

Osteitis of the apex of the third phalanx following foot trimming in a dairy cow

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ABSTRACT

An adult Ayrshire cow was presented with bilateral hind-limb lameness 5 weeks after routine claw trimming. Examination under intravenous regional anaesthesia revealed ulceration of the sole at the toe of both the right lateral and left medial claws of the hind limbs. Radiographic examination showed osteolysis and pathological fractures of the 3rd phalanx of both affected claws. Wooden blocks were fixed to the 2 healthy claws and the bone fragments were removed using a different technique for each claw. Full recovery followed within 11 weeks. The aetiological factors and treatment options for this condition, which was considered to be caused primarily by incorrect claw trimming, are discussed.

Key words: bovine, cattle, claw trimming, distal phalanx, lameness, osteitis, pathological fracture, radiography.

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INTRODUCTION

Lameness in cattle is a widespread problem that is of great economic importance and has a variety of possible aetiologies. A relatively uncommon, but perhaps under-reported cause of lameness is osteitis of the apex of the 3rd phalanx, also referred to as apical pedal bone necrosis^{2,3}. The most commonly adopted treatment for severe infection of the deep structures of the bovine claw is amputation of the affected digit. This article describes a case of osteitis and pathological fractures of 3rd phalanges in both hind limbs in a cow, thought to be caused by incorrect claw trimming. Two slightly different treatment approaches were used as alternatives to digit amputation.

CASE HISTORY

A 3-year-old Ayrshire cow, 4 months into her 2nd lactation, was presented to the Production Animal Clinic, Faculty of Veterinary Science, University of Pretoria, with a severe hind-limb lameness. Five weeks previously the cow had undergone routine claw trimming, followed 3 weeks later by an acute onset of lameness and a

sharp drop in milk yield. The farmer had then treated her with a potentiated sulphonamide and phenylbutazone, with no response, but did not seek veterinary attention until the cow was obviously losing condition.

On examination, the cow showed a grade 4 (out of 5) lameness⁴ in the right hind limb and also appeared to be lame in the left hind limb. Separation of the wall from the coronary band was evident abaxially on the lateral claw of the right hind limb. The cow stood with both hind limbs extended behind her and the right hind limb was also abducted. Her right hind foot was lifted in the crush using a rope, but was found to be too painful to work on. The cow was therefore cast on a tilting table and regional intravenous analgesia was obtained by applying a tourniquet immediately proximal to the hock and injecting 20 ml of 2 % lignocaine into a distal branch of the lateral saphenous vein. Because of the high probability that deep infection was present in the claw, 5 million units of sodium benzylpenicillin were dissolved in the lignocaine prior to injection, in order to achieve high tissue levels of the antibiotic in the distal limb⁵. The tourniquet was left in place for 60 minutes, during which time the foot was radiographed and the claws examined and trimmed.

A small defect was seen initially in the

sole near the toe of the lateral claw. On further examination, the entire sole and part of the abaxial wall were found to be undermined and were removed. This revealed an ulcer-like defect, about 20 mm in diameter, in the underlying newly formed sole at the toe, extending into the solar corium. When this cavity was probed, the 3rd phalanx could clearly be felt. A lateral radiograph revealed that a 20 mm portion of the tip of the bone had fractured and an osteitis appeared to be present (Fig. 1). Marked osteolysis of the apex of the 3rd phalanx was evident on the dorsoplantar view (Fig. 2).

Examination of the left hind limb revealed a virtually identical lesion, this time in the medial claw (Fig. 3). Once again the dorsoplantar view showed osteolysis of the apex of the 3rd phalanx (Fig. 4).

Wooden blocks were fixed to the sound claws of both hind feet using a polymethylmethacrylate adhesive (Demotec 95, Siegfried Demel, Germany). The lesions in the toes were cleaned using a 0.1 % chlorhexidine solution and the feet were bandaged. The degree of lameness was markedly reduced following application of the blocks. Systemic antibiotic and anti-inflammatory treatment were commenced, using procaine penicillin (Depocillin, Intervet) at 20 000 IU/kg body mass intramuscularly once a day and 2 g phenylbutazone (Equipalazone, Kyron) orally every 2nd day.

Two days later the cow was again cast on the tilting table and a regional intravenous block, with penicillin included, was again performed on the distal right hind limb. Using a foetotomy wire, the toe of the affected claw, including part of the wall, corium and distal fragment of the 3rd phalanx, was sawn off and removed (Fig. 5). The wound was then cleaned with 0.1 % chlorhexidine and remaining bone fragments were removed before bandaging the foot.

The following day a similar procedure was performed on the medial claw of the left hind limb, except that this time the overlying wall was left intact. The distal

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fragment of the 3rd phalanx was removed via the solear surface of the claw by enlarging the existing defect and using a periosteal elevator to loosen the fragment. The wound was cleaned in the same way, the dead space filled with a gauze swab soaked in acriflavine-glycerine and the foot bandaged.

The bandages on both hind feet were changed and the wounds cleaned every 2–3 days. The antibiotic and anti-inflammatory treatments were stopped after 6 days. Within 2 weeks the wound on the lateral claw of the right hind limb had virtually filled with healthy granulation tissue and the bandage was removed. A follow-up radiograph at that time revealed some bone reaction at the apex of the 3rd phalanx. The wound on the medial claw of the left hind limb was still discharging a small amount of purulent exudate 2 weeks post-operatively and a radiograph revealed a possible small sequestrum at the apex of the 3rd phalanx. By 5 weeks post-operatively, however, this was no longer radiographically visible. The wound was healing well and the bandage was removed. By 11 weeks post-operatively, both wooden blocks had fallen off and the cow was walking without discernible lameness. Eighteen months later, having calved and re-conceived, she was still in the herd, showing no permanent lameness, although the claws of the 2 affected digits showed a tendency to become overgrown and slightly twisted. Follow-up radiographs at this stage revealed that the 2 affected 3rd phalanges had regenerated and had assumed an almost normal shape.

DISCUSSION

Infection (osteitis) of the 3rd phalanx in the bovine most commonly occurs due to bacterial invasion through the sole or white line². This leads to a septic pododermatitis that may then extend to involve the 3rd phalanx. The osteitis may progress to the point where a pathological fracture occurs. Kofler³ considered perforation of the sole during claw trimming to be the most common cause of apical pedal bone necrosis, with less common causes being traumatic injuries and laminitis. In this case, the onset of lameness occurred 3 weeks after claw trimming. It is possible that penetration of the sole may only have occurred 3 weeks after trimming, but it is more probable that penetration occurred very soon after trimming, as this would have been when the soles were the thinnest. The septic pododermatitis would then have gradually spread to the 3rd phalanx, accompanied by mild

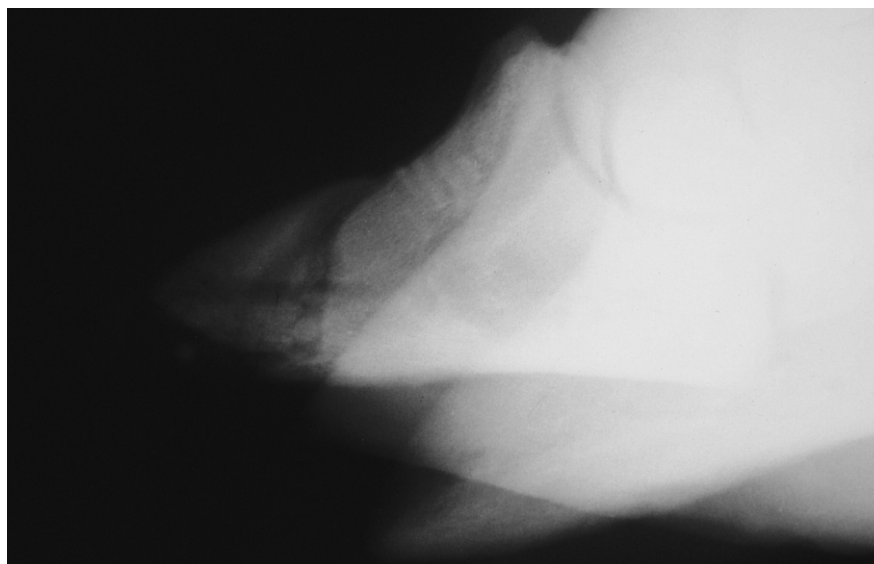


Fig. 1: Lateral radiograph of 3rd phalanx of lateral right hind digit, showing osteolysis of the apex and a pathological fracture.



Fig. 2: Dorsoplantar radiograph of 3rd phalanx of lateral right hind digit. Although the fracture is not visible, marked osteolysis can be seen.

lameness that was overlooked by the farmer. The acute onset of severe lameness would have been brought about by the development of pathological fractures in one or both affected claws. In short,

the major predisposing factor in this case is thought to have been overtrimming of the claws, thus leaving the soles too thin.

Foot trimming has been shown to



Fig. 3: Lateral radiograph of 3rd phalanx of medial left hind digit, showing a similar lesion to that seen in the right lateral digit. In addition, a thin sequestrum can be seen on the solear margin of the 3rd phalanx.



Fig. 4: Dorsoplantar radiograph of 3rd phalanx of medial left hind digit, again showing marked osteolysis.

reduce the number and duration of subsequent cases of clinical lameness in dairy cattle on both high (60 %) and low (40 %) concentrate rations, and regular trimming of overgrown claws (at least

annually) is recommended⁵. Toussaint Raven⁹ has described a now widely-accepted method of claw trimming that provides for the maintenance of adequate sole thickness (5–7 mm). This case

illustrates the potentially disastrous consequences of excessive claw trimming, eventually resulting in severe economic loss to the farmer.

Another contributing factor in this case may have been the unusually wet weather that occurred around the time of claw trimming, resulting in softening of the sole horn. In addition, the camp in which the animal was kept contained numerous small, sharp stones. When claw trimming is undertaken under such conditions, the sole should be left even thicker than is normally recommended.

The quickest and easiest approach to treating deep infections of the bovine claw is amputation of the digit. However, the expected productive lifespan of an animal after amputation is limited owing to the increased stress on the single remaining digit, and average survival times vary from 10 to 16.5 months¹. The technique of resection of the claw tip in cases of osteitis of the apex of the 3rd phalanx has been described^{6,7}. The other described technique is resection of the diseased portion of the 3rd phalanx through a distal (solear) approach, the advantage being that the entire wall of the claw is preserved². In the former approach, the dorsal wall will take several months to grow back to its normal length. Regardless of the approach used, radiography of the affected claw is useful in the diagnosis and determination of the prognosis of such a condition.

In this case, both the described approaches were used. It was decided not to perform the procedures on both hind limbs at the same time, as this would have necessitated 2 simultaneous regional intravenous blocks and may have increased the possibility of lignocaine toxicity. Instead, the procedures were performed on consecutive days. The claw in which the tip was resected appeared to heal slightly faster, possibly because better drainage was achieved by removal of the overlying wall. However, both techniques resulted in satisfactory recovery and return to function of the respective digits within 11 weeks, and eventually regeneration of the 3rd phalanx. Thus it appears that both techniques are suitable alternatives to digit amputation in cases of osteitis of the apex of the 3rd phalanx in cattle. Although the convalescent period and the accompanying aftercare requirements for the patient are greater than those following digit amputation, the animal's subsequent productive lifespan in the herd is likely to be much longer owing to the retention of the weight-bearing function of the affected digit.



Fig. 5: Resection of the toe of the lateral right hind claw. The distal bone fragment as well as the overlying corium and wall were removed.

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