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Clinical Evaluation of High-Energy Extracorporeal Shock Waves on Equine Orthopedic Injuries

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Introduction

In humans extracorporeal shock wave therapy (ESWT) or lithotripsy was initially developed for managing nephrolithiasis and cholelithiasis. Based on studies reporting the potential osteo-inductive and pain relieving properties of ESWT, it has been incorporated into the treatment of human orthopedic diseases. Extrapolation from human studies suggests that ESWT may aid in the healing of equine orthopedic injuries. Possible indications for use in the horse are stress fractures, navicular syndromes, tendinopathies, and ligament desmitis. Anticipated benefits include decreased pain, decreased healing time, improved chances for recovery, and a faster return to performance in horses with bone and ligament injuries. The purpose of our study is to determine the merit of high intensity shock waves when applied to equine orthopedic lesions.

Material and Methods

Horses presented to the University of California, Davis, Veterinary Medical Teaching Hospital for lameness evaluation were given the option to use ESWT. Between October 1999 and June 2000 sixty-seven horses with varying degrees of lameness were treated with ESWT. Thoroughbreds and Warmbloods represented the principal breeds that were treated. Ages ranged from 2 to 21 years with a mean of 9 years $\pm$ S.D. of 5 years. Minimum database include lameness score, ultrasound and/or radiographs.

A Minilith SL1 shock wave generator was used to apply the treatments. Unlike other shock wave generators' the Minilith SL 1 allows the shock waves to be applied to the horses in the standing position. All horses required some chemical or manual restraint. The horses received 1 to 3 treatments determined by the etiology of the lameness. Horses were treated on an out-patient basis. Follow up evaluation was requested at 60-90 days post treatment for all disorders.

Thirty-four cases were treated for primary bone and joint lesions with a total of 49 lesions. Lesions treated included fractures, degenerative osteoarthritis, navicular syndrome, and exostosis. Twenty-two stress fractures were treated: the dorsal aspect of the third metacarpal bone (10 bilateral and 7 left and 1 right); two stress fractures on the palmar aspect of the left metacarpal bone; one left tibial and one right humeral stress fracture. Three other types of fractures were treated: 2 non-union fractures of the accessory carpal bones (1 right, 1 left), and one avulsion fracture of the sesamoid bone (medial right forelimb). Five degenerative osteoarthritis cases were treated: 3 pasterns (2 bilateral forelimb, 1 right forelimb), one elbow (right), one bilateral tarsi. Six navicular syndromes were treated (3 bilateral forelimb). One exostosis case was treated (right forelimb metacarpal II).

Results

Follow up information was obtained for 22 horses (~33%). Of the 22 stress fracture cases, 11 have completed a 90-day follow up. Ten cases of dorsal or palmar metacarpal stress fractures were re-evaluated. Eight of these ten have returned to racing or race training. Six of the horses were pain free and/or showed radiographic healing by 90-days. Two of the ten horses took greater than 120 days to return to training or to show radiographic healing, and 2 were retired due to other causes. One horse with a humeral stress fracture showed radiographic and nuclear scintigraphy improvement at 90 days, and has started light training. Of the three other types of fractures one sesamoid fracture returned for 90 day follow up and has shown lameness score and nuclear scintigraphy improvement. Four horses with degenerative osteoarthritis have the completed 90-day follow up. One horse with unilateral (right forelimb) pastern osteoarthritis has shown lameness score improvement and is back in light work. One bilateral pastern osteoarthritis case re-evaluated at 90 days was able to return to jumping but required another treatment at 90 days. The other case showed no improvement and was retired. One case of severe osteoarthritis of the elbow that returned for follow up showed decreased pain after treatment and is now able to ambulate at the trot. The one horse with bilateral osteoarthritis of the tarsi (distal intertarsal and tarsometatarsal joints) gained temporary pain relief for one show, however has returned to the same lameness score. Of the three horses with navicular syndrome, 3 have completed 90 day follow up. One of these three horses significantly improved its lameness score and is sound at this time. One horse with exostosis of the right metacarpal II showed no improvement in the visual appearance of the lesion at 90 days.

Thirty-three cases were treated for primary soft tissue injury with a total of 35 lesions treated. Lesions treated included ligament desmitis and tendinitis. Twenty-six cases of suspensory ligament desmitis were treated: 12 cases were located in the body of the ligament (4 right and 2-left forelimb, and 6 right hindlimb). Nine cases involved the lateral suspensory branch (5 right forelimb, and 3 right and 1 left hindlimb), and 4 cases involved the medial suspensory ligament (2 left and 1 right forelimb, and 1 right hindlimb). One case had both lateral and medial suspensory branch lesions affected (right forelimb). Two cases of inferior check ligament desmitis were treated (1 bilateral forelimb, and 1 right forelimb). One case of straight distal sesamoidean ligament desmitis was treated (right forelimb). Four cases of tendinitis were treated: 2 deep digital flexor tendons (1 left forelimb and 1 right hindlimb), 1 gastrocnemius tendon (left), and 1 lateral branch of the superficial digital flexor tendon (right hindlimb).

Of the 26 suspensory ligament desmitis cases eight have completed follow up greater than 90 days. Seven of the 8 cases have shown improved lameness scores and/or returned to work. Five of these cases also showed improvement of the lesion on ultrasonographic exam. Three cases had no ultrasonographic improvement (classified as stable). Two cases with chronic lesions (lameness >6 months) have been followed past 120 days. One has returned to the same level of competition, and the other is sound on recheck exam. One case of calcific deep digital flexor tendinitis had slight improvement in lameness score but no significant ultrasonographic changes.

Side effects were reported in one case in which there was a hematoma that developed post treatment over an affected dorsal metacarpal stress fracture.

Discussion

Although this is an ongoing study, our preliminary results suggest that ESWT has shown positive resulted in horses with chronic suspensory ligament lesions and metacarpal stress fractures and that ESWT has had very few adverse side effects.