

Acquired ectopic hoof spur – diagnosis and management

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Summary: This case series reports the clinical manifestations, diagnosis and treatment of an ectopic horn formation. Three adult horses, each with an ectopic horny spur (EHS) after a chronic coronary band avulsion (occurring approximately 3 months prior), were admitted for treatment. The coronary band lesion caused ectopic epidermal germ cells to grow horn at right angles to the hoof wall at the plantaromedial or dorso-lateral side of the hoof. Under general anaesthesia in all three horses the EHS and its matrix was excised followed by a reconstruction of the coronary band. The hoof was immobilised by a half limb cast for 2–3 weeks. In all horses the wound healed per primam and no recurrence occurred.

Keywords: Ectopic horny spur, equine, avulsion coronary band, surgical excision, hoof.

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Introduction

Avulsion of the coronary band can result in permanent deformation of the hoof and lameness.^[1] Less commonly, ectopic horn formation occurs, defined as persistent growth of horn tissue at any site other than the anatomic hoof. In human onychoheterotopia or ectopic nail, characterized by nail plate growth in regions other than the normal nail bed due to the presence of an ectopic nail matrix, might be similar.^[2,3] In equines ectopic horny spur (EHS) is a clinical diagnosis and develops as a consequence of a trauma to the coronary band in which the integrity has been disturbed. It manifests as a

proliferative protrusion of horn, having a height that is more than half of the diameter of its base. Clinically EHS does not cause symptoms, but might be subject to trauma.

The differential diagnosis cornu cutaneum (CC) or ectopic cutaneous horn could be considered as well, which is a clinical term for the hyperproliferation of layers of firmly adhered, compact keratin associated with a lesion at its base.^[4]

Simply excising is not the solution, and complete surgical excision with its germinal matrix is necessary, followed by primary closure of the defect and/or reconstruction of the coronary band.

This study describes the clinical manifestations, diagnosis and treatment of an ectopic horn formation in 2 warmblood horses and an Appaloosa.

Case 1

History

Over a period of 6 years 3 patients were referred with an ectopic horny spur (EHS).

A seven-year-old Appaloosa gelding was presented with a history of an avulsion of the coronary band of the right hind limb, followed by the formation of a horn-like outgrowth projecting over the hoof (ectopic horny spur EHS) (Fig.1). The horse had a heel trauma three months before presentation, which initially healed, but 2 weeks before arrival at the clinic a fast-growing EHS was noticed. The EHS was not associated with pain, swelling or itching.



Fig. 1 An ectopic horny spur at the plantaromedial side of the hoof of the right hind limb (case 1). | *Ein ektopischer Hornsporn auf der plantaromedialen Seite des Hufes der rechten Hintergliedmaße (Fall 1).*

The horse was sound at the moment of presentation. On physical examination a solitary well defined EHS with a unicorn horn appearance and a base of 2.5 cm in width and 8.0 cm in length, was located at the plantaromedial side of the hoof connected to the proximal alignment of the coronary band. The horn was extending vertically from the skin surface. No other obvious abnormality was found on clinical examination except a small vertical superficial crack in the underlying heel horn, running from proximal to distal (Fig. 1). Radiographs (lateromedial and anterior posterior views) of the affected hoof revealed no bony abnormalities. Due to its location and its size, it was prone for trauma and the owner wanted it to be excised.

With a diagnosis of EHS complete excision with its germinal matrix was planned. Prior to surgery the affected foot was trimmed, rasped, scrubbed and a wet disinfecting bandage (povidine iodine) was applied overnight.

Treatment

Surgery was performed under general anaesthesia, in lateral recumbency with the affected side of the foot uppermost. The hoof wall was lowered at the weight-bearing surface site of the EHS and the horn distal to the spur and surrounding the crack trimmed with a Dremel tool to reduce the pressure on the coronary band (Fig. 2 and 3). After a medial and lateral local



Fig. 2 Medial view of the ectopic horny spur at the plantaromedial side of the hoof of the right hind limb under general anaesthesia (case 1). | *Seitliche Ansicht des ektopen Hornsporns an der plantaromedialen Seite des Hufes der rechten Hintergliedmaße unter Vollnarkose (Fall 1).*



Fig. 3 Plantar view of the ectopic horny spur at the plantaromedial side of the hoof of the right hind limb under general anaesthesia (case 1). | *Plantaransicht des ektopen Hornsporns an der plantaromedialen Seite des Hufes der rechten Hintergliedmaße unter Vollnarkose (Fall 1).*

sesamoid block (2% lidocaine)^a an Esmarchs' tourniquet was applied. Under strict aseptic condition surgery was performed. A vertical elliptical skin incision was made on either side of the EHS. The EHS was excised along with a part of the germinal matrix from which it was arising. The wound was closed using far-near-near-far sutures (Polydioxanone polymer PDS USP1)^b taking care to apposition the coronary band; a FNNF suture was placed through the horn distal to the coronary band. Medicinal honey (Mielosan)^c was put on the wound followed by a non-adhesive gauze. A half limb cast was applied for 19 days. The cast consisted of 2 layers thin woven padding (Cellona)^d with extra padding in the fetlock, covered by crepe paper to ensure easy removal of the cast (prevents padding to adhere to the cast material). One roll of semi rigid synthetic cast (7 cm, 3M™ Scotchcast™ Soft Cast)^e was applied from proximal to distal to ensure a flexible proximal boundary of the cast preventing pressure sores by the hardened rigid cast during limb flexion, leaving 1 cm of the padding uncovered. Then 5–6 layers of rigid cast (starting just distally to the border of the semi rigid cast) with 50% overlap were applied. The heel was slightly elevated with rigid cast. To prevent slippage and to protect the cast to excessive wear, especially at the toe, the solar surface was covered with polymerised resin (Technovit)^f. Elastic tape was positioned at the proximal end of the cast and the skin to prevent contamination from the outside.

Peri-operative antibiotics and pain relief medication were provided for 3 days using once daily gentamicin (6.6 mg/kg i.v.)^g, and twice daily procaine penicillin G (22.000IU/kg i.m.)^h and flunixin meglumineⁱ (1.1 mg/kg i.v.).

The cast was removed and the wound had healed per primam.

A hoof bandage was applied for another 3 days. The horse was discharged and box rest was advised for 2 weeks followed by training again.

Outcome

Follow-up was obtained by telephone interview with the owner half year after surgery and no recurrence of the EHS was



Fig. 4 Plantar view of the plantaromedial side of the hoof of the right hind limb 8 months after surgery (case 1). | *Plantaransicht der plantaromedialen Seite des Hufes der rechten Hintergliedmaße 8 Monate nach der Operation (Fall 1).*

noticed and the horse was performing at the same level as before. After 8 months, the horse returned to the clinic for unrelated reasons, and no crack or scar tissue could be noticed (Fig. 4).

Cases 2 and 3

Both warmblood horses (a seven-year-old mare and an eight-year-old gelding) developed an EHS after trauma to the coronary band of the right hindlimb on the dorsolateral aspect of the hoof; the size of the EHS was 4.0 × 2.5 cm and 3.5 × 2.0 cm respectively (Fig. 5). About three months after spontaneous wound healing, the horses developed a EHS. It had grown persistently up to the time of presentation at the clinic and reoccurred after trimming. Both owners could not provide information about the growth rate, but considered it to be faster than normal hoof horn growth.

Both horses were sound at the moment of presentation. The ectopic horny spurs were not associated with pain, swelling or itching. Underneath the EHS a small rim of thickened horn was visible on the hoof. Treatment was performed as mentioned above (Fig. 6 and 7). In both cases the half limb cast



Fig. 5 An ectopic horny spur at the dorsolateral side of the hoof of the right hind limb (case 2). | *Ein ektopischer Hornsporn an der dorsolateralen Seite des Hufes der rechten Hintergliedmaße (Fall 2).*



Fig. 6 Lateral view of the EHS in lateral recumbency (case 2). | *Seitliche Ansicht des EHS in Seitenlage (Fall 2).*

was removed 14 days after surgery and wound healing was per primam. In the mare a crack was created in the hoof when removing the cast with the cast saw (Fig. 8). Both horses returned to original function within 6 weeks after surgery. The mare came back to the clinic two months after surgery for an eye lid laceration. The coronary band was intact, horn had grown distally for about 2 cm in a normal way, the crack of cast removal could still be noticed (Fig. 9). Follow-up was obtained by telephone interview with the owners one year after surgery and both horses performed at the same level as prior to surgery with no signs of scar tissue on the coronary band.

Discussion

Posttraumatic ectopic horny spur (EHS) has seldom been reported in equines. [1,5-8] It is an interesting entity which probably results from the traumatic inoculation of epidermal matrix dorsal to the coronary band resulting in horn tissue growth outside the hoof. It might be compared with human ectopic nail, onychoheterotopia, which is an extremely rare disorder,



Fig. 7 Lateral view of the hoof after resection of the EHS in lateral recumbency (case 2). | *Seitliche Ansicht des Hufes nach Resektion des EHS in linker Seitenlage (Fall 2).*



Fig. 8 Dorsal view of the hoof after removal of the cast (case 2). | *Dorsalansicht des Hufes nach Entfernung des Castverbandes (Fall 2).*

in which the nail tissue grows outside the classic nail unit of the dorsal fingers and toes. [2, 3, 7, 9, 10] The coronary band of the horse is like the cuticle or nail bed of a human finger. This is the germinal centre that actively makes new cells, and so the growth of the hoof wall depends on the viability of these cells. An injury disrupting the congruency of the coronary band can result in the development of a hoof crack as well as an EHS. Also, a horny spur distally to the coronary band can develop after an incomplete avulsion in which the coronary band remains elevated. [5] It is essential to take care of an accurate alignment and apposition of the coronary band in case of trauma to prevent those complications. [11]

In all three cases the EHS developed after trauma of the coronary band and had a high height-to-base ratio. The majority of ectopic nails arise 2–3 months after the digit injury (Parks 2008), as was the case in our patients. The growth rate in humans is at the same speed as that of the underlying nail. [12] In the described patients the owners mentioned it was growing faster. They were asymptomatic; however, they might be subject to trauma resulting in a painful wound and surgical excision was indicated.

These EHS can be self-managed by shortening at regular intervals, similar to normal horn growth. However, trimming is not curative, and surgical resection of the EHS and its entire matrix, followed by reconstruction and primary closure of the coronary band, is indicated to prevent recurrence of the EHS and the formation of a hoof crack. In only the first case a thin heel crack was noticed, starting at the coronary band, whereas in the other two cases, only a small rim of horn was present on the hoof just distal to the EHS.

Considering the potential challenges of wound healing due to the loading and unloading of the hoof, a cast bandage was selected for immobilization. Alternatively, plating the hoof distal to the wound could be considered; however, a half limb cast might better mitigate vertical compressive forces at the coronary band.

As a differential diagnosis cutaneous horn can be considered. Cutaneous horns are conical hyperkeratotic cutane-



Fig. 9 Dorsal view of the hoof two months after surgery (case 2). | Dorsalansicht des Hufes zwei Monate nach der Operation (Fall 2)

ous protrusions that appear similar to animal horns but lack bone. [4,13–16] They tend to grow slowly, equal to normal horn growth. Cutaneous horns are now widely accepted as a reactive cutaneous growth caused by a variety of benign, pre-malignant, or malignant primary processes and most commonly a seborrheic or lichenoid keratosis. In dogs a viral cause has been described. [14] Occasionally they manifest at the mucocutaneous junction. [17,18] Although the morphological appearance looks alike, the cause of EHS is differently.

Ectopic horn spur formation is a rare complication after coronary band injury. Given the small number of case reports available, it is difficult to identify the actual incidence of EHS and possible risk factors beyond traumatic injury to the coronary matrix. Whereas they seldom result in clinical complaints, and can be self-managed by trimming, owners might not seek medical care. To prevent recurrence complete surgical excision with its germinal matrix is necessary, followed by primary closure of the defect and/or reconstruction of the coronary band.

Manufacturers' addresses

- ^a Lidocainhydrochlorid 2%®: bela-pharm GmbH & Co. KG, Lohner Straße 19, 49377 Vechta, Germany
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- ^c CP-Pharma Handelsgesellschaft mbH, Ostlandring 13, 31303 Burgdorf, Germany
- ^d Lohmann & Rauscher International GmbH & Co, Rengsdorf, Germany
- ^e 3M Deutschland GmbH, Neuss, Germany
- ^f Kulzer GmbH, Hanau, Germany
- ^g Gentacin® 85 mg/ml: bela-pharm GmbH & Co. KG, Lohner Straße 19, 49377 Vechta, Germany
- ^h Procain-Penicillin-G® 300,0 mg/ml: bela-pharm GmbH & Co. KG, Lohner Straße 19, 49377 Vechta, Germany
- ⁱ Finadyne® 50 mg/ml: Intervet Deutschland GmbH, Feldstraße 1, 85716 Unterschleißheim, Germany

Conflict of interest statement

The authors declare that there are no conflicts of interest.

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References

- 1 Markel MD, Richardson GL, Peterson PR, Meagher DM (1987) Surgical reconstruction of chronic coronary band avulsions in three horses. *J Am Vet Med Assoc* 15,190, 687–688; PMID 3570920
- 2 Rajashekar M, Bhandary S, Shenoy M, Sali AR (2006) Post-traumatic ectopic nail. *J Postgrad Med* 52 218; PMID 16855326.
- 3 Ena P, Ena L, Ferrari M, Mazzarello V. (2015) Ectopic Foot Nails: Clinical and Dermoscopic Features, Treatment and Outcome in 20 Cases. *Dermatology* 231, 298–303; DOI 10.1159/000437364; PMID 26329985

- 4 Cohen PR (2023) Cornu Cutaneum: Case Reports of Patients With a Cutaneous Horn Associated With Either a Verruca Vulgaris or an Inverted Follicular Keratosis and a Review of the Etiologies of Cutaneous Horns. *Cureus* 9, 15, e46747; DOI 10.7759/cureus.46747; PMID 38022343; PMCID PMC10631572
- 5 Stashak TS (1989) Management of Lacerations and Avulsion Injuries of the Foot and Pastern Region and Hoof Wall Cracks. *Vet Clin North Am Equine Pract* 5, 195–220; DOI 10.1016/S0749-0739(17)30611-9
- 6 Celeste CJ, Szöke MO (2005) Management of Equine Hoof Injuries. *Vet Clin Equine* 21, 167–190; DOI 10.1016/j.cveq.2004.11.009
- 7 Parks AH (2008) Hoofavulsions. *Equine Vet Educ* 20, 411–413; DOI 10.2746/095777308X338479
- 8 Schumacher J, Stashak TS (2017) Management of wounds of the distal extremities. In *Equine Wound Management*, 3rd ed. Theoret C, Schumacher J, eds. Wiley-Blackwell, Ames, IA, 312–351
- 9 Thakur BK, Verma S, Jitani A (2016) Post-traumatic ectopic nail. *Ind J Dermatol Venereol Leprol* 82, 416–416; DOI 10.4103/0378-6323.171644
- 10 Fleury CM, Nasser J.S, Aivaz M, Mantilla-Rivas E, Manrique M, Oh AK, Boyajian MJ, Rogers GF (2020) Pediatric Ectopic Nail Formation following Fingertip Trauma: A Case Report and Literature Review. *Plast Reconstr Surg Glob Open* 18, 8, e3291; DOI 10.1097/GOX.0000000000003291; PMID 33425603, PMCID PMC7787327
- 11 Burba DJ (2013) Traumatic foot injuries in horses: surgical management. *Compend Contin Educ Vet* 35, E5; PMID 23532730
- 12 Meher S, Mishra TS, Sasmal PK, Rout B, Sharma R (2016) Post-Traumatic Ectopic Nail: A Case Report and Review of Literature. *J Clin Diagn Res* 10, PD01-PD02; DOI 10.7860/JCDR/2016/20241.8770; PMID 28050430
- 13 Copcu E, Sivrioglu N, Culhaci N (2004) Cutaneous horns: are these lesions as innocent as they seem to be? *World J Surg Oncol* 3, 18; DOI 10.1186/1477-7819-2-18; PMID 15176977 PMCID PMC421749
- 14 Falk E, Lange CE, Jennings S, Ferrer L (2017). Two cutaneous horns associated with canine papillomavirus type 1 infection in a pit bull dog. *Vet Dermatol* 28, 420–421; DOI 10.1111/vde.12439
- 15 Riaz F, Rashid RM, Khachemoune A. (2010) Onychoheterotopia: pathogenesis, presentation, and management of ectopic nail. *J Am Acad Dermatol* 64, 161–166; DOI 10.1016/j.jaad.2009.11.018; PMID 20724029
- 16 Thiers BH, Strat N, Snyder AN, Zito PM (2023) Cutaneous Horn. 7. In: *StatPearls [Internet]*. Treasure Island (FL): StatPearls Publishing; PMID 33085427
- 17 de Araújo JM, de Lima SC, Rondon ES (2020) Mucocutaneous horn in dog. *Acta Sci Vet* 48, 1–4; DOI 10.22456/1679-9216.98347
- 18 Golchin D, Sasani F, Vazir N, Langeroudi AG, Kabir F & Vazir B (2022) Mucocutaneous Bowen's disease with a cutaneous horn overgrowth in a German shepherd dog. *Comp Clin Pathol* 31, 579–584; DOI 10.1007/s00580-022-03368-8