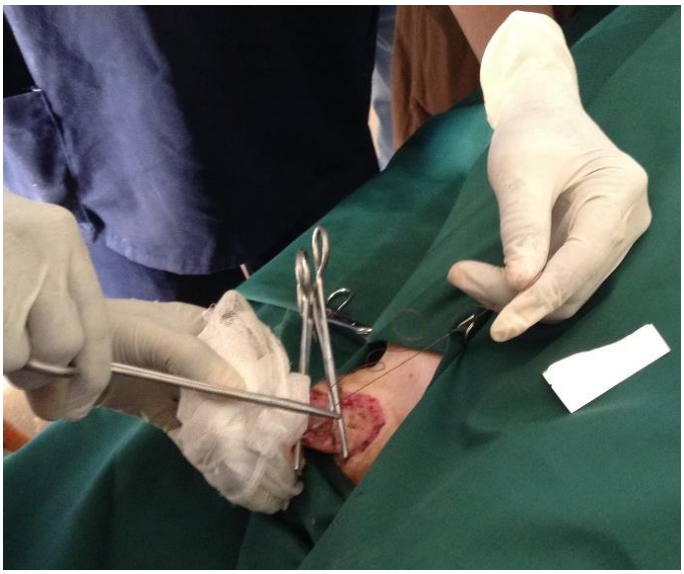

Plate 2. Application of ligature at the base of mammary ligaments.

was administered intramuscularly (I.M). Unilateral mastectomy was carried out by first sedating the patient with xylazine (Bioveta, Czech Republic) at the dose rate of 0.15 mg/kg after which the inguinal area was clipped and disinfected with diluted (10%) chlorhexidine gluconate. Five millilitres of 2% lignocaine HCl (Afirst lifesciences, India) was administered subcutaneously around the base of the left half of the mammary gland and along with the site of the incision. The patient was draped and the surgical site was exposed.

The gangrenous mass supported by the mammary ligament was excised by applying a ligature at its base using chromic catgut (Agary®, China) size 0. (Plate 2). The entire affected left mammary gland was carefully separated from the healthy udder and abdominal wall by blunt dissection (Plate 3). The site was adequately lavaged with normal saline solution. Excess skin flaps were trimmed to avoid dead space and the free space was obliterated with running sutures using chromic catgut

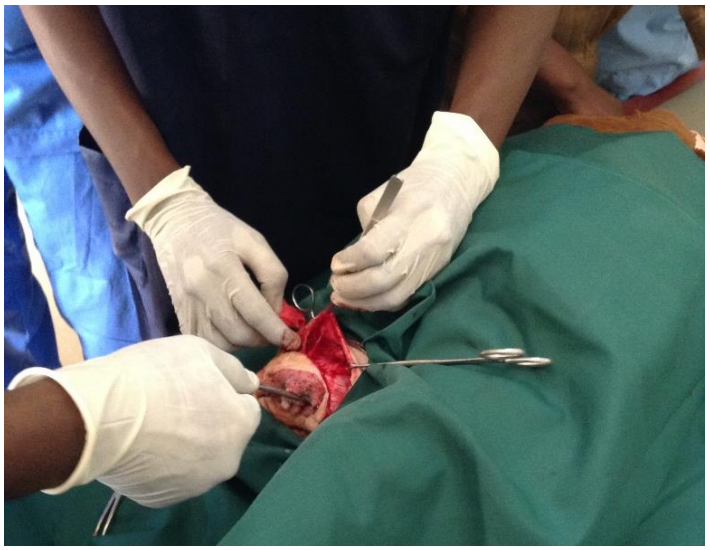

Plate 3. Blunt dissection of the left half udder from the abdominal wall.

Plate 4. Ford interlocking skin sutures with drainage tube.

suture size 1 (Agary®, China). A fenestrated catheter used as a drainage tube was placed ventral to the skin incision with a simple stitch using nylon monofilament suture material size 0 (Agary®, China) to drain any fluid accumulation and seroma formation beneath the sutures. The drainage tube was swayed daily and removed after three days. Ford interlocking suture with nylon monofilament (Agary®, China) material size 0 was used to close the skin edges (Plate 4). The patient recovered without any complications and the skin sutures were removed 14 days post-surgery.

Post-operative medical care

Enrofloxacin (5%) at 2.5 mg/kg I.M was administered for 4

days (Aboubakr, 2013). 2.5% Diclofenac Sodium (Nouvasant Pharm Health ltd, China) was also administered at 1 mg/kg I.M for 3 days (Ahmad et al., 2012). The drainage tube was swayed daily and removed on day 3 post-surgery. Daily dressing of the surgical site was also carried out.

DISCUSSION

This case report gives an account of surgical treatment involving left unilateral gangrenous mastitis using unilateral mastectomy in goat as an adjunct procedure to medical management with antibiotics or supportive therapy. The affected udder, in this case, was discoloured and sore to touch similar to findings reported by Rainard et al. (2018) following experimental infection of the udder of ewes with *Staphylococcus aureus*. Gangrenous mastitis due to toxin-producing bacteria is a serious problem in goat herds and often leads to fatality (Cable et al., 2004), therefore a specific antitoxin therapy is recommended rather than antibiotic therapy (Sabuncu et al., 2015). Unilateral mastectomy was performed in this case as a pain-relieving salvage procedure and also due to gangrene and fibrous nature of the mammary tissue.

Medical management using antibiotics alone is of limited or no value (Sabuncu et al., 2015) because the antibiotics are unable to penetrate infected tissues sufficiently following the development of gangrene, but in this case following the removal of the gangrenous tissues antibiotics therapy was necessary based on culture and sensitivity test to prevent septicemia. This is in line with Amaravathi et al. (2016) who stated that therapeutic management alone is not effective for the treatment of gangrenous mastitis unless, early surgical removal of the affected quarter is undertaken, which is the only standard treatment for gangrenous mastitis in ewes.

Though El-Maghraby (2001) reported bilateral radical mastectomy to be technically easier to perform than unilateral mastectomy, because several interconnecting blood vessels between the two halves of the udder need to be ligated during unilateral mastectomy, unilateral mastectomy was performed in this case hoping that the animal will continue to lactate subsequently using the uninfected half.

In the present report, the patient was 3 years old which falls within the age range of 1-6 years reported by Peer and Bhattacharryya (2007) to have the highest prevalence of mastitis.

The drainage tube placed at the ventral aspect of the skin suture facilitated drainage of seroma at day 1 post-surgery. The seroma was no longer present subsequently and that prompted the removal of the tube at day 3 post-surgery. It has been reported that seroma formation delays wound healing and may result in infection (Bullocks et al., 2006), but placement of drainage tube greatly reduces the risk of complications post-surgery (Srivastava et al., 2012).

Conclusion

Gangrenous mastitis has caused high morbidity and mortality in red Sokoto goats that are genetically superior in terms of their skin, however this salvage procedure (unilateral mastectomy) can serve to extend their reproductive life because of the anticipated continuous lactation of the unaffected gland as against bilateral mastectomy or culling of the patient recommended by other researchers.

CONFLICT OF INTEREST

Authors have declared that there is no conflict of interest.

REFERENCES

Aboubakr, M. H. (2013). Evaluation of bioequivalence of two enrofloxacin formulations after intramuscular administration in goats. *Korean Journal of Veterinary Research*, 53(2), 77-82.

Ahmad, I., Qureshi, T. A., Khan, F. A., Mughal, S. A. K., Sadique, U., Shah, Z., Khan, S., & Hassan, Z. U. (2012). Evaluation of biochemical effects of diclofenac sodium in goats. *Journal of Animal and Plant Sciences*, 22(2 Suppl.), 1-4.

Al Salihi, K. A. (2018). Gangrenous mastitis in ewes: Report of two cases in Al Muthanna Veterinary Hospital, Al Muthanna Governorate, Iraq. *Mirror of Research in Veterinary Sciences and Animals*, 7(3), 1- 6

Al-Muhna, B. M. M. (2014 November). Study of the mycotic mastitis in dairy goats in Al-Diwaniya province. *First Scientific Conference for College of Veterinary Medicine, Al-Qasim Green University, Iraq*.

Amaravathi, M., Bharath, K., Reddy, C., & Jyosthna, D. S. (2016). Gangrenous mastitis in a Ewe. *International Journal of Science, Environment and Technology*, 5(5), 3016-3019.

Bergonier, D., & Berthelot, X. (2003). New advances in epizootiology and control of ewe mastitis. *Livestock Production Science*, 79(1), 1-16.

Bloway, R. W. (1993). The treatment of difficult cases of mastitis. In: *Proceedings of British Mastitis Conference* Jointly organised by: Genus Animal Health AFRC Institute for Animal Health and CIBA Agriculture. Pp. 63-69.

Bourabah, A., Ayad, A., Boukraa, L., Hammoudi, S. M., & Benbarek, H. (2013). Prevalence and etiology of subclinical mastitis in goats of the Tiaret Region, Algeria. *Global Veterinaria*, 11(5), 604-608.

Bullocks, J., Basu, B.C., Hsu, P., & Singer, R. (2006). Optimization of patient safety in cosmetic surgery. *Seminars in Plastic Surgery*, 20(4), 233-240.

Cable, C. S., Peery, K., & Fubini, S. L. (2004). Radical mastectomy in 20 ruminants. *Veterinary Surgery*, 33(3), 263-266.

Egwu, G. O., Ameh, J. A., Aliyu, M. M., & Mohammed, F. D. (2001). Caprine mycoplasmal mastitis in Nigeria. *Small Ruminant Research*, 39(1), 87-91.

El-Maghraby, H. M. (2001). Comparison of two surgical techniques for mastectomy of goats. *Small Ruminant Research*, 40(3), 215-221.

FAO (2019). The future of livestock in Nigeria. Opportunities and challenges in the face of uncertainty. FAO, Rome. p. 46.

Garba, B., Habibullah, S. A., Saidu, B., & Suleiman, N. (2019). Effect of mastitis on some hematological and biochemical parameters of red Sokoto goats. *Veterinary World*, 12(4), 572-577.

Gyang, E. O. (1990). *An introduction to large animal surgery*. Agitab Publishers Ltd, Zaria-Nigeria. p. 5.

Hazlett, M. J., Little, P. B., Maxie, M. G., & Barnum, D. A. (1984). Fatal mastitis of dairy cows: a retrospective study. *Canadian Journal of Comparative Medicine*, 48(2), 125-129.

Khan, M. Z., & Khan, A. (2006). Basic facts of mastitis in dairy animals: A review. *Pakistan Veterinary Journal*, *26*(4), 204.

Kumar, V., Rana, R., Mehra, S., & Rout, P. K. (2013). Isolation and characterization of Mycoplasma mycoides subspecies capri from milk of natural goat mastitis cases. *ISRN Veterinary Science*, *2013*.

Marogna, G., Rolesu, S., Lollai, S., Tola, S., & Leori, G. (2010). Clinical findings in sheep farms affected by recurrent bacterial mastitis. *Small Ruminant Research,* 88(2-3), 119-125.

Peer, F. U., & Bhattacharryya, H. K. (2007). Studies on caprine gangrenous mastitis. *Indian Journal of Small Ruminants,* 13(1), 92-94.

Radostits, O. M., Gay, C. C., Hinchcliff, K. W., & Constable, P. D. (2006). Disease of the mammary gland. *In Veterinary Medicine: A textbook of the diseases of cattle, sheep, goats, pigs and horses,* 10th edition*,* Elsevier, p. 2156.

Rainard, P., Gitton, C., Chaumeil, T., Fassier, T., Huau, C., Riou, M., Tosser-Klopp, G., Krupova, Z., Chaize, A., Gilbert, F. B., & Rupp, R. (2018). Host factors determine the evolution of infection with Staphylococcus aureus to gangrenous mastitis in goats. *Veterinary Research*, 49, Article number 72.

Ribeiro, M. G., Lara, G. H. B., Bicudo, S. D., Souza, A. V. G., Salerno, T., Siqueira, A. K., & Geraldo, J. S. (2007). An unusual gangrenous goat mastitis caused by *Staphylococcus aureus*, *Clostridium perfringens* and *Escherichia coli* co-infection. *Brazilian Journal of Veterinary and Animal Science*, 59(3), 810-812.

Sabuncu, A., Enginler, S. Ö., Yıldar, E., Karaçam, E., Dal, G. E., & Kahraman, B. B. (2015). Unilateral mastectomy as an alternative treatment for gangrenous mastitis in a Saanen goat. *International Journal of Veterinary Science and Medicine*, 3(1), 9-12.

Shearer, J. K., & Haris, B. (2003). *Mastitis in dairy goats*. DS 85, IFAS Extension, University of Florida 7p.

Shittu, A., Chafe, U. M., Buhari, S., Junaidu, A. U., Mgaji, A. A., Salihu, M. D., Lawal, M. D., & Jibril, A. (2008). An overview of mastitis in Sokoto red goat, Nigeria. *Sokoto Journal of Veterinary Sciences*, *7*(1), 65-70.

Smith, C. K. (2010). *Raising goats for dummies*. John Wiley & Sons. p. 311.

Smith, M. C., & Sherman, D. M. (2009). Mammary gland and milk production. In: *Goat Medicine*, 2nd edition. Wiley Blackwell, Ames, Iowa. Pp. 647-689.

Srivastava, V., Basu, S., & Shukla, V. K. (2012). Seroma formation after breast cancer surgery: What we have learned in the last two decades. *Journal of Breast Cancer*, 15(4), 373-380.

Starbird, A. (2015). *The dairy goat handbook: For backyard, homestead and small farm*. Voyageur press, Quarto Publishing group, USA Inc. p. 192.

World Bank (2017). The World Bank Livestock Productivity and Resilience Support Project (P160865). Retrieved 16th February, 2020 from http://documents.worldbank.org/curated/en/479121500403272629/pdf/ITM00184-P160865-07-18-2017-1500403268591.pdf.

Zenebe, N., Habtamu, T., & Endale, B. (2014). Study on bovine mastitis and associated risk factors in Adigrat, Northern Ethiopia. *African Journal of Microbiology Research,* 8(4), 327-331.