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ABSTRACT

A dairy aryshire cow (case no A109) was referred to the University of Nairobi Large Animal ambulatory Clinic (UON, LAC) following a history of a teat laceration of the left caudal quarter of the udder following an animal attack. The teat had been previously treated and sutured with nylon suture but developed a fistula which was leaking milk. The fistula was a 1cm horizontal defect located at the tip of the teat with bite mark scars and bruises surrounding it. Further physical examination revealed a discharge in the vulva area which was straw colored. Rectal examination revealed presence of a fetal mummy which was then delivered by traction. Ring block anesthesia technique in combination with the teat cistern infusion was used to achieve analgesia of the teat during surgical repair. The fistula was closed by suturing of the submucosa and muscularis layers using polyglactin 910 suture 4/0 in a horizontal mattress suture pattern. The skin was closed with simple interrupted pattern using polyglactin 910 suture (Vicryl ®) 4/0.

INTRODUCTION

The bovine teat is composed of five layers; mucosa, sub-mucosa, highly vascularized conjuctive tissue, muscularis and the skin. Innervation of the udder is by fibres of the genitofemoral nerve. Cranial quarters are supplied by the ilioinguinal and iliohypogastric nerves. The caudal quarters are innervated by the mammary branch of the pudendal nerve and distal branch of the perineal nerve (Hendrickson, 2007).

Teat lacerations are a common occurrence in dairy cattle reared in zero grazing systems and cause losses in milk production (Nichols, 2008). Trauma to the udder may extend from superficial injuries to deep penetrating wounds. The severity of the trauma is judged
by the extent of damage to the udder structures. Management of teat trauma depends on the structures which have been traumatized. Trauma can be broadly categorized into superficial and deep laceration. Management of superficial wounds involves regular cleaning the teat and udder using suitable antiseptic agents then leaving the wound to heal. Deeper lacerations involving the teat canal will require prompt suturing (within 6 hours of trauma) of the defects (Roberts and Fishwick, 2010).

Local anesthesia techniques facilitate surgical repair of lacerated and traumatized tissues of the udder (Steiner and Rotz, 2003). Use of sedatives such as Xylazine maybe contraindicated in cases of advanced pregnancy and thus local techniques offer favorable options to anesthesia. The local anesthetic block techniques allow surgical interventions with animals in standing restraint which prevents further damage to udder structures. In addition minimal quantities of local anesthetic agents ensure economical management of teat and udder trauma (Marongiu, 2012).

**CASE HISTORY AND MANAGEMENT**

An adult Ayrshire cow was referred to the UON, LAC (Ambulatory unit) following the development of a fistula as a sequel to postoperative complication of a repaired teat laceration which had developed one week following the incident. The fistula had developed due to improper closure of the initial teat laceration with no. 2/0 nylon suture. Physical examination showed the animal to be in fair body condition and good posture. Vital parameters taken were within the normal range. A straw colored discharge was noted to be emanating from the vulva. Per-rectal examination revealed a doughy mass in the uterus with no cardinal signs of pregnancy. The mass was diagnosed as a fetal...
mummy. History of service and the texture of the mummy aged it to be approximately 4-5 months of age. The cow was positioned in a crush and secured using a halter with the legs tied using rope and a tail tie to immobilize the tail. Sedation was achieved using Xylazine hydrochloride 2% (Bomazine ®) at a dose rate of 0.02mg/kg administered intramuscularly. A total dose of 0.5 ml of Xylazine HCl was administered. The cervix was examined for patency. It was open with a diameter of approximately 6cm. Liquid paraffin was used to lubricate the vagina and the mummy delivered by traction. Anesthesia of the teat was achieved using the ring block technique in combination with teat cistern infusion technique. The teat and udder were cleaned using chlorhexidine (Savlon®) antiseptic and surgical spirit applied. A rubber tourniquet was then applied at the base of the teat and local anesthetic, lignocaine hydrochloride administered into the tissues ventral to the tourniquet in a ring fashion. 5ml of lignocaine HCl was infiltrated into the tissues. In addition a teat infusion using 3ml lignocaine HCl was administered to provide analgesia to the mucosa of the teat canal. The anesthesia was given time to take effect (10 minutes) and the nylon suture removed. The margins of the laceration were debrided using a scalpel blade to remove the scar tissue that had already formed around it and the newly freshened margins apposed using polydioxanone (vicryl) 4/0 suture. A sub-mucosal horizontal suture pattern was used to appose the teat canal mucosa. The skin was apposed using a simple interrupted pattern using vicryl 4/0 suture. An in-dwelling mammary catheter was left in place to facilitate the draining of the teat for 7-10 days. Post operative antibiosis was achieved by administering penicillin and streptomycin (Penstrep®) 20ml administered intramuscularly.
DISCUSSION

Teat injuries occur due to trauma, chemical injury, insects, environmental conditions and the milking machine (Shearer, 1999). Several factors contribute to the incidence of teat injuries. Structural housing and management of cattle predispose the cattle to teat injuries. Poor structural integrity with sharp edges and wire pieces left standing out will cause lacerations to passing animals. The physical characteristics of the teat and udder play a role in predisposing the teat to injuries. Poor udder conformation, with low hanging teats predisposes the teat to being kicked by the cow causing injuries to it. Housing structures also play a major role in the predisposition of the teat to injuries. Longer stall lengths show a lower incidence of teat injuries compared to short stall length (Koskiniemi K, 1982). Injuries to the teat in addition predispose the teat to mastitis due to introduction of pathogens and affect the normal milk flow (Dohoo and Martin, 1984). Cattle fed in pasture paddocks show lower incidences of teat trauma compared to cattle housed in sheds.

The management of teat lesions will vary depending on the extent of damage to the tissues. Superficial lacerations require cleaning the wounds regularly with mild antiseptic and/or disinfectant and allowing the teat to heal. Deeper lacerations with penetrating wounds require prompt response to prevent infection. Surgical intervention of the laceration to repair the teat is required for gaping wounds which expose the inner lying structures. Failure to repair the teat adequately leads to development of teat fistulas. Fistulas are draining tracts which communicate the teat canal to the outside environment. Fistulas predispose the cow to ascending mastitis infections and economic losses due to milk leakage. Inability to achieve an impervious seal during apposing will lead to fistula
formation. It is required that the suturing techniques used do not perforate the mucosal layer but aim to appose the underlying submucosa and muscularis layers. Presence of suture material in the teat canal predisposes the canal to stricture formation which eventually obstructs the canal affecting milk flow.

Anesthesia techniques of the udder and teat allow surgical manipulation of the organ. There are various techniques used in large animal practice and the choice is dependent on several factors including; surgical intervention to be undertaken, experience of the clinician and nature of the trauma. The techniques include; ring block, inverted-V block, teat cistern infusion, intravenous regional anesthesia of the teat, and perineal nerve block. The techniques may be used solely or in combination with other techniques to provide analgesia (Marongiu, 2012).

**Ring block technique.**

This involves the application of a tourniquet at the teat base which may include a rubber tubing or a doyens clamp. Local anesthetic is then infiltrated to the area ventral to the tourniquet in a ring fashion around the teat base. The anesthetic is then massaged into the tissues and given some time to take effect (10-15 minutes). The technique provides analgesia to the area distal to the tourniquet.

**Perineal nerve block technique.**

The technique involves the desensitization of the perineal nerve which innervates the udder. 5-7ml of a local anesthetic agent is injected into the subcutaneous and sub-fascial tissues at the ischial arch approximately 2cm lateral to the midline on both sides.
**Intravenous regional anesthesia of the teat.**

The technique involves the application of a tourniquet at the teat base and intravenous infiltration of any superficial vein distal to the tourniquet.

**Teat cistern infusion technique.**

The technique involves application of a tourniquet at the teat base and subsequent infiltration of local anesthetic into the teat cistern. The tip of the teat is blocked and the teat massaged to facilitate infiltration of the local anesthetic into the mucus membranes of the teat canal. This provides analgesia to the teat canal (Marongiu, 2012).

**Inverted V block.**

This technique involves a full thickness (involving the skin and muscularis layers) line block administered over and adjacent to the affected tissue in a V-pattern. Local anesthetic is infiltrated 0.5-1cm apart to cover the area to be operated on.

**Paravertebral anesthesia**

Infiltration of local anesthetics to the paravertebral area of the first (L1), second (L2) and third (L3) spinal nerves will provide analgesia to the fore udder and fore teats. In this technique 10-20ml of 2% lidocaine hydrochloride is instilled in a fan shaped manner to desensitize the spinal nerves (Marongiu, 2012).

**Topical (splash) application**

The technique involves the splashing of local anesthetic agents directly to the surgical wound for some time (20 minutes) to desensitize the area (Marongiu, 2012).
Post-operative management

Adequate antibiosis following the surgery is required to prevent mastitis infection. Intramammary antibiotic preparations should be used as an adjunct to systemic antibiotics. The management is aimed at restoring milk flow and allowing adequate time for healing. The retention of a self-retaining catheter for 10 days allows for milk flow to be restored with minimal manipulation of the teat which may cause injuries and dislodge sutures. Non-absorbable sutures should be removed 10-14 days post-operatively. Hand milking should only resume following complete healing of the teat while machine milking may resume following surgery.

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