

Keratoma from the frog corium of a horse.

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A keratoma is usually described as an aberrant, focal, proliferation of cornified tissue produced by abnormal corium on the inner surface of the hoof wall (Honnas *et al.* 2003). Keratomas have been regarded benign horn tumours (Wagner *et al.* 1986) although no true neoplastic tissue has ever been identified (Honnas *et al.* 2003). It is proposed that keratomas may be produced in response to chronic irritation (Lloyd *et al.* 1988). Surgical removal is the recommended treatment, and this usually carries a good prognosis (Bosch *et al.* 2004).

This case report describes a keratoma of the frog corium (*cunei corium*) in a horse.

History

A twelve-year-old Warmblood stallion had been treated for the previous five months for a hoof crack and recurrent abscess formation on the medial heel region of the left hind foot. An oblique bar shoe had been used in the treatment (FIG 1) and the areas of the foot not covered with the shoe were filled with a hard acrylic compound. The farrier had noted in the central area of the frog an area of abnormal proliferative horn with adjacent purulent tracks and this prompted a request for veterinary attention.

Clinical examination

The stallion was found to be 1/5 left hindlimb lameness. Examination of the foot revealed a significant mediolateral foot imbalance with the medial wall still being too high, resulting in excessive wear on the medial branch of the shoe (Fig 2). The application of hoof testers onto the middle of the central sulcus of the frog caused pain and the discharge of purulent material. Within this was an area of abnormal yellow coloured horn. The lameness was not affected by flexion tests and was abolished by an abaxial sesamoid nerve block.



FIG 1: Removal of all the surrounding under-run and healthy frog horn revealed the presence of the keratoma. Note there is still considerable mediolateral imbalance as indicated by the excessive wear on the medial branch of the shoe (left side of image).

Whilst the foot remained anaesthetised the horse was sedated and using hoof knives and a scalpel all the areas of under-run horn were removed leaving a discreet spherical mass of yellow horn about 20-25 mm in diameter (Fig 1). A small neck of horn attached the mass to the underlying tissues. The mass, neck and 2mm (approximately) of the underlying frog corium was removed *en bloc*. The defect into the corium was circular in outline with a diameter of approximately 5 mm. The incisional site was dressed and covered with disposable nappies prior to bandaging. The dressing and bandage was changed every second day. By day 6 post-operatively the area of exposed corium was covered with immature horn and the wound then treated with topical 2% iodine. The bandage was then changed every 4 days before being left open from 20 days post surgery. Over the next 5 months the foot was regularly checked for development of abnormal horn. To assist in this assessment, the farrier at subsequent visits trimmed the frog more than normal to expose young frog horn so any abnormality could be observed quickly and more easily. At no stage was there any evidence to suggest further keratoma development. The horse has since had no further episodes of left hindlimb lameness and the frog appears grossly normal two and a half years later.

Histology

Histology of the mass revealed it was composed of proliferating squamous epithelium with some orthokeratosis and parakeratosis and there were small rete ridges extending into the underlying corium that was inflamed. Histologically it was identical to that described in the literature for keratomas found in the dorsal wall of the hoof (Lloyd *et al.* 1988; Honnas *et al.* 2003).

Discussion

To the authors knowledge there has been no description in the literature of a keratoma from the corium of a horse's frog. The keratoma described in this paper was grossly and histologically similar to those described from the laminae (Lloyd *et al.* 1988) and the sole corium (O'Grady and Horne 2001). Keratomas are typically solitary, as in this case, although multiple masses have been recorded. Two basic types of keratoma have been described, the cylindrical and the spherical forms (Greet 2002). This case would be described as a solitary spherical keratoma.

It is thought that keratomas develop as a result of chronic irritation on the sensitive dorsal laminae or sole corium of the foot through pressure, injury or chronic abscessation. This leads to abnormal horn production (Honnas *et al.* 2003).

Lameness associated with a dorsal wall keratoma is thought to occur secondary to the gradual enlargement of a keratoma in the confined space between the distal phalanx and the hoof capsule (Honnas *et al.* 2003). This creates pressure on the sensitive laminae and the underlying distal phalanx. The space occupying keratoma also creates abnormal structure to the horn that allows access for bacteria and resultant abscesses may develop (Wagner *et al.* 1986). The lameness often becomes apparent or more severe with the developing abscess (Bosch *et al.* 2004), as occurred here.

The prognosis for a return to soundness after complete surgical excision of a keratoma is favourable to excellent. Lloyd *et al.* (1988) found no recurrence of the keratoma in 7 cases 1 to 11 years after resection. Bosch *et al.* (2004) had an 83 % return to the same or higher level of performance in horses that had undergone surgical treatment. If a keratoma is not removed entirely regrowth is possible (Wyn-Jones 1988). Recurrence happens particularly if the keratoma originates at the coronary band where it is difficult to resect the mass completely without damaging the coronary corium and risking the production of weak horn that will be predisposed to hoof crack formation. In this case removal of some of the frog corium was not viewed as a short or long-term problem as this is frequently undertaken to gain access to deep foot infections (for example navicular bursa infection) without any recorded problems. Six months following the surgery the original medial hoof crack had grown out at this stage and it was not possible to determine grossly by looking at the frog horn that surgery had been undertaken on the underlying corium.

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