Successful management of exuberant granulation tissue in two horses *(Equus caballus)* and a donkey *(Equus asinus)*

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SUMMARY

Proud flesh is a complication of wound healing. In this study, two horses and one donkey were presented with proud flesh on the pastern joint of left hind limb (n=2) and cranial aspect of right hock region, respectively. Surgical excision of proud flesh was done in all three equids under general anaesthesia and were treated post operatively, with copper sulphate ($CuSO_4$), potassium permanganate ($KMNO_4$) and glycerine paste in the ratio of 1:1:5. The present report accounts for the successful management of proud flesh in 3 equines by the combination of surgical excision and chemical methods for wound management.

KEY WORDS

Donkey, granulation, horse, proud flesh, surgical excision.

INTRODUCTION

Exuberant granulation tissue (EGT) is commonly known as proud flesh/ fibroplasia. Granulation tissue reduces the wound size and dead space by contraction, and acts as a barrier for external contaminants[1]. Whereas, EGT is a complication of wound healing in equines and is composed of dark red fleshy exuberant granulation tissue with sero-sanguinous fluid discharge and protrudes out from the wound and prevents normal wound healing[2, 3]. The pathophysiology of proud flesh in horse is not yet clear but several contributing factors such as anatomy and function of the distal limb, high motion areas, low oxygen tension and blood flow, chronic contamination, a difference in concentration of growth factors (TGF-β_1), the disparity between the synthesis and degradation of collagen and a prolonged low grade of inflammation favours the genesis of proud flesh in equines[4-7]. Histological examination of a biopsy specimen of the proud flesh can confirm the condition[8]. The surgical resection of the exuberant granulation tissue[9-11] is considered the best treatment modality. This paper discusses the successful management of EGT in the distal extremities of two horses (*Equus caballus*) and a donkey (*Equus asinus*) using a combination of surgery and medicine.

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HISTORY AND CLINICAL FINDINGS

Case 1 and 2: Two male horses weighing 300kgs each were presented to this referral institute with the history of trauma leading to laceration and later growth in the pastern joint of the left hind limb for two months (Figure 1a and 1b). The equines were unsuccessfully treated at field level.
Case 3: A female donkey aged 5 years and weighing 220 kgs was presented with an ulcerative growth on the cranial aspect of the right hock region. The equine had a history of barbed wire injury 45 days back (Figure 1c)
On physical examination of the equines, a firm granular tissue was observed in the respective wound areas. The physiological parameters of all the equines were within the normal range. Biopsy samples were taken prior to surgery to rule out sarcoids or tumour. Histological examination of the biopsy samples revealed a chaotic, unorganized, cellular appearance (Figure 2). After the confirmation of the sample as an exuberant granulation tissue, surgical excision was decided as the first line of treatment followed by wound management.

SURGICAL PROCEDURE

All the equines were fasted 12 hrs and were administered with inj. Tetanus toxoid (1500 IU) and prophylactic antibiotic (ceftriaxone) prior to surgery. The equines were pre-medicated with inj. xylazine (1.1 mg/kg body weight) and inj. butorphanol (0.03

Figure 1 - Photographs showing exuberant granulation tissue at the left hind pastern joint (a and b) and cranial to hock joint (c).

mg/kg body weight), intravenously. Anaesthesia was induced and maintained with inj. thiopentone sodium solution (5%)[12]. The proud flesh were excised aseptically and the bleeding vessels were ligated using absorbable suture material or were arrested by local application of potassium permanganate crystals ($KMNO_4$). Relaxation sutures were applied on the skin of both the horses. The growth on hock was removed and the skin was sutured with horizontal mattress sutures (Case 3). The weights of the excised granulation tissue masses were 300g, 1.2kg and 400grams in equines1, 2 and 3, respectively.

POSTOPERATIVE CARE

The surgical wound was daily flushed with potassium permanganate ($KMNO_4$) solution and pressure bandage was applied with the paste made of 10 parts of copper sulphate ($CuSO_4$), 10 parts potassium permanganate ($KMNO_4$) and 50 parts of glycerine for until (almost 7 days) the wound surface went 2mm below the skin[16]. Postoperative antibiotic (Amoxicillin-Sulbactam, 3gm, IM) and anti-inflammatory (Flunixin meglumine 1.1 mg/kg, IV) were given BID for five days. The skin sutures were removed on 15th, 18th, 20th post-operative day in equine 1,2 and 3, respectively. The complete cicatrix formation in wounds took more than 30 days in all the equine without the evidence of re-occurrence.

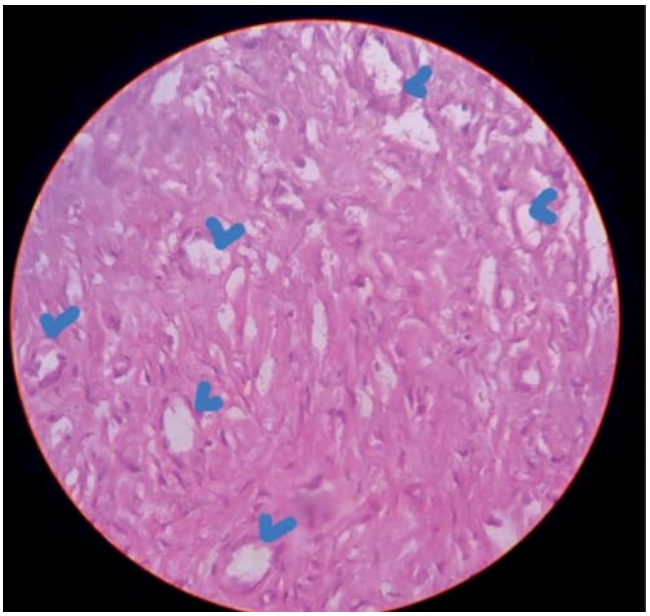

Figure 2 - Micro-photograph showing neovascularization (blue marks: small arterioles) with infiltration of different cells and fibrosis (40x) on H&E stain.

DISCUSSION

The incidence of traumatic wounds is higher in equine than in any other species and healing is usually complicated[13] attributing to differences in the inflammatory response and wound contraction property[14]. The exuberant granulation tissue is commonly seen in the limbs of the horses due to multiple reasons (less skin, more mobility near joints and improper wound management) that causes oxygen gradient (increase) between tissue and wound surface and create a warm and moist environment, and in turn favours the granulation tissue formation[10]. Any treatment that arrests wound contraction or epithelization promotes excessive granulation tissue formation. In the current paper all the equines had granulation tissue on joints (2 on pastern, 1 in hock region) and had a history of being treated with caustic agents topically. Though there are reports on the successful treatment of proud flesh using caustic agents[16], but the present equines treated in field, could not make any successful remarks, which may be due to use of improper concentration and application.

Many treatment modalities for the management of proud flesh have been debated in the literature such as chemical cautery, thermo cautery cryosurgery, bandaging, electromagnetic stimulation, topical antibiotics, gentian violet, tetra-chloro-decaoxide and boric ointment impregnated gauge, steroids application or surgical excision[16,17] followed by skin grafting[2,16].

Neovascularization with the proliferation of endothelial cells along with infiltration of different mono-nuclear cells and fibroblasts on H&E staining of the biopsy tissue sample is considered as confirmation for proud flesh[15].

CONCLUSION

The present report accounts for the successful management of proud flesh in 3 equines by the combination of surgical excision and chemical methods for wound management.

Conflict of interest

The authors do not have any conflict of interest.

Authors Contribution

All the authors have contributed in terms of giving their technical knowledge to frame the article.

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