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Surgical management of unilateral gangrenous udder in a cow: A clinical study

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Abstract
Gangrenous mastitis is a per-acute form of mastitis, characterized by necrosis of the udder tissue causing severe acute inflammation, with classical signs of heat and redness. In gangrenous mastitis, surgical removal of the dead and dying tissue is an immediate management option. Therefore, in the present study a case of gangrenous mastitis was managed by partial mastectomy of the affected quarter under local anaesthesia using 2% lignocaine hydrochloride with favorable prognosis of the mastectomized udder of a cow suffering from the naturally occurring gangrenous mastitis without any major complication after 10 days of post-treatment and management. To avoid secondary complications, Postoperative management was done by administering Injection Floxidin - LA 30ml i/m for 5days, Injection Melonex power 10ml i/m for 3 days, topical application included (Bismuth subnitrate 10gms+ Iodoform20gms+ Liquid paraffin 450ml) applied until healing was acheived and Bovispray were used as a fly repellent. The incision site was inspected daily and the drains removed over a period of 4 days. A purulent exudate began to flow from the infected mammary tissue, which was draining efficiently till clinical recovery by day 20 post treatment and management, when the animal started to produce apparently normal milk from the unaffected quarters of the udder.

Keywords: Management, mastectomy, mastitis, surgical, udder

1. Introduction
Animal care, hygiene, and management are important factors in the dairy cow diseases of great economic importance. Mastitis is one of the most common problems reported throughout the world accounting to its major impact on both economy and animal welfare as it affects the production status of an animal. During latency of the infection, the causative organisms persist in the udder and environment as well and the resulting disease leads to irreversible injury to the udder by afflicting alveolar epithelium through setting up inflammation. Affected cows always lose the quarter of the mammary gland that is involved and sometimes the animal dies too [1]. The hidden organisms in the udder may flare up to produce clinical mastitis [2]. Bovine mastitis is divided into 4 categories: peracute, acute, sub-acute and subclinical [3] based on the severity and rapidity of its occurrence. Diagnosing subclinical mastitis at earliest by somatic cell count and bacterial load count is a prerequisite in limiting the development of clinical mastitis.

Gangrenous mastitis, a per-acute form of mastitis is associated by alpha-toxin induced necrosis of the udder [4] and is characterized by severe acute inflammation along with signs of heat and redness. The lesions are histopathologically characterized as progressive swelling, vascular degeneration, and focal erosion and ulceration occur throughout the ductal system [5]. Mastitis progress to gangrenous ones which are mainly caused by *Staphylococcus aureus* and *Escherichia coli* [6]. But the lacking of early diagnosis and farmer's awareness, the approximately curable *Staphylococcus aureus* and *Clostridium perfringens* were also isolated from the gangrenous mastitis. Despite of doubtful prognosis, the treatment of gangrenous mastitis is very difficult and only possible by amputation of the gangrenous quarter (s) only to save the life of an animal. Physical examination of the udder is characterized by discolored (blue- blackish or blue-greenish) and cold udder [7] and surgical removal of the dead and dying tissue is considered as an immediate management option.

Gangrenous mastitis being the deadliest form of mastitis to be treated [8] could lead to gangrene induced toxemia and loss of animal life in severe cases [7].

Drying-off the affected animal is advocated in cases of mastitis not amenable to medical treatment to allow sloughing of the affected quarters or surgically as implicated. Partial mastectomy is considered as a safe and effective surgical procedure for udder disease in elite cattle and complete mastectomy following conservative therapy in exceptional circumstances provided the animal is sound and healthy as reported by some authors who compared different methods of mastectomies [9, 10, 11, 12].

Teat amputation and physiological udder amputation (tying off blood vessels supplying the udder) have also been suggested to treat gangrenous mastitis. The aim of the present case study was to explore the partial mastectomy of the affected quarter of the cow suffering from gangrenous mastitis.

2. Case history

A case of gangrenous mastitis in 4 year aged cow was presented to Teaching Veterinary Clinical Complex, IIVER Rohtak, Haryana, with a history of necrosis of the left forequarter of the udder (Fig.1A). On examination, the affected left forequarter was swollen, cold, hard to touch, presented a bluish discoloration with presence of one rudimentary teat, foul smelling of the udder along with depression, inappetence from the last 10 days,. The left rear and right front quarters were swollen, with substantial inflammation of the right rear quarter. The vitals of the cow were in the normal physiological range (temperature, respiratory rate, ruminations were normal). The owner reported that there was blood in the milk from last four days and the swelling had rapidly spread to all four quarters. It was apparent that the milking ability of the cow had been permanently impaired, so an attempt was made to save her life. Diagnosis was based on the physical changes in the milk sample and characteristic changes in the udder (swelling and pain, progress to necrosis with coldness of the affected area, blue black colouration with foul-smelling reddish brown fluid exudation). So keeping in view the condition of the udder, surgical removal of the affected quarter (Mastectomy) was attempted.

3. Surgical technique and results

The cow was properly restrained and the area over the inguinal region was aseptically prepared and painted with tincture of iodine for surgery before an elliptical incision was made on the lateral udder. 40 ml of 2% lignocaine was infiltrated around the site of the incision. The small blood vessels were clamped, ligated, and then transected. The incision was then deepened through the subcutaneous tissue to expose the lateral fascia covering the mammary gland tissue. Blunt dissection was carried out laterally, medially, cranially, and caudally. The tissue was necrotic and easy to separate. About one half of the left front quarter and a considerable portion of the gangrenous part were removed (Fig. 1B). The subcutaneous tissue was sutured using a walking suture pattern in order to reduce the open space resulting from the defect (Fig. 2B). The skin incision was opposed with nylon. The resulting defect was cleaned with dilute chlorhexidine, and then open weave bandages were packed in it. After the operation 500 ml of 40 % dextrose solution was administered intravenously to help override the absorption of toxic end products as well as to furnish a source of nutrition. General wound treatment was done post-operatively and the cow soon came back on feed. A purulent exudate began to flow from the infected mammary tissue, which was draining efficiently till clinical recovery.

Postoperative management involved administering Injection Floxidin – LA 30ml i/m for 5days, Injection Melonex power 10ml i/m for 3 days, Topical application include (Bismuth subnitrate 10gms+ Iodoform20gms+ Liquid paraffin 450ml) applied until healing was achieved and Bovispray used act as a fly repellent. The incision site was inspected daily and the drains removed over a period of 4 days.

(A) **(B)**

Fig 1: Left quarter of the affected udder showing bluish black discolouration (A) and the affected gangrenous part which was removed (B).

(A) **(B)**

Fig 2: Mastectomy of the affected necrosed and gangrenous quarter (A) and the intact quarters being sutured with proper drainage left in place (B).

4. Discussion

Gangrenous mastitis is the most severe form of mastitis reported in cattle. It is typified by a sudden onset, hyperemia and edema with progressive discoloration of the udder. Surgical removal of the dead and dying tissue is an immediate management option in gangrenous mastitis. Partial mastectomy is indicated when the other quarters are unaffected and still functional [13]. Amputation of the complete mammary gland, although less frequent, can be a good alternative depending on factors such as health status, genetic value of the animal and costs. During surgery, some skin areas adjacent to the mammary gland were cold and friable with evidence of necrosis; consequently, the tissue was removed, leaving a wide open wound. Surgical treatment of the gangrenous mastitis done in this case was in accordance with several other case reports studied as far [7, 14, 15].

Physical examination of the udder is characterized by discolored (blue- blackish or blue-greenish) and cold udder [7, 14, 16]; similar findings were also observed in the present study. The pain and inflammatory response were managed with NSAIDs proved to be useful in promoting comfort during recovery and the immediate postoperative period.

Further, concluding that increased hygiene and disinfection procedures should be subsequently employed, particularly in the milking facilities.

5. Conclusion

Partial mastectomy can be a safe and effective procedure for ruminants with udder disease. It can avoid certain complications associated with radical mastectomies and retain milking and reproductive potential of the affected animal. Cranial epidural analgesia was used for the amputation of the affected quarter but it needed a greater dosage of analgesic to provide adequate period of analgesia [17]. In the present case, our approach involved around giving elliptical incision on the dorso lateral aspect of the left affected quarter and preserve the adjacent unaffected one so as to left future production potential uncompromised. To the best of our knowledge, the operated procedure is still in its infancy stage in large animals, but can be well explored demanding skilled hands and proper post-operative care. From a standpoint of food hygiene, affected cows need to be strictly isolated from the herd until full recovery and milk cannot be sold out. Ruminants having localized udder diseases of moderate to severe may respond well after radical mastectomy [18]. Large surgical defects after mastectomy are common, but they heal by second intention. Seroma formation is the most common complication following mastectomy and needs to be addressed during the early postoperative period [19] as supported in our case, which was taken care of by proper drainage system in pace.

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7. References

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