

## Surgical management of unilateral gangrenous mastitis in a doe: A case report

Md. Samun Sarker<sup>1</sup>, Zamila Bueaza Bupasha<sup>1</sup>, Md. Mizanur Rahman<sup>2</sup>, Sharmin Akter<sup>2</sup>, Abdul Mannan<sup>2</sup> and Md. Ahaduzzaman<sup>2,\*</sup>

<sup>1</sup>Department of Microbiology and Veterinary Public Health, Chittagong Veterinary & Animal Sciences University (CVASU), Bangladesh;

<sup>2</sup>Department of Medicine and Surgery, Chittagong Veterinary & Animal Sciences University (CVASU), Bangladesh.

\*Corresponding author's e-mail: [zaman.cvasu@gmail.com](mailto:zaman.cvasu@gmail.com)

### ABSTRACT

A case of gangrenous mastitis was surgically managed in a cross breed doe aging 3.5 years and weighing 25 kg at SA Quadery Teaching Veterinary Hospital of Chittagong Veterinary and Animal Sciences University, Chittagong, Bangladesh. Confirmatory diagnosis of the case was done based on physical changes of udder, and identification of associated bacterial agents; two bacteria namely *Staphylococcus aureus* and *Escherichia coli* could be isolated from the milk sample. Parenteral administration of combined antimicrobials (Gentamycin + Sulphadimidine + Trimethoprim) and concurrent intra-mammary infusion of antimicrobials (Streptomycin + Penicillin) along with supportive treatments for 7 days could not save the quarter rather the condition deteriorated. After performing the antibiogram of the isolated bacteria, only Ciprofloxacin was found to be sensitive. Mastectomy was done, and together with supportive medicine, Ciprofloxacin (dosed at 10 mg/kg body weight) was given intramuscularly as antimicrobial. The doe recovered without any complication after 7 days of post-treatment and management.

### Keywords

*E. coli*, Gangrenous mastitis, Mastectomy, *S. aureus*, Surgical management, Unilateral mastitis

### ARTICLE HISTORY

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### INTRODUCTION

The term mastitis originated from the Greek words *mastos* (means breast) and *itis* (means inflammation of). The condition is characterized by a range of physical and chemical changes in the milk, and pathological changes in the glandular tissues of the udder (Radostits et al., 2007). Cases of mastitis can be divided into clinical and subclinical categories (White, 2007). Mastitis is considered as one of the most important diseases of domestic animals that are caused by multiple etiologic agents. However, *Staphylococcus aureus* is considered as the most common causal agent of goat mastitis, which is followed by a minor occurrence of mastitis by *Pasteurella haemolytica*, *Escherichia coli*, *Clostridium perfringens*, *Streptococcus*, *Pseudomonas* and *Nocardia* genera (Olechnowicz and Jaśkowski, 2014). On the other hand, several risk factors for instance milker and the process of milking, management practice, feeding, number of days not lactating, and number of lactation per day, and geographical locality may influence the type and the frequency of isolation of organisms causing mastitis in animals (Gomes et al., 2014).

*S. aureus* can produce subclinical, chronic and acute type of mastitis. However, the organism increases more pathogenic potential to cause gangrenous mastitis as compared to other types of mastitis (Peton and Le Loir, 2014). In severe cases of mastitis caused by similar virulent strains of organisms, thrombosis in the mammary vessels occurs resulting in infarction, and occurrence of gangrene. Additional losses associated with the cost of treatment and culling of does due to

permanent damage of the udder. Yet gangrenous mastitis is one of the most difficult forms of mastitis to be managed clinically whereas in very severe cases, the gangrene may lead to toxemia and loss of animal life (Ribeiro et al., 2007). Diagnosis of mastitis is a cumbersome task and can be done by California Mastitis Test and Somatic Cell Counts. Besides, bacteriological isolation and PCR identification can be done (Paterna et al., 2014). The importance of diagnosis and treatment of mastitis in small ruminants is undoubtedly important for economic, aesthetic and welfare points of view. This clinical case report describes the surgical management of unilateral gangrenous mastitis in a doe caused by *S. aureus* and *E. coli* mixed infection.

## CASE HISTORY

A 3.5 years old 25 kg body weight, cross breed (Black Bengal × Jamuna Pari) lactating doe was admitted to the SA Quadery Teaching Veterinary Hospital (SAQTVH) of Chittagong Veterinary and Animal Sciences University, Chittagong, Bangladesh with a history of the doe was anorexic and reduced milk output for two weeks.

## PHYSICAL EXAMINATION

Examination of the doe revealed as rectal temperature 104°F, heart rate 80/min, respiratory rate 28/min, and slightly pale mucous membranes. The right quarter of the doe had swelling of 6.5 cm in diameter, and was cold upon touch. The milk from the affected quarter was red in color, and the skin of the quarter was indurate with reddish-black discoloration (Figure 1).

## LABORATORY DIAGNOSIS

Biochemical examination of blood showed that serum calcium and phosphorus levels were 8.85 mg/dL and 7.95 mg/dL, respectively, and other parameters were remained within physiological range. Subsequently, isolation of the associated organism was done after growing on blood agar, MacConky and Mannitol salt agar, as described by Chandrasekaran et al. (2014). Finally, *E. coli* and *S. aureus* were identified based on colony morphology and biochemical analysis. Antibiotic sensitivity test was performed using commonly used antibiotic discs, as per the procedure described by Begum et al. (2007). In antimicrobial sensitivity test, only Ciprofloxacin was found to be highly sensitive, whereas Gentamicin and Oxytetracycline were shown moderate sensitivity.

## THERAPEUTICS & MANAGEMENT

Combined preparation of Gentamycin, Sulfadimidine and Trimethoprim (Inj. Gentasone plus®, 10 mL vial) dosed at 2.5 mL were administered intramuscularly daily for 7 days. As well as intra-mammary infusion with Penicillin and Streptomycin combination (Inj. SP-Vet® 0.5 gm vial) dosed at 2 mL was administered for 7 days. As a supportive treatment, Inj. Calcium-Jayson® (Calcium gluconate 10% w/v solution) dosed at 5 mL/day intramuscularly for 3 days and Inj. Aminovit plus Vet® (Preparation of Vitamin, mineral and amino acid, Vial-20 mL) dosed at 2 mL were administered intramuscularly for 5 days. There were no positive outcome from the medicinal management of the case, and we decided for unilateral mastectomy to save the life of the doe.

## SURGICAL PROCEDURE

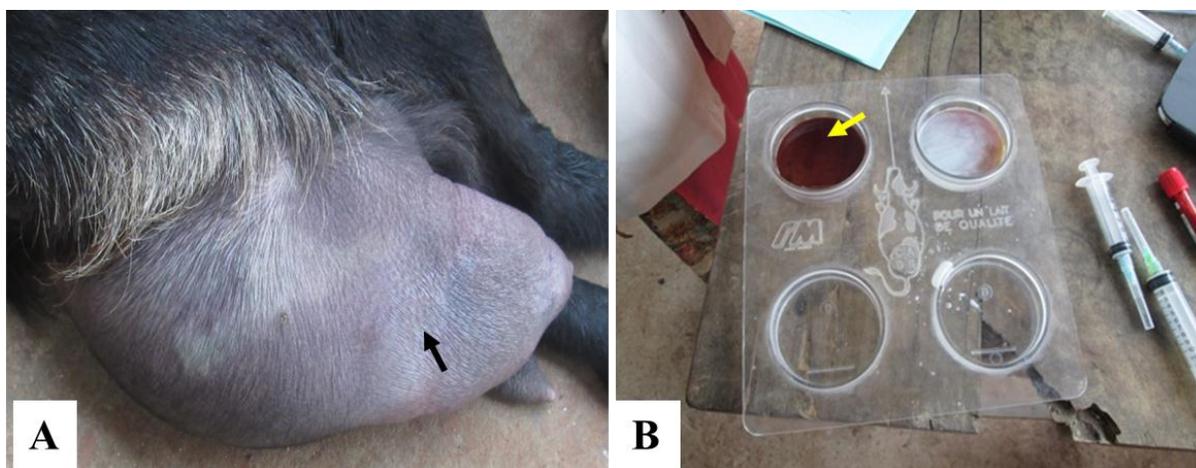
The doe was controlled by left lateral recumbency with high epidural (last sacral and first coccygeal vertebrae) anesthesia using 2% solution of Lidocaine HCl dosed at 4 mL (Inj. Jasocaine® 2%, 50 mL vial). Ring block was also done locally with 2% Lidocaine dosed at 20 mL. Antiseptic washing was done properly. About 6-7 cm skin incision at the border of the affected right quarter was performed. Pudental artery was crushed by artery forceps and ligated using catgut to stop bleeding and subsequently bleeding from other minor mammary vessels was managed with the help of electric cauterizer. Then affected quarter was removed and the area was sprayed by 0.5% Metronidazole saline to protect the secondary bacterial infection. Finally, after mastectomy, skin was closed with proper apposition and the skin tension was normal, and it was confirmed that there was no more gangrenous or dead tissue inside the suture (silk) (Figure 2).

## POST OPERATIVE CARES

As post-operative care, Ciprofloxacin (Inj. Cipo-A vet®, 30 mL vial, 10%) dosed at 10 mg/kg body weight (bwt) based on culture sensitivity test, Ketoprofen (Inj. Keto vet, 10 mL vial, 10%) dosed at 3.3 mg/kg bwt and Pheneramine melete (Inj. Astavet, 10 mL vial, 22.75 mg/mL) dosed at 1 mg/kg bwt were administered intramuscularly for seven days.

## DISCUSSION

Gangrenous mastitis is a per-acute form of mastitis, characterized by necrosis of the udder tissue, caused by alpha-toxins (Smith and Sherman, 2009). In goats, mastitis is considered as a severe clinical outcome of



**Figure 1:** (A) Changes in udder in the early stage of gangrenous mastitis. Black colored arrow indicates reddish to black discoloration of skin. (B) Red color milk from the affected quarter (left) and normal milk with negative California mastitis test result (right).



**Figure 2:** (A) udder before surgery having black discoloration and sloughing of tissue leaving an open wound. (B) After surgery (Mastectomy) of right quarter; arrow indicates the skin suture.

inflammatory process in mammary glands. Evolution of the process is characterized by discolored (blue-blackish or blue-greenish) and cold udder, development of abscess with a demarcation line of the affected tissue, and draining pus (Ribeiro et al., 2007); similar findings were observed in our study. In a study, Vautor et al. (2009) reported that mastitis occurred more frequently in ewes, and suffered from a severe unilateral attack of mastitis originated from *Staphylococcus*. *S. aureus* is accused to cause subclinical mastitis, but also might cause acute clinical mastitis or gangrenous mastitis (Contreras et al., 2003). Etiological agent is crucial to determine the therapeutic regime. Combined infection by *S. aureus*, *C. perfringens* and *E. coli* in gangrenous mastitis in goats was reported in Brazil by Ribeiro et al. (2007). In another study, Pal et al. (2011) reported six clinical cases of gangrenous mastitis in goats caused by *E. coli* alone or mixed infection with *S. aureus*; these were in line with our

findings. In general, antibiotics are not always effective as they do not able to enter into the infected tissues sufficiently following the development of gangrene process (Davis, 2014), but treatment with antibiotics is necessary based on CS test to prevent the septicemia. Furthermore, surgical removal of the dead and dying tissue is an immediate management option (Davis, 2014). Surgical treatment of the gangrenous mastitis in this case was in accordance with several other case reports (Ribeiro et al., 2007; Yeshwantkumar and Nirmala, 2008; Pal et al., 2011).

## CONCLUSION

The prognosis of gangrenous mastitis in goat is not favorable as septicemia may develop. Success depends on early treatment with appropriate antibiotics based on culture sensitivity test and proper supportive therapy. Surgery may be the alternative option to save

the animal, but milk production might be lost partially or completely.

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