Use of electroacupuncture to treat laryngeal hemiplegia in horses

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LARYNGEAL hemiplegia in horses is an important disease associated with poor performance and upper respiratory noise. It is also known as 'roaring' and was first identified in the 1800s (Goulden and Anderson 1981, Brakenhoff and others 2006). Progressive paralysis of the left intrinsic laryngeal muscles results in this clinical condition (Hahn and Mayhew 2000). Non-surgical treatments of laryngeal hemiplegia induced by perivascular or perineural injection include topical dimethyl sulfoxide, oral anti-inflammatory drugs and dilution of the injected material with normal saline (Seeherman 1983). Surgical treatments include vocal fold resection, arytenoidectomy, neuromuscular pedicle grafting and laryngoplasty (Radcliffe and others 2006, Inoue and others 2008). These procedures can be performed with or without ventriculocordectomy (Radcliffe and others 2006). Surgical intervention is generally required for horses with disease of grade III or IV associated with inspiratory stridor and exercise intolerance (Seeherman 1983). In successfully treated cases, upper airway function can take up to one year to return (Seeherman and others 1992). Surgical procedures are effective in young horses with grade III or IV disease or adult horses that have longer athletic careers, due to the extended time required for return to full function (Seeherman 1983). Surgical procedures may be impractical for the treatment of laryngeal hemiplegia in horses if the problem occurs during the sale season. Therefore, horse owners often try to find alternative methods for the long-term prevention or treatment of laryngeal disease.

Acupuncture may be a suitable alternative therapy in this situation. Limited mechanistic data exist to explain the therapeutic efficacy of acupuncture, but it has been effective in the treatment of nerve disorders and in pain management. In equine clinics, acupuncture has been applied as an alternative therapeutic method for many clinical conditions, including reproductive disorders, foot lameness, back pain, chronic diarrhoea, and other signs caused by peripheral equine nerve disorders (Schofield 2008), with favourable results. This short communication describes the use of electroacupuncture (electrical stimulation via needles placed at acupuncture points) to treat laryngeal hemiplegia in horses.

Eighteen thoroughbred horses were referred to the acupuncture service at the Veterinary Medical Center of the University of Florida for the treatment of laryngeal hemiplegia. There were 11 males and seven females, and their mean age was 1·4 years. The horses had a history of excessive respiratory noise when training. All horses were examined endoscopically, which revealed the presence of loose tissue on the left side of the larynx that adducted during breathing. The laryngeal condition of the horses was examined at rest. There was no assessment of muscle atrophy by palpation of the larynx. The grades of the hemiplegia, assessed endoscopically, ranged from IIa to IIIb (Table 1). The endoscopic grades were assigned in accordance with the findings of Embertson (1998). Most of the horses' owners wanted to start acupuncture to prevent the development of laryngeal hemiplegia before the upcoming sales.

TABLE 1: Changes in endoscopic grade of laryngeal hemiplegia in 18 thoroughbred racehorses treated with electroacupuncture

Horse	Age	Sex	Endoscopic grade of hemiplegia		Number of treatments
			Before treatment	After treatment	
1	1y 8m	Female	IIIa	IIb	6
2	1y 5m	Male	IIIa	IIa	5
3	1y 2m	Female	IIb	Normal	4
4	1y 5m	Male	IIIb	IIa	7
5	1y	Male	IIb	Normal	4
6	2y	Male	IIb	Normal	3
7	2y	Male	IIb	Normal	4
8	1y	Male	IIa	Normal	4
9	1y	Female	IIab	Normal	3
10	2y	Male	IIb	Normal	4
11	2y	Female	IIa	Normal	7
12	1y	Female	IIab	Normal	6
13	1y	Female	IIb	IIa	7
14	1y	Male	IIb	Ib	5
15	1y	Male	IIab	Normal	7
16	2y	Male	IIa	Normal	3
17	2y	Female	IIIa	Normal	5
18	1y	Male	IIab	Normal	5

m Months, y Years

Electroacupuncture was performed once a week for a total of three to seven sessions, depending on the severity of the hemiplegia. Sometimes, the therapeutic response varied due to the horses' tolerance of the treatment. The acupuncture points used were LI15, LI17, LI18, GB21, CV23, ST9, SI17, Hou-bi and Hou-shu (Fig 1). LI15 is located proximal to the cranial part of the greater tubercle of the humerus, between the supraspinous and infraspinous muscles. LI17 is located on the dorsal border of the sternocleidomastoid muscle at the level of the sixth cervical vertebra, and LI18 is located on the cranial border of the cleidomastoid muscle at the level of the tip of the larynx. GB21 is located in a depression situated halfway along the cranial edge of the scapula. CV23 is located on the ventral midline of the neck, just cranial to the larynx. ST9 is located in the depression caudal to the angle of the mandible, and SI17 is located in the depression of the cranial border of the brachiocephalic muscle (Fleming 2001). Hou-bi is located halfway between ST9 and SI17, and Hou-shu is located on the ventral midline of the third tracheal ring (Xie and Trevisanello 2007). The electroacupuncture treatment was used at 20 Hz for 10 minutes, then at 80 to 120 Hz for 10 minutes (Fig 2). On the left side of the horse, electrodes were placed with two pairs on CV23 and GB21 and on LI18 and LI17, respectively. Bilaterally, a pair of electrodes was placed with one pair on Hou-shu. On both sides, electrodes were placed with four pairs on ST9 and Hou-bi, and SI17 and LI15, respectively. The electrical intensity was increased several times to maintain minimal muscle contraction during the treatment sessions (Steiss and others 1989). Most horses accepted the electroacupuncture well without requiring sedation. All the horses were examined endoscopically by equine practitioners one or two days after the last electroacupuncture treatment. The endoscopic grades of hemiplegia had improved in all the horses, to between normal and grade IIb (Table 1). The respiratory noise during training was significantly improved after the treatment.

Laryngeal hemiplegia is an important and incurable disease in horses, characterised by progressive axonal degeneration of the recurrent laryngeal nerve (Seeherman 1983, Hahn and Mayhew 2000). Male thoroughbreds are more likely to suffer its clinical effects because they are significantly taller than the average for horses (Goulden and Anderson 1981, Brakenhoff and others 2006, Inoue and others 2008). Affected horses are

Veterinary Record (2009) **165,** 602-603

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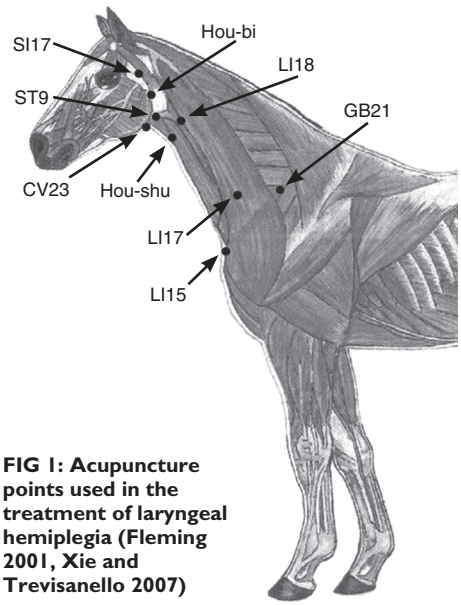

FIG 1: Acupuncture points used in the treatment of laryngeal hemiplegia (Fleming 2001, Xie and Trevisanello 2007)

exercise intolerant and have significant inspiratory noise. Physical performance can also be significantly impaired, although the causes of inspiratory noise have not been identified (Hahn and Mayhew 2000). The associated exercise intolerance may result from a dynamic collapse of the arytenoid cartilages and vocal folds, resulting in inspiratory resistance and hypoxia (Brakenhoff and others 2006, Inoue and others 2008).

Surgical methods have been used in the treatment of laryngeal hemiplegia, including ventriculectomy, vocal cordectomy, arytenoidectomy, neuromuscular pedicle grafting and laryngoplasty (Radcliffe and others 2006, Inoue and others 2008). Suitable procedures must improve the upper airway function and reduce the associated respiratory noise with minimal postoperative complications (Seeherman 1983). Some horses that have undergone surgical treatment have suffered vocal fold occlusion and inspiratory stridor because of insufficient abduction of arytenoid cartilage or changed positions of the arytenoid (Seeherman 1983). The average success rate of laryngoplasty is only 50 per cent in adult racehorses (Seeherman and others 1992). Therefore, horse owners may be reluctant to perform surgical procedures on horses with laryngeal hemiplegia, particularly during the sale season, and would rather use alternative methods to prevent the further development of respiratory noise into laryngeal hemiplegia.

Acupuncture appears to be an effective alternative method for treating laryngeal hemiplegia. Acupuncture has been used in the treatment of human and animal diseases for thousands of years, and has been used in small and large animal veterinary practices in Western countries since the 1970s (Chan and others 2001); in recent years, increasing numbers of veterinarians have integrated acupuncture into their more conventional practice (Chan and others 2001). In the authors' opinion, acupuncture is an ideal non-pharmacological treatment for animals. There have been clinical and scientific studies of the therapeutic effects of acupuncture; although these have not been fully elucidated, there have been many clinical reports that provide useful information. Acupuncture has been used in the treatment of pain, reproductive disorders, gastrointestinal problems, and other clinical problems resulting from nerve disorders (Xie and others 1996, 2009). Acupuncture has been shown to be effective in the treatment of paralysis in dogs caused by intervertebral disc disease, and for peripheral nerve damage in both facial and radial nerve paralysis, and appears to be particularly effective in neurological disorders (Steiss and others 1989, Xie and others 1996, Chan and others 2001, Fleming 2002, Xie and others 2009). In traditional Chinese medicine, nerve diseases such as paralysis or neuropathies are considered to be due to the stagnation of Qi (energy) (Jeong and others 2001); such Qi stagnation can be relieved by acupuncture stimulation at specific points.

In the present study, 18 horses with laryngeal hemiplegia were treated with electroacupuncture. Electrical stimulation has been used to enhance the therapeutic effects of manual acupuncture stimulation, and studies in horses have shown that electrical stimulation increased the blood flow to the sciatic nerve (Steiss and others 1989, Angeli and others 2005). The grade of laryngeal disease improved in all the horses after electroacupuncture therapy, and no side effects were observed (Inoue and others 2008). In Western medicine, therapeutic effectiveness is based on 'cause and effect' responses; and the therapeutic value (effect) of acupuncture may be difficult to assess in the clinic (Schofield 2008). In order to evaluate the efficacy of acupuncture from the perspective of evidence-based or Western medicine, studies involving an experimental, treated group and a control group are required. The authors also suggest that the horses in this study should be followed up long term, to determine whether they need regular treatments to maintain the improvements in their airways.

FIG 2: Electroacupuncture treatment of a horse with left-sided laryngeal hemiplegia

The results of this study suggest that electroacupuncture may serve as an effective non-surgical method for the control of laryngeal hemiplegia. Electroacupuncture should be applied under guidelines for preventing the unethical use of this technique. The authors conclude that the merging of therapeutic disciplines may provide greater benefits for horses with laryngeal hemiplegia.

Acknowledgements

This paper was partially supported by the international collaborative research funds of Chonbuk National University, 2008.

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