A Case of Canker in a Draft Horse

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A draft horse, 8 years of age, which contracted canker in the right fore hoof was treated by application of wood tar ointment to the debrided area for 1 month following radical debridement. The function of the affected leg was restored three months postoperation. After 1 year the horse contracted the same disease in the left hind hoof and was treated with the same surgical procedure. After surgery, the debrided hoof tissue was packed with sufficient chitosan cotton and the hoof was wrapped with sterile bandage. The bandage was removed two weeks after surgery. Good granulation tissue formation at the debrided area and no lameness at the affected leg were observed. The horse was clinically normal 1 month after surgery.

Key words: canker, chitosan cotton, draft horse

Canker in the horse is characterized by hypertrophic moist eczematous pododermatitis [2, 3, 8, 10–12] and is most commonly seen in the hind feet of draft breeds [3, 9, 10]. Recommended treatments, which include keeping the foot clean and minor debridement with appropriate antimicrobial therapy, are based on tenets of good wound care [3, 12]. Though the propensity of recurrence has led to an approach of radical surgical debridement, Wilson et al. [12] pointed out that a “cut them deep” approach results in the removal of more tissue than was necessary, increased risk of deep infection and delayed healing. The purpose of the present study was to observe the influence on gait condition and on wound healing of wood tar treatment and chitosan cotton packing after radical surgical debridement.

Clinical case. The case involved a draft horse, 8 years of age. The first sign of illness appeared at the age of 7 when the horse contracted thrush in all hooves. These were treated by applying wood tar and bactericides such as 0.05% chlorhexidine gluconate (Hibidil, ICI-Pharma Co.) or PVP-I (Isodine, Meiji Co.). These conditions persisted and became chronic. Around the age of 8, vegetative growth beginning from the corium of the frog was observed in the right front foot. This vegetative cankerous tissue then occupied almost the whole area of the frog and developed downward over the bearing surface of the hoof wall. The horse showed lameness in the affected leg with development of abnormal vegetative growth and hemorrhage on the frog. Increasing pain in the affected leg made it difficult for the horse to walk. First surgical treatment was done during this time. About a year after fore hoof treatment, the left hind hoof began to produce the same vegetative growth from the corium of the frog and the horse showed marked lameness in the
affected hind leg (Fig. 1).

**Operation on the right fore hoof and post-operative treatment.** Ketamine-HCl and Xylazine-HCl rapid induction following atropin premedication described by Kawanuma et al. [4] was employed as general anesthesia for radical surgical debridement. Anesthesia depth was maintained by intermittent inhalation anesthesia with mask. A tourniquet was placed in the mid-metacarpal area for control of hemorrhage. The cancerous tissue was debrided with a large scalpel and hemostasis was controlled by firing. After surgery, wood tar ointment was applied in the surgical area and the hoof was wrapped with a sterile bandage with rolled cotton towel. Ampicillin antibiologic agent was administered for three days intramuscularly and subsequently for five days orally. At one week postoperation, the horse could hardly be treated on the affected leg without anesthesia because of pain in the debrided area. General anesthesia in the same manner as described above was performed and the debrided area was macroscopically observed. The surface of the debrided area was covered by conglutinant exudate and regenerated granulation tissue was pale in color and had poor vascularization. Exudation from the operative area and lameness of the affected leg continued up to one month after surgery. It took three months for the horse to recover completely for drafting a sightseeing coach. One year after, the frog of the right fore hoof was observed to have reformed insufficiently and the hoof showed slightly contracted heel in comparison with the left fore hoof.

Anaerobic bacterial culture was performed during the first medical examination. *Staphylococcus aureus* and *Staphylococcus intermedius* were detected.

**Operation on the left hind hoof and post-operative treatment.** The second operation was performed approximately one year after the first operation on the left hind hoof. The same anesthetic procedure and surgical management done during the first operation of the right fore hoof was performed, though wood tar and cotton towel pack were not employed for post surgical treatment because of prolonged recovery time in the first operation of the fore hoof. Chitosan cotton for wound remedy of debrided area was prepared as follows. Chitosan (Flonac-C, 80% deacetylated chitin; grain size, 50–60 μm) was purchased from Kyowa Tecunos Co. Ltd. Dissolution of chitosan (200 g) in water-acetic acid (volume ratio 23:1, total ca. 2.5 l) followed by repeated filtration under increased pressure (1–2 Kg/cm²) and standing overnight gave a solution containing no bubble. The dope thus prepared was spun into the coagulant (ethylene glycol, 10 l; ice, 1.5 Kg; NaOH, 1.8 Kg) through a nozzle (0.1 mm, 500 holes) and 50% aqueous methanol was used as a second coagulant. Resultant filaments were stretched 1.15 times in air and washed with running water for more than 12 h. The chitosan fibres were then treated with
water at 70–80 °C for 3–5 h, immersed in methanol or ethanol for more than 24 h, dried in air on the cassette, and cut into short fibres (1–4 cm). Treatment of the chitosan fibres with a mixer and successive drying produced chitosan cotton, which consisted of 2–20 mm fibres (width, 20–50 μm; thickness, 3–15 μm; density, 0.11–0.2 g/ml).

Sufficient amount of chitosan cotton was packed in the surgical area (Fig. 2) and the foot was placed in a sterile bandage. Antibiological agent was used only once during surgery. The following day, weight bearing and ambulation were observed. No special treatments including changing of sterile bandage and chitosan cotton during two weeks were performed.

After two weeks, the surgical area was observed macroscopically under general anesthesia. On the debrided area, a soft and elastic granulation tissue formation was observed. No fetid odor and suppuration appeared (Fig. 3). Treatment with wood tar ointment of the open wound was performed from this time. The function of the affected leg was gradually restored and was clinically normal within one month after surgery, and the horse tolerated a heavy weight drafting of sightseeing coach (ca. 2000 Kg) in which approximately ten people rode for sightseeing of Tottori sand dune (National park).

Pathological findings in debrided tissue of left hind hoof at second operation. The verrucose growth of the frog consisted histologically of parakeratotic and acanthotic epidermis. Prickle cells of the parakeratotic epidermis occasionally showed ballooning degeneration with eosinophilic, cytoplasmic droplets and karyopyknosis. Bacterial clumps and
intramural microabcesses were sparsely distributed in the epidermis. In the corium, prominent changes seen include edema in perivascular areas and the interstitium of apocrine glands. Edematous loosening of arteriolar walls was occasionally encountered (Fig. 5).

Macroscopic aspects and histological survey of biopsy specimens closely resembled other reports of canker [2, 3, 5, 8-12] and made it possible to diagnose the case as one of exudative pododermatitis accompanied by hyperplasia of the epidermal lamellae. Canker was usually reported to occur mostly in the hind foot of draft breeds where it begins in the frog [3, 9, 10]. Wilson et al. [12], however reported in their fourteen thoroughbreds cases that the front feet were more commonly involved and housing condition was open paddock housing. In the present case, the horse was housed in a free stall of concrete floor, therefore, foot environmental conditions were not so bad in comparison with those in a tie stall housing [12].

In general, no etiologic agents had been definitively incriminated, though it had been suggested that in chronic dermatitis the result of thrush is one of the most suspected trigger agents of canker [5]. Poor shoeing is a well known predisposing cause of thrush [9]. Metal shoes of the horse in this study were too small for all hooves. It could be easily suspected that disturbance of hoof mechanism existed in those hooves due to poor shoeing. The etiologic factors involved in canker were reported to include moisture, trauma, poor hygiene of hooves and occlusion from the common practice in saddle horses of shoeing over pads [8, 9]. As described above, the horse’s hooves in this study was not subjected to poor housing, bedding and ground condition. Unfavourable foot care with poor shoeing including size and shape of metal shoes was suspected as the more probable predisposing factor for canker in this case.
For treatment of canker, Wilson et al. [12] recommended minor debridement with an appropriate antimicrobial therapy rather than radical debridement because of shorter time for clinical recovery in the former method. In our fore hoof treatment, the recovery time agreed with Wilson et al. On the other hand in hind hoof, in spite of the same radical manner, the recovery time was obviously reduced to one-third which corresponded to that of minor debridement in Wilson et al.

It has been reported that chitin derivatives were applied to wound remedies such as biological dressings and surgical materials [1, 6, 7]. We reported the effect of chitin derivatives on various wounds of other species for accelerating the formation of granulation tissue [7]. On dog’s fibroblasts, we also reported that the exudate which was induced by implantation of a chitin-coated non-woven fabric in the subcutaneous tissue had direct proliferation activity in vitro [7]. According to the conventional method of postoperative care after radical debridement, several treatments are required until the horse became clinically normal, but with the application of chitosan cotton to the debrided area, local treatments are not required for at least two weeks.

In equine practice, the effect of chitin derivatives on horse’s hooves must be investigated and clinical cases analyzed.

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References
ールによる後療法を1カ月間実施した。患肢は1カ月間重度な跛行を呈したが、術後3カ月で機能回復がみられた。1年後に左後肢に同じ症状が発生し同様な外科的療法を実施した。術後切開部位に十分な量のキトサン綿を充填し、滅菌包帯を実施した。この包帯を術後2週間目に除去したところ、術部に良好な肉芽の形成がみられた。患肢の跛行は認められず、術後1カ月には臨床的に正常となった。