



ISSN (E): 2277- 7695

ISSN (P): 2349-8242

NAAS Rating: 5.03

TPI 2019; 8(9): 374-377

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www.thepharmajournal.com

Received: 13-07-2019

Accepted: 15-08-2019

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Surgical and therapeutic management of gangrenous mastitis in a cow: A case report

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Abstract

The present report describes a case of surgical and therapeutic treatment of gangrenous mastitis at the right forequarter of udder in a 2 years old non-descriptive cow. Based on the history from the owner, the case was unresponsive to conservative treatment and long term antibiotic therapy. Surgical approach was opted to conserve the other unaffected quarters, followed by post operative local treatment with zinc oxide and coconut oil. The animal recovers uneventfully with a successful clinical outcome.

Keywords: Snail, bovine, porcine, physicochemical properties, mucin, mucoadhesives

Introduction

Mastitis in general means an inflammation of the mammary gland, which may occur due to any type of bacterial infection secondary to teat injury or due to poor managerial practices (Marogna *et al*, 2010) [10]. It is reported to be one of the major problems throughout the world owing to its huge impact on both economy and animal welfare as it influence the production status of an animal. In severe cases, affected cows may lose the quarter of the mammary gland that is involved and sometimes may even cause mortality (Phiri *et al*, 2010) [15]. Bovine mastitis is divided into 4 type *viz.* peracute, acute, sub-acute and subclinical (Fraser *et al*, 1998) [5] based on the severity and onset of the disease condition. Gangrenous mastitis is the per-acute form of mastitis which induces necrosis of the udder induced by alpha-toxin (Smith and Sherman, 2009) [17], characterized by severe acute inflammation along with signs of heat and redness. The organisms responsible for gangrenous lesion of mastitis are mainly *Staphylococcus aureus* and *Escherichia coli* (Jubb and Kennedy, 1963) [9]. The prognosis of gangrenous mastitis is doubtful and the treatment is very strenuous. Hence, amputation of the gangrenous quarter (s) and removal of the dead and dying tissue may be the only possible treatment in order to save the life of an animal. In addition, partial mastectomy may be indicated when the other quarters are unaffected and still functional (Phiri *et al*, 2010) [15].

Although several clinical trials have published to depict the benefits of using oral or topical zinc therapy in wound management, variations in treatment regimen and zinc formulations used have obscured the true efficacy of the protocols. Nonetheless, it is evident that not only is zinc beneficial in the healing profile of wound but it provides an effective level of anti-infective property as well (Agren *et al*, 2006) [1]. The value of topical zinc application in wound care was underpinned by early observations of Henzel *et al.* (Henzel *et al*, 1970) [8]. Furthermore, coconut oil also showed remarkable effects on wound healing (Nevin *et al*, 2010) [13]. Hence, the present case report describes the surgical approach of unilateral mastectomy as a treatment option for cattle with gangrenous mastitis, followed by post operative local treatment with zinc oxide and coconut oil combination while allowing the other mammary gland to continue lactation.

Case History and Clinical Observation

A two-year-old non descriptive cow, weighing approximately 300 kg body weight was presented with history of blackish discoloration and necrosis of the right forequarter of the udder [Fig. 1 (A)], as well as depression and inappetence from the last 7 days. Clinical examination of the animal revealed normal physiological parameters (respiration, pulse rate and rumination were within the normal range); however, the body temperature was slightly elevated (103 °F). On local examination of the udder, it was observed that the right forequarter was swollen, cold, hard to touch and blackish in colour with blood tinged milk.

Based on the owners history, it was further reported that the animals was non-responsive for long duration of antibiotic therapy and there was blood in the milk since the last few days and the swelling have spread to the other quarters as well. So, diagnosis was done based on the anamnesis and physical changes with the udder on examination. Keeping in view of the udder condition, surgical removal of the affected quarter (Mastectomy) was attempted.

Treatment and Management

A cranial epidural block was achieved by injecting 70 ml of 2% lignocaine in the epidural space. Additionally, 40 ml of 2% lignocaine was infiltrated around area of the affected side of the udder. The cow was then restraint in lateral recumbency with the affected side toward the upper part so that the surgeons will have good exposure [Fig. 1 (B)]. The surgical site was aseptically prepared as per the standard procedure [Fig. 2 (A)] and was draped. An elliptical incision was made on the lateral side of the affected udder and the small blood vessels were clamped, ligated with absorbable suture material (Vicryl No.1), and then transected. The incision was extended through the subcutaneous tissue to expose the lateral fascia covering the mammary gland tissue. Blunt dissection was carried out on all the sides surrounding the affected quarter and the necrotic and gangrenous tissue was easily separated. The gangrenous tissue along with the skin was removed [Fig. 2 (B)]; however, deeper part of tissue was left intact to avoid excessive bleeding. All the associated arteries and veins were ligated and transected. The resulting defect was flushed with normal saline and cleaned with povidone iodine. After this, magnesium sulfate + glycerine was applied and it was packed with sterile gauge. Stay suture was applied so that the paste will be retained in the area [Fig. 2 (C)].

Postoperative management involved administration of combined streptopenicillin 2.5 gm IM daily for 7 days and gentamicin @ 1 ml/10 kg IM daily for 5 days after the antibiotic sensitivity tests result of samples collected from the same animal, along with meloxicam @ 2 mg/kg body weight for 3 days. After 3 days, a huge mass of necrotic tissue (approximately 1.5 kg) was removed from the surgical site without much bleeding [Fig. 2 (D)]. This was followed by general wound dressing and additional local treatment with a combination of zinc oxide and coconut oil (50 gm and 20 ml respectively to make a paste) applied locally [Fig. 3 (A & B)]. Regular wound dressing and similar therapeutic protocol was carried out after every 2 days along with fly repellent spray until the wound heals completely. The wound contracted and the defect greatly reduced by second intention over a period of 2 weeks and eventually heals completely after 4 weeks [Fig. 4 (A, B & C)]. Finally, the cow made an uneventful recovery, and return to its normal productive status.

Results and Discussions

This case of gangrenous mastitis is a per-acute form of mastitis, characterized by necrosis of the udder tissue and is caused by alpha-toxins (Smith and Sherman, 2009) [17]. Physical examination of the udder revealed blackish discoloration and is cold to touch (Ribeiro *et al*, 2007) [16]; which was also observed with the present case and surgical

removal of the dead and dying tissue is considered as an immediate management option. Gangrenous mastitis is one of the most complicated forms of mastitis (Bloway, 1993) [3] and in very severe cases, the gangrene may lead to toxemia and may even result in loss of animal life (Ribeiro *et al*, 2007) [16]. So, surgical removal of the dead and dying tissue is the immediate treatment option to save the life of the animal. Here we have opted for removal of only the affected quarter only, since partial mastectomy is indicated when the other quarters are unaffected and still functional (Phiri *et al*, 2010) [15]. During surgery, we have observed that the skin areas adjacent to the mammary gland were cold and friable with evidence of necrosis; consequently, as this large area of necrosed tissue was removed, a wide open wound was left exposed. As a result, the present treatment of gangrenous mastitis was also done in accordance with several other case reports studied with some modifications (Ribeiro *et al*, 2007 and Pal *et al*, 2011) [16, 14]. Monsang *et al*. (Monsang *et al*, 2017) [11] have also reported similar technique of partial mastectomy for the management of gangrenous mastitis in cow. Our approach was to make an elliptical incision of the affected quarter on the upper lateral aspect but to preserve the adjacent quarters so that the unaffected quarters will remain functional after the operation. Large surgical defects after mastectomy are common, but they heal by second intention. Seroma formation is the most common complication after mastectomy and continues to be an important problem during the early postoperative period; however, such complication was not observed with this report. So, we can suggest that mastectomy is a procedure of choice in gangrenous mastitis in ruminants (Frank, 2002 and Ribeiro *et al*, 2007) [4, 16].

Zinc oxide presents a promising agent for wound healing application. There are several reports of zinc oxide to promote healing of wound and ulcers (Stromberg and Agren, 1984) [19]. Furthermore, zinc oxide was as effective as an enzymatic topical debriding agent in the treatment of pressure ulcers (Agren and Stromberg, 1985) [2]. Moore (Moore, 2003) [12] also strongly advocates topical zinc oxide treatment for diabetic foot ulcers. In addition, a debriding effect of zinc oxide has also been observed in burn wounds (Gang, 1980) [5]. Results from clinical trials also indicated the beneficial effects of topical zinc on human wounds healing predominantly by epithelialization such as suction-blister wounds (Tronnier, 1975) [20], superficial (1 mm deep) small incisions (Greenway *et al*, 1999) [7] and split-thickness skin graft donor sites (Weingart and Stoll, 1993) [21]. Similarly, we have appreciated a similar positive impact of zinc oxide with the present case. Further, the addition of coconut oil as a paste with zinc oxide may aid in wound healing of post-operative gangrenous mastitis. It is well documented that coconut oil possess outstanding wound healing property via promoting reepithelialization and collagen synthesize as well as increasing wound closure rate and total protein content (Soliman *et al*, 2018) [18]. We have adopted the present treatment method of partial mastectomy and therapeutic management for gangrenous mastitis with an outstanding result and excellent clinical outcome. So, it may be further practiced for treatment protocol of mastitis at various clinical levels.

Figures

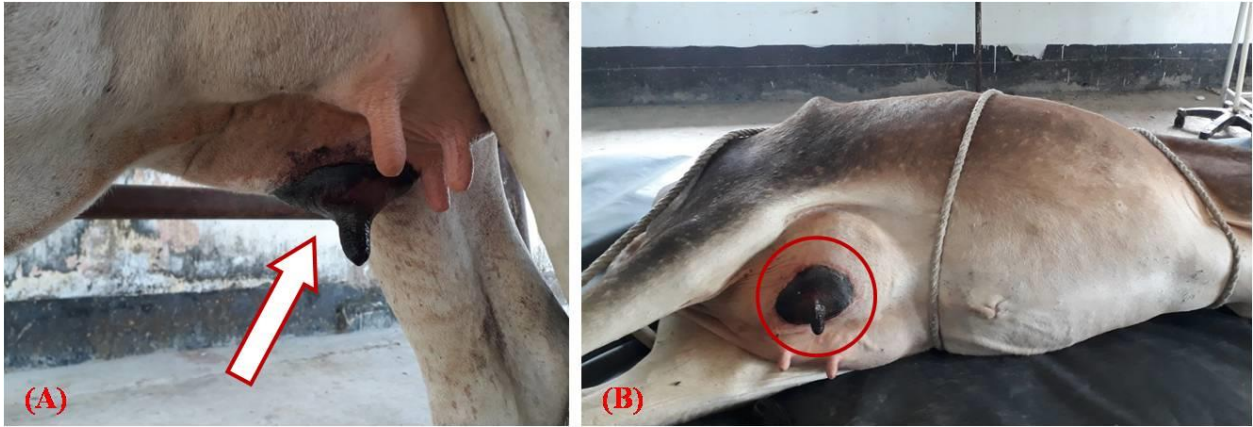


Fig 1: Photographic image showing (A) Gangrenous mastitis on the right forequarter of the udder and (B) Restraining of the animal on left lateral recumbency before the operation.



Fig 2: A photographic image showing (A) Affected quarter just before surgery, (B) Surgical site after removal of necrotic tissue along with the skin, (C) Manesium sulfate + glycerine packed with sterile gauge and (D) Necrotic tissue mass removed after 3 days.

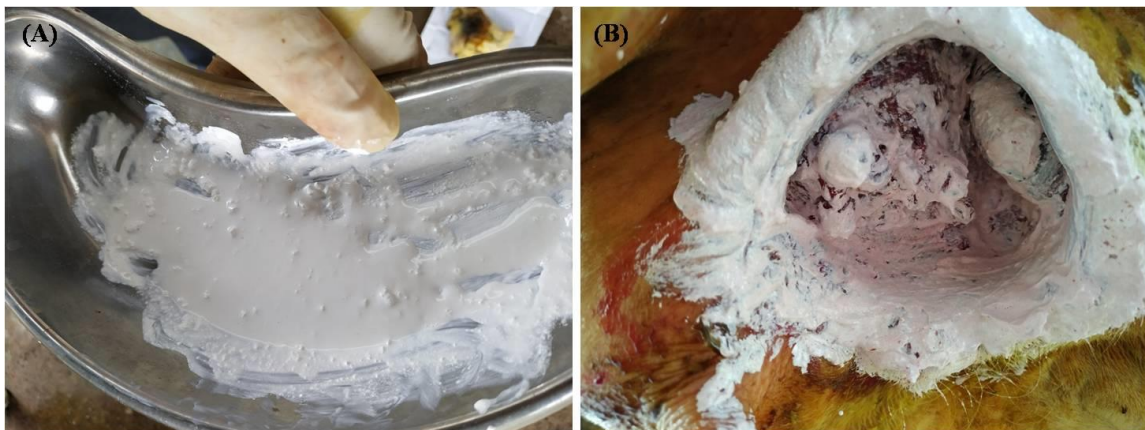


Fig 3: A photographic image showing (A) Zinc oxide + coconut oil paste and (B) Application of the paste on the affected area.

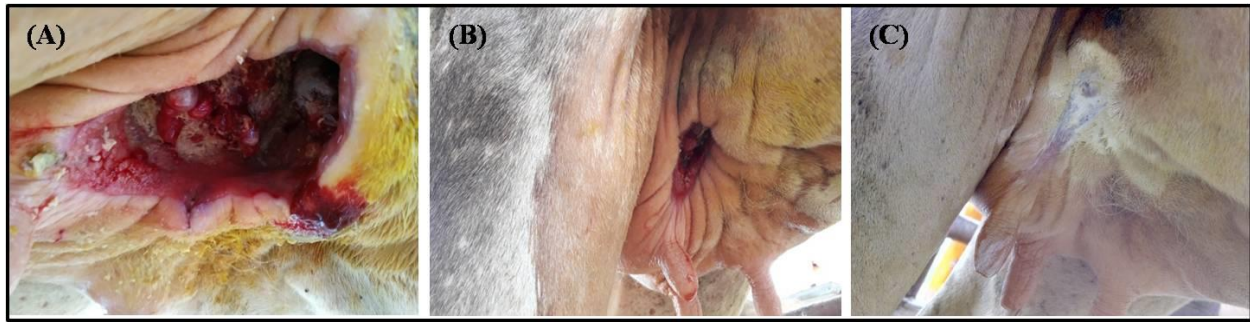


Fig 4: A photographic image showing healing of surgical wound after (A) 1 week, (B) 2 weeks and (C) 3 weeks.

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