

## EXUGUNLATION FOLLOWED BY FRACTURE AND AVULSION OF THE DISTAL PHALANX IN MARE

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### ABSTRACT

This is a case report that describes a severe condition of exungulation with distal phalanx avulsion in a mare, Quarter Horse of nine years old, attended at the Veterinary Hospital (HCV) from the Santa Catarina State University (CAV/UDESC), Lages, SC, Brazil. The animal showed exungulation of the right hindlimb due to transportation trauma and presented with severe lameness. All radiographs demonstrated osteoproliferative reaction in the proximal and middle phalanges and absence of the distal phalanx and the alar cartilage and severe peripheral soft tissue swelling. Due to the extensive injury with severe involvement of the distal phalanx and poor prognosis euthanasia was recommended and performed.

**Keywords:** lameness, hoof avulsion, horse, trauma.

## EXUNGULAÇÃO SEGUIDA DE FRATURA E AVULSÃO DA FALANGE DISTAL EM UMA ÉGUA

### RESUMO

Este é um relato de caso que descreve uma condição grave de exungulação com avulsão da falange distal em uma égua, Quarto de Milha, de nove anos de idade, atendida no Hospital Veterinário (HCV) da Universidade do Estado de Santa Catarina (CAV/UDESC), Lages, SC, Brasil. O animal apresentou exungulação no membro pélvico direito, decorrente de trauma durante o transporte, apresentando intensa claudicação. Nas radiografias obtidas observaram-se reação osteoproliferativa nas falanges proximal e média e ausência de grande parte da falange distal e da cartilagem alar e aumento de volume dos tecidos moles. Devido à extensa lesão com grave comprometimento da falange distal e prognóstico ruim, recomendou-se a eutanásia.

**Palavras-chave:** claudicação, avulsão do casco, equino, trauma.

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## EXUNGULACIÓN SEGUIDA DE FRACTURA Y AVULSIÓN DE LA FALANGE DISTAL EN UNA YEGUA

### RESUMEN

Se trata de un caso clínico que describe una condición seria de la exungulación con avulsión de la falange distal en una yegua Cuarto del Milla de nueve años de edad que fue atendida en El Hospital Veterinario (HCV) de la Universidad del Estado de Santa Catarina (CAV/UEDESC), Lages, SC, Brasil. El animal mostro exungulación de la extremidad posterior derecha, debido a un traumatismo durante el transporte, con una marcada claudicación. Las radiografías mostraron reacción osteoproliferativa en las falanges proximal y medial y carecen de la mayor parte de la falange distal y del cartílago alar, también se evidencia aumento de volumen de los tejidos blandos. Debido a La extensa lesión con deterioro severo de la falange distal y mal pronóstico, se recomienda la eutanasia.

**Palabras-chave:** claudicación, avulsión del casco, caballo, el trauma.

### INTRODUCTION

The distal portion of the equine limb is a structure adapted to receive enormous mechanical tasks with great flexibility associated and considerable resistance, however is not free from receiving damage by traumatic events (1). Injuries can be associated with anatomical factors such as its distally location and functional factors in which a small area is available to bear a heavy load and also being able to perform exercise, rising the mechanical demand considerably, along with the constant contact with the environment (2). Often the surface that the equine perform activities is not adequate, which gives it a much greater potential for serious injury compared to a natural environment (3).

Avulsions of the hoof wall are rare events that seriously undermine athletic and functional performance of the animals. Avulsion may be complete where the corneum stratum is completely separate from subcorneum stratum or incomplete when the some wall tissue remains intact (4). The structures that can suffer damage from exugulation also involve the coronary band and distal ends of the tendons, ligaments and deeper structures of the hoof capsule may compromise the distal phalanx (4). Apart from acute cases of traumatic origin mainly leading to complete avulsion of the hoof capsule, chronic processes can also follow this outcome, as in laminitis, so that ischemic processes lead to an infarct of dermal blades, causing destabilization of the distal phalanx and in some cases culminates in the complete separation of these structures (4,5).

The establishment of the prognosis is related to the degree of involvement of structures, and in situations of extensive injuries to bone tissues, readily protrudes to an unfavorable condition. However, in situations where there is a significant loss of germinal tissue the digit has the ability to complete regeneration of structures, albeit more slowly than other tissues, when properly treated is established for a sufficiently long period, since, due to the location of the lesion, the establishment of infectious processes is an aggravating factor (6,7). In cases where there is a broad involvement of distal structures, being practically impossible to return the minimum support conditions, euthanasia is more applicable instead of clinical management (4,8).

The objective of this paper is to describe a case of exungulation with partial loss of the distal phalanx and the alar cartilage of the right hindlimb in a Quarter Horse resulting from trauma, addressing issues related to the diagnosis and the most appropriate clinical management.

## CASE REPORT

A Quarter Horse mare of nine years of age was presented to the Veterinary Hospital of the University of the State of Santa Catarina (UDESC) Agroveterinary Sciences Center (CAV), presenting with complete avulsion of the hoof of the right hindlimb and swelling of the distal aspect of the limb. In the anamnesis the owner reported that 25 days prior to presentation the equine was transported to an equestrian event (rodeo), when by transposing a road bump caused the animal to scare suffering trauma to the right hindlimb inside the truck. The next day the animal was primed and performed activities in the event. Since then the limb was presented with a progressive increase in swollen in the coronary band region. Over the days the owner noticed the presence of pus in the site. After seven days of the incident was noticed exungulation of the affected limb. The limb remained enlarged and with edema and a presented serosanguinous exudates. In the first week the owner treated with penicillin G benzathine (40.000 UI/kg, IM, three times every 48 hours) and flunixin meglumine (1.1 mg/kg, IV, SID). Topical treatment was performed with iodine application on the wound. The owner proceed with administration of corticosteroids (flumetazona) for five days and antibiotic (florfenicol) for six days.

Physical examination showed hyperthermia (39°C) and tachycardia (50 bpm) and loss of function in the right hindlimb with the presence of granulation tissue at the distal end of the limb region with absence of the hoof and continuous bleeding (Figure 1A). Upon physical examination of the locomotor system it was identified lameness grade of IV (I-IV) with diffuse bleeding from the lamellar corium. The limb was distally swollen from the tarsal joint to its most distally aspect, with positive Godet sign, and had increased temperature and palpation sensitivity. As the animal had increased pain sensitivity in the injured limb making impossible to carry out a more detailed physical examination, sedation was performed, using 0.5 mg/kg of xylazine at 10 % intravenous and epidural morphine at a dose of 0.1 mg/kg diluted in 20 ml saline solution for 120 seconds. After 15 minutes of epidural administration the animal allowed manipulation and proper positioning to perform the radiographic examination. Orthogonal radiographs of the distal region of the right hindlimb was obtained showing marked swelling of soft tissues in the region was obtained. The distal phalanx showed morphological changes and reduced dimensions. There was a complete oblique fracture of the body of distal phalange with severe proliferative lytic mixed reaction in the lateral plantar process indicating chronic process. The fractured bone fragment and the hoof were not identified. There was mild periosteal reaction in dorsal edges of the first and second phalanx and the presence of periarticular osteophytes on the distal edge of the second phalange with swelling of adjacent soft tissues (Figure 1, B and C). The diagnosis was confirmed and determined as complete transverse fracture of body of distal phalange with the absence of the fractured fragment of osteomyelitis process and avulsion of the hoof.

As a supplementary analgesic medication was used at a dose of 25 mg/kg dipyrone intravenously associated with flunixin meglumine at a dose of 1.1 mg/kg intravenously and euthanasia was indicated due to the poor prognosis of the animal.

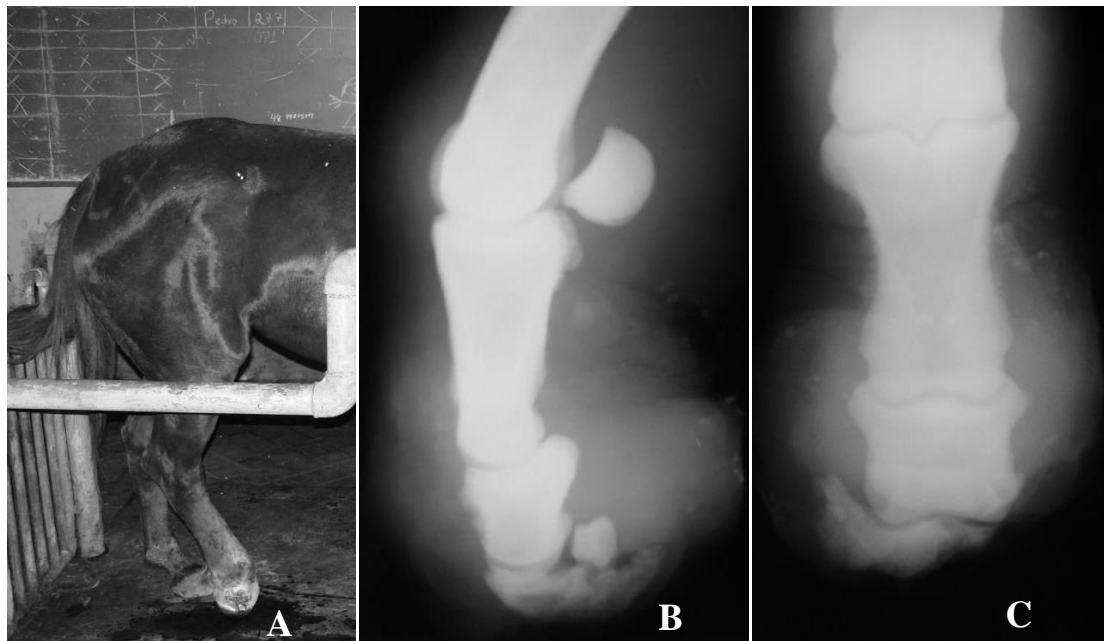


Figure. 1. (A) Quarter Horse mare of nine-year-old presenting total hoof capsule avulsion in the right hindlimb. (B) Lateromedial view showing severe soft tissue swelling and loss of the third phalange. Periosteal reaction is identified in the cranial aspect of the second and first phalanx. (C) Dorsoplantar view of the same limb described in “B”. Note the lack of the medial aspect of the alar process.

## DISCUSSION

Although the diagnosis of complete avulsion of the hoof case can be obvious, the investigation of the involvement of deeper structures should be observed since the depth of the lesion is directly related to prognosis (4). Obtaining radiographs is extremely important to know the conditions of the distal phalanx, navicular bone and the distal epiphysis of the middle phalanx. Special appreciation to the affections of the hoof is needed due to their structural and functional peculiarities and the degree of contamination, which is usually high (2).

The process of regeneration of corneal sheath differs from that observed in other body surfaces (6). Loss of tissue of the hoof and sole are contoured for local epithelialization, dermic-like, with homogeneous epithelial layer surrounding the edges. In the formation of a new hoof wall, the epithelium is restored by progressive growth of the hoof wall from the coronary band for a distal direction (9).

In the case where there is destruction of tissue beyond the coronary band, tissue which will cover the whole area may be laminated from both sources - dermic and coronary - resulting in bad appearance end (10). Thus, complete avulsions with involvement of skin and coronary band often promote the formation of persistent defects in the hoof. Debridement of the underlying granulation tissue and reconstruction of the coronary band, drainage and washing of synovial compartments when affected, and bandages may be necessary until all infectious complications are resolved (2). The decision to perform the treatment in case of complete avulsion should be applied only after economic factors evaluation and severity of clinical signs (8).

Young (11) obtained good results in the treatment of three cases of partial avulsion using debridement and frequent dressing and delivery of oral supplementation of methionine and biotin. Heart bar shoe are also useful in supporting the patient in the weight distribution. Nunes et al. (12) reported a case of complete avulsion with similar results with footbath solution of potassium permanganate and nitrofurazone topical dressings were prepared with

sugar. To cushion the impact and to facilitate locomotion dressing with cotton as also performed. Barreira et al. (13) described a case of total avulsion of the hoof with significant impairment of dermal lamellar tissue and the distal phalanx in the horse showed remarkable recovery after combination treatment with conventional cell therapy.

The animal was presented with considerable time elapsed since the trauma, with the absence of the third phalanx, establishment of an intense inflammatory, hemorrhagic and infectious process, an alternative to consider would be the amputation of digit, a controversial action between professionals and is sometimes applied, but with numerous subsequent disorders such as prolonged decubitus leading to myositis and peripheral nerve compression, support laminitis in the contralateral limb, and successive injuries to the surgical stump. Invariably the implementation of any therapy aiming to regenerating the corneal sheath would not be successful in this case since the absence of the distal phalanx.

## CONCLUSION

The exungulation are rare conditions, and it should be part of the list of diseases of the equine locomotor system in which the veterinarian is required to provide much attention. Therapeutic protocols can be established even when prognostic is reserved, since that the sooner the injury is identified, planning the therapy in order to stabilize the condition to avoid consequences resulting from an erroneous or even nonexistent care. However when faced with conditions where there is severe damage to the deep structures of the hull, as presented, subsequent complications promote a painful survival, euthanasia can be the most appropriate clinical management.

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