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TREATMENT OF DORSAL METACARPAL DISEASE IN 29 THOROUGHBRED RACEHORSES WITH RADIAL EXTRACORPOREAL SHOCK WAVE THERAPY

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Dorsal metacarpal disease (DMD) is a common source of lameness in the Thoroughbred racehorse. It most commonly affects horses in the first two years of training and is seen with a wide range of severity. Dorsal metacarpal disease is caused by high-strain, cyclic fatigue that causes decreased bone stiffness, leading to periosteal new bone formation and fracture.¹ Fractures of the dorsal cortex of equine metacarpal bones are slow to heal and often recur after the horses are returned to speed work.

For the past 16 years extracorporeal shock wave therapy has been used to treat renal calculi in man. More recently, extracorporeal shock wave therapy has been adapted to treat orthopedic diseases in both man and animals. In vivo experiments in rats, rabbits and sheep have shown that application of high-energy extracorporeal shock wave therapy to bone generates hematomas, diffuse hemorrhages, fragmentation of bony trabeculae in the marrow and the transport of marrow content under the periosteum.² Although both high-energy focused and low-energy radial shock wave devices are being used to treat a number of equine lameness conditions in Europe and North America, there is little documentation of the effects of shock waves on equine tissue or the efficacy of treatment.³⁻⁵

The purpose of this study was to document the results of treatment of dorsal metacarpal disease in Thoroughbred racehorses with radial extracorporeal shock wave therapy.

MATERIALS & METHODS

Twenty nine Thoroughbred racehorses with dorsal metacarpal disease were included in this study. In order to meet the criteria for case selection, all horses had a history of persistent or recurrent lameness associated with clinical and radiographic signs consistent with dorsal metacarpal disease and previous treatment for a minimum of 2 months. Previous treatment protocols included rest, controlled exercise, percutaneous periosteal scraping, osteostixis and NSAID medication.

At the time of admission a complete lameness examination was performed to eliminate additional sources of lameness. The degree of lameness was recorded (Grades 1 to 5). Xeroradiographs were obtained of both forelimbs to document the degree of pathologic change present in the dorsal cortex of the third metacarpal bone (MC3). The dorsal aspect of the metacarpus of affected forelimbs was clipped and shaved prior to treatment. Horses were sedated with 200 mg Xylazine and 5 mg Detomidine IV. Additional physical restraint was provided in some cases by application of a nose twitch.

A contact gel was placed on the treatment area and 2100 pulses (3 bar of pressure and using the 15 mm applicator) were applied to the dorsal surface of MC3 on either side of the extensor tendons, using the Swiss DolorClast Vet[®] low-energy radial shock wave generator.^a Following treatment, the treated limbs were bandaged with a compression bandage.

A total of three treatments were applied at two-week intervals. Lameness examinations were performed again prior to the second and third treatment sessions. Horses were walked during the treatment period and allowed daily turnout if no lameness was evident. After the third treatment, follow-up Xeroradiographs were obtained. Provided no lameness was evident at the time of the third treatment and radiographic evidence of fracture healing was present, horses were allowed to gallop for 30 days prior to a gradual return to regular training. Trainers were encouraged to obtain radiographic examinations of the treated areas prior to speed work. Recommended speed work began with short breezes (1/8 mile) once or twice weekly, gradually increasing the breezing distance over a period of 2 months. Long-term follow-up information was obtained from telephone interviews with trainers, owners and referring veterinarians.

CLASSIFICATION OF DORSAL METACARPAL DISEASE

Dorsal metacarpal disease is seen with varying grades of severity. For the purposes of this study, Grade-1 DMD was defined as a horse with varying degree of lameness, shins that are painful to palpation with normal radiographic findings.

Grade-2 DMD was defined as a horse with varying degrees of lameness, shins that were painful to palpation and radiographic evidence of thickening of the dorsal cortex of MC3.

Grade-3 DMD was defined as a horse with varying degrees of lameness, shins that were painful to palpation and radiographic evidence of radiolucent lines in the dorsal cortex of MC3 that ran parallel to the long axis of the bone.

Grade-4 DMD was defined as a horse with varying degrees of lameness, shins that were painful to palpation and radiographic evidence of a single oblique fracture line in the dorsal cortex of MC3.

Grade-5 DMD was defined as a horse with varying degrees of lameness, shins that were painful to palpation and radiographic evidence of multiple oblique fracture lines in the dorsal cortex of MC3.

Grade-6 DMD was defined as a horse with persistent lameness, a shin that was painful to palpation and radiographic evidence of a fracture line that extended through the dorsal cortex of MC3 into the shaft and/or palmar cortex of MC3.

RESULTS

Twenty nine Thoroughbred racehorses met the criteria for inclusion in the study and were available for long-term follow-up. There were 18 males and 11 females in this study. The mean age of horses in the study was 2.8 +/- 0.9 years. The grades of DMD present in the horses of this study ranged from Grade-2 to Grade-5. The mean grade of DMD present in these horses was 3.3 +/- 0.9.

The mean duration of clinical signs prior to treatment of these horses with radial extracorporeal shock wave therapy was 4.5 +/- 3.4 months. The mean lameness grade at time of admission was 0.65 +/- 0.8. At the time of the second treatment (2 weeks later) the mean lameness grade was 0.25 +/- 0.4. At the time of the final treatment (4 weeks after initial treatment) the mean lameness grade was 0.

Eight of 8 horses with Grade-3 DMD showed radiographic evidence of fracture healing with remodeling of the periosteal callus, if present, within 60 days of treatment. Four of 12 horses with Grade-4 DMD showed healing of the fracture within 60 days of treatment. The long term follow-up of the horses in this study ranged from 3 to 19 months. The mean time of follow-up was 5.5 +/- 3.6 months.

When returned to speed work, 24 of 29 horses resumed breezing and racing without recurrence of lameness or clinical signs associated with DMD. Three horses experienced some degree of lameness or soreness when returned to breezing and responded to a temporary reduction in speed work to race without further lameness or soreness. Two horses in this study died of unrelated causes. One horse was euthanized subsequent to surgery for recurrent colic and the other was euthanized after developing a humeral stress fracture in the same limb as the DMD.

DISCUSSION

Extracorporeal shock wave therapy is reported to have both analgesic and osteogenic properties. Horses in this study presented with variable degrees of lameness. During the treatment period, the degree of lameness diminished to the point that none of the horses in this study were lame after 3 treatments.

Although this effect was statistically significant, it is not possible to entirely attribute the decreased lameness to an analgesic effect of treatment, since horses with dorsal metacarpal disease will become sound by simply discontinuing training for 30 days. Radiographic examination of the fractures in this group of horses indicated healing of all Grade 3 type-fractures and 33% of the Grade 4 type-fractures within 60 days of treatment.

Long-term follow-up of these horses indicated that 83% of these horses returned to racing without recurrence of clinical signs or lameness. Ten percent of these horses developed some degree of soreness when returned to speed work, but were able to continue training without further treatment.

The criteria for successful therapy included healing of the fracture and return to active race training (breeding or racing) without recurrence of the fracture. Using these criteria, radial extracorporeal shock wave therapy appears to be an effective treatment for dorsal metacarpal disease in the Thoroughbred Racehorse when combined with an appropriate training program.

It is critical to provide an appropriate period of rehabilitation following extracorporeal shock wave therapy so that remodeling and formation of lamellar bone can occur prior to the application of extreme forces associated with cyclic loading at high speeds that is characteristic of Thoroughbred racing. Otherwise, catastrophic failure of the metacarpal bone may occur.

Footnote

^a Swiss DolorClast Vet[®] manufactured and distributed by EMS Electro Medical Systems, 12092 Forestgate Drive, Dallas, TX 75243

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