

Surgical management of traumatic lower lip avulsion in a buffalo

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Lower lip injuries are commonly encountered in domestic animals and are often caused by sharp objects, infighting, or falls from heights, particularly in hilly terrains. Cases of lip avulsion in cattle have been reported by Rao (1999), Patil *et al.* (2007), Fazili (2009), Anjaneya *et al.* (2010), and Patil and Laxmaiah (2010). The present report describes a case of complete lower lip avulsion in a 5-year-old female buffalo resulting from an accidental fall from a hill.

Wound infection can significantly delay the healing process, contribute to wound deterioration, and ultimately result in failure of healing (Edwards and Harding, 2004). This occurs through various mechanisms, including persistent and excessive release of inflammatory mediators, accumulation of metabolic waste products and toxins, tissue hypoxia, formation of haemorrhagic and fragile granulation tissue, reduction in fibroblast numbers and collagen synthesis, and interference with re-epithelialization (Robson, 1990). In ruminants, the management of jaw and oral tissue injuries should therefore include correction of fluid and electrolyte imbalances, meticulous tissue apposition, and effective control of opportunistic pathogens to promote optimal wound healing.

A 5-yr-old female buffalo was presented to the Government Veterinary Hospital, Kathud Hindav, Block Bhilangana, Tehri Garhwal, Uttarakhand, with a history of accidental fall from a height. The animal exhibited a drooping lower lip due to severe injury to the supporting soft tissues. Clinical examination revealed blood-tinged salivary drooling and complete separation of the lower lip from the mandible extending up to the cranial half of the mandibular body (Fig.

1A). The wound was heavily contaminated; however, no mandibular fracture was detected. All physiological parameters were within normal limits except for approximately 5% dehydration.

The dehydration was corrected using balanced isotonic fluid therapy. The animal was restrained using KetaStun (butorphanol 0.025 mg/kg, xylazine 0.05 mg/kg, and ketamine 0.1 mg/kg, i.m.). The wound was initially lavaged with Ringer's lactate solution and subsequently cleaned using regular toothpaste and a soft-bristled toothbrush as described by Vajrabhaya (2022), with the aim of minimizing opportunistic bacterial contamination of the oral cavity during treatment. Following bilateral mental nerve blocks, thorough wound debridement was performed. Reattachment of the avulsed lower lip was achieved using copper wire applied in a horizontal mattress suture pattern through the interdental spaces, sublingual region, and mandibular tissues to provide secure fixation of the lip to the mandible (Figs. 1B and 1C).

Postoperatively, the animal was treated with procaine penicillin (50,000 IU/kg body weight, i.m.) once daily for five days. In addition, a balanced electrolyte supplement was provided in the drinking water to prevent dehydration associated with potential salivary losses. The animal resumed feed intake and normal rumination by the second postoperative day. The fixation wire was removed 60 days after surgery, and no signs of wound dehiscence or other postoperative complications were observed.

Degloving and avulsion injuries of the lower lip pose significant challenges in ruminants, as impairment of prehension and rumination can adversely



Fig. 1: (A) Animal when presented with lower lip injury; (B) Intraoperative stabilization with copper wire; (C) Lip properly apposed after surgical repair.

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affect the entire digestive process. Reconstruction of such injuries is particularly demanding for the surgeon due to the limited availability of local tissue, the continuous movement of the lower jaw during rumination, and the risk of suture damage caused by the strong, keratinized, and papillated tongue. Furthermore, suture tract infections resulting from the normal microbial flora of the oral cavity may predispose animals to conditions such as wooden tongue and wooden jaw.

In the present case, copper wire was selected as the suture material because of its inherent antimicrobial properties and its ability to withstand the mechanical stress associated with continuous tongue and mandibular movements. Similar successful use of copper wire in the management of lip avulsion has been reported by Rao (1999). In addition, several wound-healing mechanisms are dependent on copper and its biological interactions (Kornblatt, 2016). Copper serves as a cofactor for superoxide dismutase, an antioxidant enzyme that protects tissues from oxidative damage, including membrane injury and lipid peroxidation, thereby contributing to tissue repair and healing (Phillips *et al.*, 2012). Copper may also enhance the effectiveness of systemic antimicrobial therapy. Unlike antibiotic resistance, which has emerged rapidly in many bacterial species, microbial tolerance to copper remains exceedingly rare despite its presence in the environment for millions of years. This may be attributed to copper's ability to simultaneously disrupt multiple essential cellular processes in microorganisms, thereby reducing the likelihood of resistance development (Borkow, 2005).

Based on the successful outcome of the present case, copper wire appears to be a suitable and effective material for the management of lower lip avulsion injuries in ruminants.

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