Nonsurgical management of type II fractures of the distal phalanx in 48 Standardbred horses

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Objective To evaluate nonsurgical management of type II fractures of the distal phalanx in Standardbred horses.

Design Retrospective study of 48 affected horses.

Results Most fractures occurred on the lateral palmar process of the left forelimb or the medial palmar process of the right forelimb; 81% of horses were considered sound enough to return to training and 63% raced. Of those returning to racing, 41% competed in > 10 races, 37% in 2 to 10 races and 22% in only 1 race. There was no difference in performance before and after fracture. Twenty-four of 25 horses had a bar shoe fitted for > 50% of the treatment phase. Of those horses returning to training without a bar shoe, 89% refractured at the same site. Sixty percent of horses returning to training with a bar shoe raced successfully. The total convalescent time, the time rested in a box and the time spelled in a paddock were similar for horses returning to racing and those that did not. The age of the horse had no effect on the ability to return to racing.

Conclusion The prognosis for type II fractures of the distal phalanx is guarded. It is advisable to fit a bar shoe on the horse during convalescence. Horses returning to training and racing with a bar shoe appear less likely to refracture the distal phalanx. Those horses that return to racing can perform at a level similar to that prior to fracture.

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Fractures of the distal phalanx are a common cause of lameness and attrition in Standardbred racehorses.1-4 A classification system based on fracture configuration has been developed describing types I to VI.1,2 In a review of 274 distal phalanx fractures, solar margin fractures (type VI) were found to be the most common in the general horse population followed by type II fractures.1 However, type II fractures are the most common fracture of the distal phalanx in Standardbred racehorses.2-4 Type II fractures are oblique fractures of the palmar or plantar process that extend into the distal interphalangeal joint.

Trauma is the most common cause of type II fractures of the distal phalanx in the horse.5,6 Predisposing factors include poor mediolateral balance, inadequate track camber and landing on or kicking an immovable object. Horses racing in an anticlockwise direction are more likely to fracture the lateral aspect of the left forelimb or the medial aspect of the right forelimb.6-8 Reported methods of treatment include rest with or without bar shoes1,2,4,6,7 and internal fixation using an ASIF lag screw technique.10,11

This article reports the outcome of nonsurgical conservative management of type II distal phalanx fractures in Standardbred racehorses.

Materials and methods

The medical records and radiographs for all Standardbred horses diagnosed with a distal phalanx fracture at the University Veterinary Centre, Camden, between January 1985 and December 1995 were retrieved. The radiographs were reviewed by two veterinary radiologists. Only horses with type II fractures were included in the study. Horses with evidence of other lesions of the distal interphalangeal joint such as degenerative joint disease or bone cysts were excluded. Information obtained from records included the name and telephone number of the owner or trainer, the horse’s name, age, and gender and the date the fracture was confirmed radiographically. The leg affected and after fracture were retrieved for each horse, and used to compare racing performance before and after fracture.

Statistical analysis

Normally distributed data were analysed by t test. Nonparametric data were analysed using the sign test. The level of statistical significance was set at P < 0.05.

Results

There were 48 horses with unilateral type II fractures: 35 (73%) occurred in the left forelimb, of which 34 involved the lateral palmar process of the distal
Figure 1. The results of the questionnaire showing the relationship between use of a bar shoe during treatment, training and racing and racing performance.

phalanx and 1 involved the medial palmar process; 12 (25%) occurred in the right forelimb, of which 10 (83%) involved the medial palmar process and 2 (17%) involved the lateral palmar process; 1 fracture in the right hindlimb was associated with the horse kicking a wall. The questionnaire was completed for 25 horses and race results were available for 39. There were 33 males (7 stallions, 26 geldings) and 15 females aged 1 to 8 years. The cause of the fracture was determined in 25: 19 occurred in a race, 5 during training and 1 from kicking a wall.

Based on race records and the questionnaire response, follow-up information on performance was available for 43 of 48 horses; the remaining 5 were lost to follow-up. Four horses died or were retired for an unrelated condition during convalescence and four did not return to training for undisclosed reasons. Thirty-five horses returned to training and race records of those racing after recovery from fracture were available for 27 of these. Disregarding those that died or were retired for an unrelated condition and assuming the 9 horses that did not return to training were considered unsound, 81% (35 of 43) were considered sound enough to return to training and 63% (27 of 43) raced. Of those that raced 5 (19%) ran in > 30 races, 6 (22%) ran in 10 to 30 races, 10 (37%) ran in 2 to 10 races and 6 (22%) ran in only 1 race. Of those racing after recovering from fracture, 16 (59%) raced and won and 21 (78%) raced and placed. There was no difference when the number of wins per start was compared for horses between pre- and post-fracture periods.

Twenty-four of 25 horses with questionnaire data had a bar shoe during all or most (> 50%) of the treatment phase; the horse that did not was retired after one race due to poor performance (Figure 1). The subsequent shoeing history of 19 of the 23 horses that returned to training was known: 8 of 9 (89%) horses without a bar shoe refractured at the same anatomical site while 1 was retired with suspensory desmitis. Of 10 horses returning to training with a bar shoe, 6 (60%) raced successfully in a bar shoe, 3 (30%) were retired due to an undiagnosed lameness in the same leg, and 1 was retired with superficial flexor tendonitis. None of these horses had a palmar digital neurectomy.

Horses that returned to racing successfully were rested for 11.8 ± 2.9 (mean ± SD) months with 2.4 ± 1.1 months spent in a box or small yard and 9.4 ± 2.9 months in a paddock. Horses that failed to return to racing were rested for 11.0 ± 3.4 months with 3.5 ± 4.3 months spent in a box or small yard and 7.5 ± 4.5 months in a paddock. There was no difference between horses that did and did not return to racing for any of these variables. Thirty percent of horses 3 years or younger returned to race without evident lameness compared to 18% of those older than 3 years (difference not significant).

Discussion

Type II fractures in Standardbred horses reportedly occur more often in geldings than stallions or females. Fractures most commonly occur during racing and in the front limbs and involve the side of the distal phalanx bearing most weight through turns. Where horses run anticlockwise, these fractures are most common in the lateral aspect of the left forelimb and the...
The time reported for healing and the reported success rates for return to soundness vary for type II fractures managed conservatively.\textsuperscript{1,2,5,6} Rest periods of 3 to 19 months have been recommended.\textsuperscript{1,3,7,11} In general, it would appear that distal phalanx fractures that progress to healing show radiographic evidence of healing by 6 months and evidence of bone union by 11 months after injury.\textsuperscript{1} However, healing of type II fractures is slower and occurs from the nonarticular surface proximally towards the joint.\textsuperscript{1} In one study, 9 type II fractures had radiographic evidence of complete healing 11 months following injury while 12 had incomplete healing, suggesting complete healing of these fractures may take longer. On average the horses studied here returned to training approximately 11 months after injury. In this and a previous study,\textsuperscript{4} there was no difference in convalescent times between horses with type II fractures going on to race successfully and those showing signs of refracture or persistent lameness. The recommended convalescent period for horses in our study was largely empirical, and radiographic evaluation of healing was not performed in most of them. Some horses may have had incomplete fracture healing and if allowed longer convalescence more horses may have returned to race successfully.

Horses given longer periods of stall rest are suggested to have a better prognosis.\textsuperscript{2,3} One study suggested stall rest for less than 6 months was insufficient for fracture stability to develop. However, in that study, the period of stall rest for horses in the favourable category ranged from 2.5 to 12 (mean 6.4) months compared to 1.5 to 12 (mean 4.4) months in the unfavourable category. No statistical analysis was performed.\textsuperscript{2,5} Furthermore, 60% of the horses did not return to full work despite prolonged stall confinement.\textsuperscript{2} In our study the duration of stall rest was similar in horses successfully returning to work and in those that did not, and was generally shorter than 6 months. It is possible more horses may have returned to racing after more prolonged stall confinement.

Horses 3 years old or younger have been suggested to have a better prognosis than older horses,\textsuperscript{1,3} but in accordance with others' findings we could not demonstrate an age-associated difference.\textsuperscript{3,4}

Most fractures of the distal phalanx treated conservatively with rest and bar shoes will heal.\textsuperscript{1} The prognosis for complete radiographic healing of nonarticular fractures is better than that of fractures involving the joint.\textsuperscript{1} However, irrespective of the nature of the fracture or the radiographic evidence of healing, the prognosis for soundness is similar for non-articular and articular fractures.\textsuperscript{1} Reports on conservative management of type II distal phalanx fractures suggest approximately 50% of horses will return to soundness,\textsuperscript{3,6,8,9} although the prognosis for athletic performance may be poorer than for other fracture types.\textsuperscript{1} Eighty-one percent of horses returned to training and 63% returned to racing in this study suggesting that the prognosis for racing Standardbreds with this type of fracture may be more favourable than for other breeds.\textsuperscript{3,6,8,9} Furthermore, for those horses returning to racing, no reduction in performance based on wins per start could be demonstrated when compared to performance prior to fracture. Where follow-up was available, most horses had a bar shoe applied during most of the treatment phase, perhaps contributing to the better outcome in this series. Most studies recommend the use of therapeutic shoes or casts that limit expansion of the hoof and movement of the fracture line during weight bearing.\textsuperscript{1-4,8} Removal of the shoe is suggested to concentrate forces on the fracture line and predispose the horse to refracture where healing is incomplete or the fracture has not remodelled,\textsuperscript{3,8} leading some veterinarians to recommend that the support shoe remain for life.\textsuperscript{1,3-8} Our findings support these recommendations. Corrective shoeing with a bar shoe and clips ultimately leads to contraction of the hoof,\textsuperscript{8} making removal of the shoe at some time desirable. Although shoe removal may be possible if sufficient time is given for bone remodelling,\textsuperscript{8} our findings suggest caution should be exercised before removing the shoe, particularly while the horse is in work.

In conclusion, the prognosis for return to racing for Standardbred horses with type II fractures of the distal phalanx is guarded. During treatment it is advisable to apply a bar shoe. Periods of stall rest up to 6 months and a total convalescent period greater than 11 months are desirable.\textsuperscript{1-3} Radiographic monitoring of fracture healing with particular attention to the subchondral bone at the articular surface may be the best method of determining when to return a horse to training.\textsuperscript{1} Horses returning to training and racing with a bar shoe are less likely to refracture the distal phalanx,\textsuperscript{1-3,8} and horses returning to racing can perform successfully.

Present indications are that the support shoe should remain for the performance life of the horse unless there is objective evidence to support removal.\textsuperscript{3,8}

References

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