

Surgical removal of a third horn (cutaneous horn) in a ram: A case report

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Abstract Cutaneous horn, also known as *cornu cutaneum*, is a firm, hyperkeratotic, cone-shaped projection from the skin surface that varies in size. These keratinous skin lesions may be classified as primary benign, premalignant, or malignant. The etiology of *cornu cutaneum* remains unclear; however, it is believed to be associated with exposure to radiation, certain tumors, and various viruses. A 2-year-old ram, weighing 60 kilograms, was admitted to Shiraz University Teaching Hospital with a primary complaint of ram fighting and horn fracture. A thorough examination of the case revealed that the ram had three horns, with the third horn (cutaneous horn) exhibiting a fracture. The cutaneous horn was located on the nose, and upon inspection, it was observed to be movable and lacked a root. The consistency of the cutaneous horn was found to be comparable to that of primary horns. The present study reports a case of third horn (cutaneous horn) of a ram treated with surgical excision, and the rationale for this intervention is discussed. A surgical excision was performed, and an elliptical incision was made, taking into consideration the cutaneous limitations for surgical wound closure. Postoperative care involved surgical wound closure, and the ram was discharged approximately two hours later. Unfortunately, a histopathological examination of the lesion was not possible. However, its location and the absence of any evidence of malignancy suggest a potential association with sun exposure.

Introduction

The majority of bovids, including cattle, buffalo, goats, sheep, and ibex, are characterized by the presence of a pair of sharp, curved horns on their heads. It is noteworthy that these horns do not undergo annual shedding; rather, they undergo continuous growth due to the proliferation of germinal cell layer [1]. The functions of horns are diverse and include mate attraction, thermoregulation, defense against predators, and intraspecific combat [2, 3]. Horns have evolved

into diverse shapes over the course of millions of years [4]. Concurrently, the primary constituent of horns, keratin, has remained unchanged. Keratin is a structural protein produced by keratinocytes [5, 6]. The shape of horns in different species corresponds to their specific fighting behaviors [4, 7]. Furthermore, it should be noted that the microstructures and mechanical properties of horns may be associated with their fighting behaviors [8, 9]. Cutaneous horn, otherwise known as *cornu cutaneum*, is a firm, hyperkeratotic, and cone-shaped projection from

the skin surface that varies in size [10]. These keratinous skin lesions may be classified as primary benign, premalignant, or malignant [11, 12]. The primary cause of *cornu cutaneum* is not yet fully understood, but it is believed to be associated with exposure to radiation, certain tumors, and various viruses [12, 13]. Regions of the body with increased exposure to radiation, such as the scalp, nose, eyelid, neck, and the cartilaginous portion of the ear, are more susceptible to this condition [14]. While there are limited reports of cutaneous horn in animals compared to humans, these lesions have been documented in cattle, sheep, goats, birds, horses, pigs, dogs, and cats, as well as in wild animals [12, 15]. The present study reports a case of third horn (cutaneous horn) in a ram treated with surgical excision.

Case presentation

History

A 2-year-old ram, weighing 60 kilograms, was admitted to Shiraz University Teaching Hospital with the primary complaint of ram fighting and horn fracture. A thorough examination of the case revealed that the ram had three horns: the broken horn was the third and additional horn (cutaneous horn). This additional horn was located on the nose, and no bleeding was observed at the fracture site (Figure 1). Additionally, no signs of infection or miasis were detected. The owner reported that the ram had developed a third horn at approximately three months of age, which was subsequently removed once but regrown later.

Clinical and laboratory findings

A general physical examination revealed that the animal exhibited signs of discomfort, as evidenced by a lack of appetite. The animal was not febrile. A rectal temperature of 39°C and a heart rate of 83 beats per minute were recorded. During inspection, the intact parts of the horn were found to be mobile and lacked a root. The consistency of the cutaneous horn was found to be identical to that of the primary horns. No other

abnormalities were observed. A blood specimen was obtained for serological analysis to detect brucellosis, and the test results were negative.

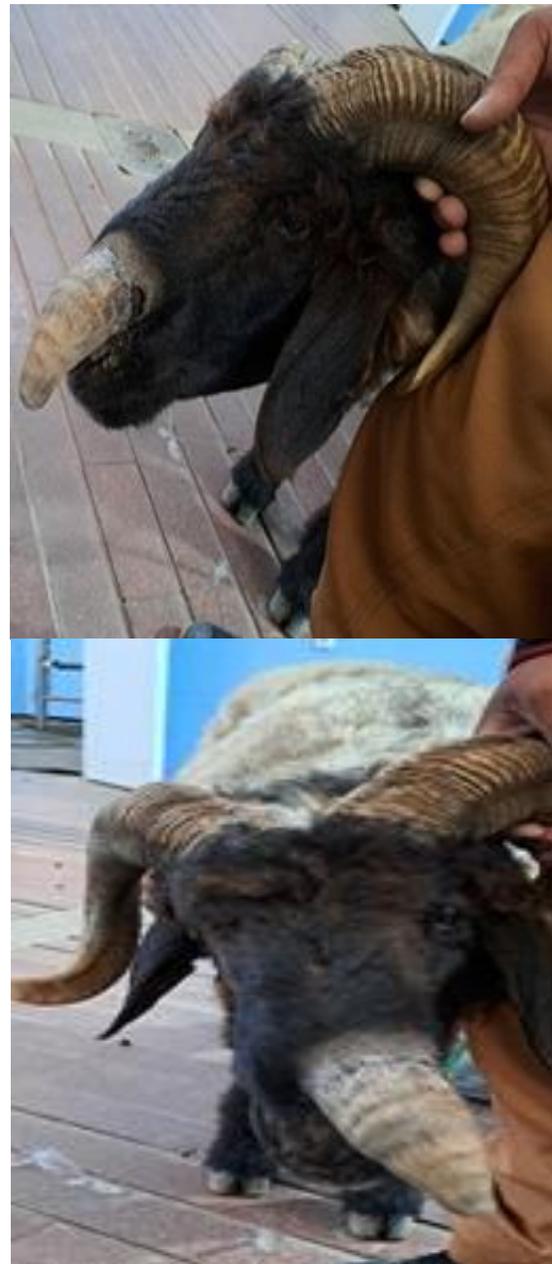


Fig 1. Clinical view of third horn and its fracture

Surgical treatment

Given the presence of a fractured horn, resulting pain, and the owner's desire to preserve the ram, surgical excision was deemed necessary (Figure 2).



Fig 2. Prepared skin and horn for excision and elliptical incision

Due to the location of the cutaneous horn and specific considerations for ruminant anesthesia, it was decided that sedation and local anesthesia would be the best approach for the surgery. Sedation was achieved by injecting 10 mg/2 ml of diazepam into the jugular vein. Local anesthesia was administered by injecting lidocaine 2% in an inverted "V" shape and around the base of the horn. Vital signs, such as heart rate, respiration rate, and temperature, were carefully monitored throughout the procedure. The surgical site (around the cutaneous horn) was shaved and prepared by scrubbing with povidone iodine solution three times. An elliptical incision was made, considering the cutaneous limitations for wound closure. It was observed that the horn had no connection to the sinuses or nasal cavity. The horn was excised by undermining as it lacked a bony root. The underlying tissues were dense and fibrotic (Figure 3). After excision, the wound edges did not come together, requiring undermining to create a sufficient margin for suturing. The underlying tissues were sutured with vicryl No. 2 using a simple continuous

pattern, followed by skin suturing with silk No. 2 using a tension-relieving pattern (Figure 4). Postoperative care included administering antibiotics (penicillin-streptomycin 3+3, 15000 IU/kg intramuscular injection once daily for 4 days) and analgesics (ketoprofen 3 mg/kg intramuscular injection once daily for 4 days). Following a four-day postoperative period and a subsequent 14-day follow-up, the patient demonstrated a full recovery, with no adverse complications observed.



Fig 3. Third horn after excision

Discussion

Cutaneous horn, *cornu cutaneum*, is an uncommon, conical, dense, and hyperkeratotic lesion that may be triggered by a variety of factors. While 60% of these cases are benign, there are also premalignant and malignant causes. The body parts involved are often related to burns, actinic and sun exposure [16, 17]. In this particular case, the cutaneous horn was located on the nose, a region of the body frequently exposed to the sun. This observation suggests a

potential correlation between the development of cutaneous horn and sun exposure. Despite the absence of a specific etiology for cutaneous horn in some reports, as evidenced by the case of a cutaneous horn on the pinna of a goat [18], other reports have associated these projections with tumors. One such report indicates that a horn-like mass located on the pinna of a sheep is attributable to trichoblastoma, arising from hair follicles or associated glands [13]. Another report has associated the cutaneous horn with squamous cell carcinoma (SCC). According to the report, the majority of cutaneous tumors manifest on the ear, presenting as cutaneous horns. These lesions can be addressed through surgical intervention, specifically involving the excision of the affected ear [19]. A notable report in the literature classifies this abnormality as a congenital anomaly [20], underscoring the potential for underlying genetic or developmental factors contributing to its occurrence.

Although *cornu cutaneum* has been documented in cattle, sheep, goats, horses, cats, dogs, pigs and birds [12], there are some rare reports of its occurrence in buffalo, along with reports of its surgical management [20 - 22]. Additionally, there are a few reports of cutaneous horns in wild animals, such as alpine chamois, which exhibit horns of varying sizes [15].

It has been observed that equine keratomas, which are conical or cylindrical growths, are a rare lesion of the horse's foot. These lesions are derived from the epidermal cells of the coronary band and are typically located between the hoof wall and the third phalanx [23].

Cornu cutaneum is an uncommon neoplasm in canines. Although this lesion is typically observed in areas exposed to the sun, some case reports have documented its presence in regions with minimal sunlight exposure. This report details the case of a cutaneous horn that developed in the perianal region of a pug [24].

In felines, cutaneous horns are typically associated with feline leukemia virus-associated dermatoses (FLV) and frequently manifest in the center of the foot or paw pads [25]. However, a report has emerged of a lesion exhibiting no evidence of viral infection in an atypical area of a cat's neck skin. The etiology of cutaneous horns

in this case is considered to be of a congenital origin [12].



Fig 4. Skin suturing and after surgery

Conclusion

Cutaneous horn is characterized by a cone-shaped protrusion from the skin surface, exhibiting variability in size and numerous etiologies. The primary cause of cutaneous horn remains to be elucidated, though it is predominantly associated with benign factors. In the present case, the cutaneous horn, located in the nasal region, was excised due to its fracture.

This horn did not extend into the nasal cavity or sinuses and lacked a bony root. Unfortunately, further investigation is precluded by the inability to perform a histopathological examination. However, given its location and the absence of any evidence of malignancy, it is reasonable to hypothesize a relation to sun exposure. Further investigations are recommended to ascertain the primary etiology of cutaneous horn.

Acknowledgements

Not applicable

Conflict of interest

The authors declare that they have no competing interests.

Ethical approval

For this type of study, formal consent is not required.

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