Article

Efficacy of a single-formula acupuncture treatment for horses with palmar heel pain

Katherine A. Robinson, Stephen T. Manning

Abstract — Acupuncture is used without strong scientific evidence to treat many diseases of the horse, including palmar heel pain. Research is needed to provide evidence for the application of these treatments. Within the confines of our study, acupuncture did not reliably modulate palmar heel pain in horses.

Résumé — Efficacité d'un traitement d'acupuncture à formule simple pour les chevaux souffrant de douleur du talon palmaire. L'acupuncture est utilisée, en l'absence de solides preuves scientifiques, pour traiter plusieurs affections des chevaux, y compris la douleur du talon palmaire. De la recherche est requise pour fournir des preuves pour l'application de ces traitements. Dans les limites de notre étude, l'acupuncture n'a pas modulé de manière fiable la douleur du talon palmaire chez les chevaux.

(Traduit par Isabelle Vallières)

Can Vet J 2015;56:1257–1260

Introduction

Palmar heel pain (also known as navicular disease or syndrome) is a common cause of bilateral forelimb lameness; "estimated to cause one third of all chronic forelimb lamenesses in the horse" (1). The syndrome most commonly affects horses over 6 y of age (2,3), although younger horses may also be affected (3). Quarter Horses, some Warmblood breeds, and Thoroughbreds may be overrepresented (3,4). There is no known gender predilection, although at 1 institution, geldings were more likely to be diagnosed (2). The etiology of palmar heel pain remains unknown but 2 main theories, abnormal biomechanical stresses and vascular compromise, have been suggested (3–8). Magnetic resonance imaging (MRI) may be considered the new gold standard of diagnosis, and has allowed for confirmation of the theory that many different osseous or soft tissue abnormalities (alone or in combination) may be affecting the horse with palmar heel pain (3,4,7). Magnetic resonance imaging is not readily available to all equine practitioners and may be beyond the financial means of some clients. Therefore, the diagnosis of palmar heel pain is frequently still based on clinical and radiographic examination. These non-specific diagnostic methods lead to the continued use of non-specific treatments for palmar heel pain, such as corrective shoeing and systemic non-steroidal anti-inflammatory drug administration. Although non-specific with regard to etiology, these therapies are applicable and helpful to many horses with palmar heel pain (3). Acupuncture, a similarly non-specific treatment, may be useful for alleviating the pain experienced by affected horses.

Indeed, acupuncture has been utilized to combat palmar heel pain (1,8,9), although peer-reviewed literature substantiating its efficacy is lacking. However, there is peer-reviewed literature that seems to support the efficacy of acupuncture as a treatment for pain associated with other conditions in the horse (10–12).

Many owners today are looking for non-invasive, drug-free ways to treat their horses. Acupuncture has gained great popularity as a way to provide this service, but there is little scientific evidence to suggest that it is effective for the treatment of palmar heel pain. The aim of this study was to investigate the efficacy of acupuncture for horses affected by palmar heel pain.

Materials and methods

Case selection

Client-owned horses with clinical disease were used for this trial. Horses may or may not have had a previous diagnosis of palmar heel pain and chronicity of lameness was not part of the selection process, although all horses included had a history of chronic forelimb lameness. To be included in the trial, horses had to have a forelimb lameness that was no more severe than a grade 3 out of 5 according to the American Association of Equine Practitioners lameness scale, meaning that horses which were lame at the walk or non-weight bearing were excluded from the trial. As well, the lameness had to improve substantially (at least 70%) to biaxial palmar digital (PD) perineural analgesia. Perineural analgesia was accomplished using 40 to 50 mg of lidocaine hydrochloride (Lidocaine Neat; Vétoquinol, Lavaltrie, Quebec) per site. Horses could be bilaterally or unilaterally lame,

Department of Large Animal Clinical Sciences, Western College of Veterinary Medicine, University of Saskatchewan, 52 Campus Drive, Saskatoon, Saskatchewan S7N 5B4.

Address all correspondence to Dr. Kate Robinson; e-mail: katherine.robinson@usask.ca

but needed to have the same blocking pattern on each limb if lameness was bilateral.

Horses were radiographed using 1 of 2 portable, digital X-ray units (truDR lx; Sound-Eklin, Carlsbad, California, USA or uno1; Cuattro Americas, Pekin, Illinois, USA). Horses with radiographic evidence of disease in the proximal interphalangeal joint or distal interphalangeal joint were excluded from the study as it has been shown that a PD block may decrease pain associated with these joints (3). As well, horses with evidence of modeling of the third phalanx were excluded. Acceptable radiographic changes included: modeling of the navicular bone, cyst-like lesions of the navicular bone, entheseophytosis of the navicular bone, dystrophic mineralization of soft tissue structures below the level of the distal interphalangeal joint, and abnormal hoof-pastern angle (as evidenced by "broken back" or "broken forward" angles at the distal interphalangeal joint). Horses were barefoot for the duration of the trial and were trimmed by the same farrier (TB). Anti-inflammatory medications were not permitted for use in the horses during the study period. If an anti-inflammatory drug had been recently administered to a horse that otherwise qualified for the study, a washout period of 2 wk was given (13). Twelve horses met the inclusion criteria, of which 9 completed the study. The study was approved by the University of Saskatchewan's University Committee on Animal Care and Supply.

Of the 9 horses that completed the study, 8 were geldings and 1 was a mare. The ages ranged from 6 to 19 y with a mean age of 14.4 y. Breeds represented included: Paint (n = 4), Quarter Horse (n = 3), Thoroughbred cross (n = 1) and Paint cross (n = 1). Eight of the 9 horses included were bilaterally lame; only 1 horse was unilaterally lame. Owners gave informed consent for the use of their horses in this trial.

Radiographic evaluation

Standard radiographic projections were taken as part of the inclusion criteria and then again at the completion of the trial. Views included: lateral-medial, dorsal-palmar, 60° dorsoproximal-palmarodistal oblique and 45° palmaroproximal-palmarodistal oblique (skyline). Radiographs of both forefeet were obtained on each horse at the pre- and post-study assessments.

Experimental design

Horses were randomly assigned to the treatment group or the control group. Horses were trimmed to maintain heel mass and decrease breakover (3) and then given a 1 wk adjustment period. The trial period then commenced and was carried out over the next 4 wk. During this trial period, horses were kept in their home environment, on their regular diet, and at their normal level of activity.

Twice weekly visits on non-successive days were made to each horse. Horses in the treatment group received 20 min of dry needle and electroacupuncture at each visit; horses in the control group received no treatment. Acupuncture treatments were administered by a certified veterinary acupuncturist (SM). The same acupuncture points were applied to each horse in the treatment group. Acupuncture treatment points included: Bai Hui, Bladder (BL) 11, BL 13, Pericardium (PC) 1, Heart (H) 9, Lung (LU) 1, and LU 11 bilaterally, and electroacupuncture at Small Intestine (SI) 9 and Large Intestine (LI) 11 bilaterally. Sterile, single use acupuncture needles were used (Seirin Corporation, Shizuoka, Japan). Needle size was similar for all points (0.25 × 40 mm) with the exception of H9 and LU11 (0.25 × 15 mm). Electrical stimulation was provided in a mixed pattern at 2 to 5 Hz using a commercially available electrostimulator (Electro-Acupuncture Stimulator 4C; Pantheon Research, Venice, California, USA).

Table 1. Lameness grades at initial and final assessments

	Grade at initial assessment		Grade at final assessment	
Horse	Right front	Left front	Right front	Left front
1 (Control)	3	2	2	2
2 (Control)	2	3	2	1
3 (Treatment)	0	2	3	2
4 (Control)	3	2	2	2
5 (Treatment)	3	2	1	3
6 (Treatment)	2	2	1	2
7 (Treatment)	3	2	3	2
8 (Control)	3	1	3	1
9 (Treatment)	2	1	1	1

A second visit was made on the same day but at a different time by a clinician blinded to the treatment (KR). This clinician scored each horse's lameness at each visit based on the AAEP lameness scale and applied electronic calibrated hoof testers developed and validated in our laboratory (unpublished data) to quantify hoof compression threshold (HCT) at 7 sites on the foot: toe, medial quarter, medial heel, lateral quarter, lateral heel, over the frog, and across both heels. Two modified hoof testers were purpose built for this project using strain gauges to measure applied forces. These modified hoof testers were validated on 20 horses with no evidence of musculoskeletal disease, prior to use in the current study. Serial lameness examinations were videotaped for further review.

At the end of the 4-week trial period each horse was given another week off and then lameness examination, blocking pattern, and radiographs were repeated to confirm no changes from the pre-study baseline.

Data analysis

Data were not normally distributed; therefore, non-parametric statistics were employed. Lameness grades were compared between groups using the Kruskal-Wallis one way analysis of variance (ANOVA), and HCT data were compared using the Mann-Whitney U-test (IBM SPSS Statistics 20.0, IBM Corporation, Armonk, New York, USA).

Results

Lameness evaluation

There was no significant difference in grade of lameness between treatment and control animals at initial assessment [right front (RF); P = 0.27, left front (LF); P = 0.66], nor at final assessment (RF; P = 0.44, LF; P = 0.27). All 4 horses in the control group maintained the same grade of lameness through the duration of the study or improved on 1 or both limbs by no more than 1 grade of lameness. Of the 5 horses in the treatment group,

3 showed improvement of 1 lameness grade on 1 or both limbs, 1 horse did not change, and 1 horse's lameness worsened through the course of the study. Table 1 presents lameness grades for all of the horses in the trial at the initial and final assessments.

Hoof compression threshold

There was no significant difference in HCT's between treatment and control groups at any of the 7 sites on the foot over the course of the study ($P > 0.05$). For the left front foot, calculated *P*-values ranged from 0.41 to 1.0 over the 7 sites. For the right front foot, calculated *P*-values ranged from 0.56 to 1.0 over the 7 sites.

Discussion

Acupuncture did not effectively modulate pain in horses with palmar heel pain under the conditions of the current study. There was no significant difference between horses in the treatment group and horses in the control group with regards to lameness grade or hoof compression threshold. To the authors' knowledge, there is only 1 study of similar depth published in a peer-reviewed journal investigating the use of acupuncture and electroacupuncture for pain relief in horses with palmar heel pain (9). That study investigated 2 groups of horses; those with laminitis and those with navicular syndrome. In each disease group there were horses that showed improvement with acupuncture treatment but there were no statistically significant differences between treatment groups and controls, regardless of disease process. The current study used similar acupuncture points and treatment protocols and achieved similar results.

The major limitation of the current study includes patient numbers, which reduce statistical power and therefore possibly statistical significance. Our recruitment of eligible horses was greatly limited in that, under the conditions imposed by the Animal Care Committee, horses could not be enrolled in the study if at initial assessment they had a lameness grade of 4 out of 5 or greater on the AAEP Lameness Scale. Had horses with this degree of lameness been able to participate, we would have been able to include significantly more animals in the trial, and a different result might have been achieved.

Another significant limitation is the need to approach clinical trials such that all treated animals received the same treatment. Traditional acupuncture would have each horse diagnosed as an individual and then a specific acupuncture treatment applied as indicated for that individual; having each horse treated in exactly the same way is at odds with traditional acupuncture, and may have limited the efficacy in certain individuals. It would be difficult to design a study that allows for strict, scientific comparisons while using a traditional approach to acupuncture. This core dilemma between science and acupuncture is likely to continue limiting our ability to scientifically assess the efficacy of acupuncture.

The current study utilized electronic calibrated hoof testers to collect quantitative data, rather than force plate analysis, which is typically used for lameness studies (5,14). Electronic calibrated hoof testers are much more accessible to the average practitioner than a force plate for the quantitative evaluation of pain in the foot. Commercial products are available, and the use of hoof compression thresholds in lame horses has been validated (15). As has been previously reported when using calibrated hoof testers, there were few extreme values in the current study, which is evidence that the test is repeatable and consistent. Hoof compression thresholds, whether tested manually or robotically, seem to be a reliable and objective way of assessing foot pain in the horse.

Interestingly, it was noted throughout the course of the study that horses did not test across the heels as consistently as has been historically reported. Horses were much more likely to be positive to hoof testers across the toe, which may be a consequence of repeated overloading (3).

Lameness grade did not significantly change through the course of the study. Other researchers claim that palmar heel pain is a stable lameness with no significant variation over days or weeks (14). This lends credibility to our serial lameness scoring, and the fact that acupuncture did not appear to make a significant difference in level of comfort to the horses receiving that treatment.

In conclusion, acupuncture does not appear to be effective in relieving palmar heel pain in horses. A larger study and the use of MRI for more specific inclusion criteria may lead to different results.

Acknowledgments

We express our gratitude to research students Ben Lobb and Lindsay Rogers, our farrier Todd Bailey, the clients who allowed us to use their horses, Drs. Nora Chavarria, Sue Ashburner, Andrea Plaxton, Rochelle Lewis, and Holly Sparks for sending cases to us, Dr. Tawni Silver for her assistance in interpreting radiographs, Deanna White and all the other students who assisted with this project. Special thanks to Dr. Scott Noble, of the University of Saskatchewan's College of Engineering, for designing, building, and calibrating the electronic hoof testers used in this study and other ongoing research. The research was funded by the Equine Health Research Fund of the University of Saskatchewan. CVJ

References

1. Turner TA. Diagnosis and treatment of the navicular syndrome in horses. Vet Clin North Am Equine Pract 1989;5:131–144.
2. Johnson JH. The navicular syndrome. Mod Vet Pract 1973;54:69–77.
3. Dyson SJ. Navicular disease. In: Ross MW, Dyson SJ, eds. Diagnosis and Management of Lameness in the Horse. 2nd ed. St. Louis, Missouri: Elsevier Saunders, 2011:324–342.
4. Sampson SN, Schneider RK, Gavin PR, Ho CP, Tucker RL, Charles EM. Magnetic resonance imaging findings in horses with recent onset navicular syndrome but without radiographic abnormalities. Vet Radiol Ultrasound 2009;50:339–346.
5. Erkert RS, MacAllister CG, Payton ME, Clarke CR. Use of force plate analysis to compare the analgesic effects of intravenous administration of phenylbutazone and flunixin meglumine in horses with navicular syndrome. Am J Vet Res 2005;66:284–288.
6. Bell BTL, Bridge IS, Sullivan STK. Surgical treatment of navicular syndrome in the horse using navicular suspensory desmotomy. NZ Vet J 1996;44:26–30.
7. Widmer WR, Buckwalter KA, Fessler JF, Hill MA, VanSickle DC, Ivancevich S. Use of radiography, computed tomography and magnetic resonance imaging for evaluation of navicular syndrome in the horse. Vet Radiol Ultrasound 2000;41:108–116.
8. Schoonover MJ, Jann HW, Blaik MA. Quantitative comparison of three commonly used treatments for navicular syndrome in horses. Am J Vet Res 2005;66:1247–1251.

9. Steiss JE, White NA, Bowen JM. Electroacupuncture in the treatment of chronic lameness in horses and ponies: A controlled clinical trial. Can J Vet Res 1989;53:239–243.
10. Chan W-W, Chen K-Y, Liu H, Wu L-S, Lin J-H. Acupuncture for general veterinary practice. J Vet Med Sci 2001;63:1057–1061.
11. Habacher G, Pittler MH, Ernst E. Effectiveness of acupuncture in veterinary medicine: Systemic review. J Vet Intern Med 2006;20:480–488.
12. Fleming P. Nontraditional approaches to pain management. Vet Clin North Am Equine Pract 2002;18:83–105.
13. Agriculture and Agri-Food Canada, Minister of Public Works and Government Services, Schedule of Drugs. Ottawa, ON, Canada: 2011.
14. Symonds KD, MacAllister CG, Erkert RS, Payton ME. Use of force plate analysis to assess the analgesic effects of etodolac in horses with navicular syndrome. Am J Vet Res 2006;67:557–561.
15. Vinuela-Fernandez I, Jones E, McKendrick IJ, Molony V. Quantitative assessment of increased sensitivity of chronic laminitic horses to hoof tester evoked pain. Equine Vet J 2011;43:62–68.

Book Review
Compte rendu de livre

Missing Microbes. How the Overuse of Antibiotics is Fueling our Modern Plagues

Blaser MJ. HarperCollins Publishers. Toronto, Ontario. 2014. 273 pp. ISBN: 9781-4434-2024-2.

This is a very important book by an erudite medical microbiologist, renowned for his work on *Campylobacter* and *Helicobacter.* Martin Blaser has been President of the Infectious Disease Society of America and Chair of Medicine at New York University, where he now directs the Human Microbiome Program. It's important to highlight his blue-chip credentials because his message could be dismissed as utterly cranky. It seems to be being resisted by the medical establishment, but the evidence is accumulating, and the tide is turning and may soon reach rip-tide. It's a book about the flip-side of the antibiotic miracle.

As a successful infectious disease physician researcher, Dr. Blaser is steeped in understanding of the revolutionary impact of antibiotics as the basis of modern medicine as well as with the problems of antibiotic resistance as microbes fight back. However, he asks whether antibiotics have a biological cost as well as their clear benefits. He then takes us through a tour of some of the modern human "plagues," which may well have antibiotic use as important and perhaps critical initiating factors. The list is daunting, and perhaps incomplete: allergies and asthma, autism, celiac disease, *Clostridum difficile,* Crohn's disease, type 1 diabetes, eczema, gastric reflux and oesophageal cancer, inflammatory bowel disease and irritable bowel syndrome, and obesity. He presents compelling evidence, based on both medical epidemiological studies and on experimental infections in mice, for these associations, many very strong.

The basis of Blaser's hypothesis is that humans have co-evolved over the millennia with their microbial flora, especially in the large bowel, which has a critical role in normal development and function. Things that interfere with the normal microbiome may have profound effects. The use of broad-spectrum orally administered antibiotics has the effect of a nuclear weapon on the microbiome. Blaser's hypothesis is, however, not just about the adverse impacts of antibiotics. He presents compelling evidence that caesarian section, which prevents the normal acquisition during birth of the mother's vaginal flora and seeding of the baby with the bacteria essential for successful intestinal colonization by other bacteria, can have long-term adverse consequences on the child. Early intestinal colonization by our normal microflora is increasingly recognized as a critical part of how we start to train our developing immune system to recognize what is dangerous from what is not. There are as many neurones in the intestinal tract as there are in the brain, and increasing evidence of the important link between the two mediated by the intestinal microbiome, so that the microbiome can affect the developing brain.

For someone who pioneered our understanding of *Helicobacter pylori* in gastroduodenal ulcers and stomach cancer, it was a wake-up call when Blaser discovered that having virulent *Helicobacter* decreases a person's chance of developing asthma by 40% and protects against celiac disease. Infants receiving antibiotics in their first year of life are at increased risk of developing asthma by the time they are seven. Children who have early inflammatory bowel disease are 84% more likely to develop Crohn's disease than children who don't; the risk goes up 18% for each course of antibiotics. The average American child receives 17 courses of antibiotics before they reach their 20s. Children who receive antibiotics in the first 6 months of life become fatter than those who don't.

This book is about the other side of the antibiotic miracle. Apart from *C. difficile,* are we recognizing in veterinary medicine some of the important adverse impacts of antibiotics that are emerging in medicine and discussed in this book? I think not, but we have not been looking. As veterinarians and agriculture grapple with antibiotic resistance and with trying to reduce antibiotic use to where the benefits are both clear and substantial, medicine is starting to recognize the need to develop a totally new relationship with antibiotics. The future lies in recognizing this new relationship and in improved diagnostics so that antibiotics can be targeted to the pathogen, such that treatment has the precision of a laser not of a nuclear weapon. We've all got a long way to go.

Reviewed by ***John Prescott, VetMB PhD,*** *Department of Pathobiology, University of Guelph, Guelph, Ontario N1G 2W1.*