Proceedings of the
Society for Theriogenology 2013
Annual Conference

Aug. 7-10, 2013 – Louisville, KY, USA

www.therio.org/

Next SFT Meeting:

Aug. 6-9, 2014 – Portland, OR, USA

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An introduction to acupuncture and its incorporation into equine reproductive practice
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Introduction

Traditional Chinese veterinary medicine (TCVM) has been used to treat animals, primarily horses, cattle and pigs, for thousands of years in China. It differs from Western medicine in that acupuncture focuses on “balance” of the physiological, spiritual and emotional wellbeing of an individual while conventional Western medicine focuses on controlling a disease. Western medical practitioners analyze a disease to discover its specific, physical cause, whether this is an infectious agent, an enzymatic defect, cancer or a toxic insult. By fully understanding the functions of the physical body down to a cellular or molecular level, one can target the abnormality and better control the disease process.1

On the other hand TCVM practitioners recognize disease as an imbalance in the body. They understand that the body is an integrated, energetic structure and that disturbance of energy flow creates disease in the whole organism. When a disease pattern is identified, one can restore balance and health by helping the body regulate itself. Traditional Chinese veterinary medicine therapy is directed at not only treating the disease but identifies external and internal factors contributing to the primary abnormality. These include environment, nutrition, hereditary influences, the neuroendocrine system and the animal’s emotional state. Therefore, TCVM is directed at evaluating the entire animal and its response to its environment as a whole as each contributes to the imbalance.

Other than pain relief, acupuncture does not directly address any specific clinical sign but normalizes physiological homeostasis and promotes self-healing through normal endogenous pathways. Thus, acupuncture, in terms of its therapeutic mechanisms, is non-specific in that it treats certain tissues through overall body systems and targets balance. As a physiological therapy, the efficacy of acupuncture depends on the pathology involved and the healing potential intrinsic to each patient.2 Research has shown that the response to acupuncture when used for pain control differs between humans. About 28% are excellent responders, 64% are good and average responders and 8% are weak or non-responders.3 It is possible that the horse population may respond in a similar manner.

Both Western medicine and TCVM rely on medical history and physical examination to make a diagnosis or identify a pattern. Western medicine adds diagnostic tests such as bloodwork or radiographs. Traditional Chinese veterinary medicine uses tongue color, carotid pulse quality, and pain over acupoints to diagnose an imbalance. The technique takes practice to be able to discern normal from abnormal. Besides the obvious challenges with learning new diagnostic standards, the concepts around which these tools are used are very foreign to our scientifically- and physiologically-based physical examinations. In an oversimplification for purposes of this manuscript, TCVM practitioners look for carotid pulses weaker on the right or left side of the body, and differences in tongue color to diagnose different patterns of energy imbalance. Body temperature also plays a factor in diagnosis, and is usually assessed by ear tip temperature and whole-body (especially lumbar area) palpation. The following is an abbreviated introduction to basic concepts of acupuncture and how it can be incorporated into a reproductive practice.

Meridians and acupoints

Traditional Chinese veterinary medicine is based on energy freely flowing through specific channels called meridians. There are many channels of energy both inside and outside the body, but the most basic consists of 12 channels on the lateral aspects of the body, with an additional two coursing through the dorsal and ventral midlines, totaling 14. Each of the 12 bilateral channels corresponds with an organ, and many organs have relationships with other tissues. Many of the channels on the inside of the body have a connection with the outside through surface acupoints. Recent scientific studies have shown that these connections exist and are the basis for the somatic-visceral reflexes and referred pain. The internal organs are referred to as Zang-Fu organs, with the Fu (Yang) organs being hollow, paired with a Zang (Yin) organ which is structurally solid. Each organ has an association point on the Bladder meridian and these acupoints are commonly used to treat organ dysfunction.
Acupuncture is the stimulation of specific pre-determined points (acupoints) located on meridians near the surface of the body which produces a therapeutic effect by evoking homeostatic mechanisms within the nervous, immune, endocrine, cardiovascular and other body systems to promote self-healing. Acupoints range in size from 1 to 25 mm and can be identified by their electrical conductivity which differs from surrounding tissue. Electrical conductivity of acupoints is higher and electrical resistance is lower than surrounding tissues. At each point is a high density of free nerve endings, arterioles, lymphatic vessels and mast cells. Each acupoint has a defined and specific function. Treatment effects are based on acupoints selected, method of stimulation – dry needles, electro-acupuncture (EA), aquapuncture, or hemo-acupuncture – the length of stimulation and the timing and number of treatments. Some points may be used singly, but it is more common to use several points treated simultaneously, to achieve the desired effect. A typical treatment may involve the use of as few as one to as many as 20 acupoints. Research in humans and rats indicates that stimulation of specific acupoints results in increased blood flow to certain organs, increased movement of lymph, specific changes in the brain as observed on functional magnetic resonance imaging (fMRI), modulation of the immune system and release of opioids from the hypothalamus.

Different types of acupoints can be used for both diagnostic and treatment purposes. Association points or shu points are the most frequently used points for acupuncture diagnosis. They are located on the bladder meridian along the back and each is associated with a certain organ. Part of a TCVM examination involves scanning these diagnostic points to identify areas of pain or sensitivity. Pain when light pressure is placed on a point indicates an acute condition while pain with deep pressure indicates a chronic condition. About 70% of acupoints that exhibit sensitivity correspond to trigger points. Trigger points are defined as circumscribed hypersensitive foci in myofascial structures that give rise to a larger area of pain in adjacent or distant referred areas when palpated. Sensitive acupoints appear to be regions of hyperalgesia that arise spontaneously from local irritation or from excitation of somatic or visceral structures distant from the painful point. As each organ corresponds to a specific bladder acupoint on the horse’s back, palpation and elicitation of pain on these specific points indicate either a chronic condition of the musculoskeletal system or a specific problem with a visceral organ.

**Neurophysiology**

In the last decade, studies on neural mechanism underlying acupuncture analgesia focus on cellular and molecular substrates and functional brain imaging. Needle insertion stimulates afferent A-delta nociceptive fibers which leads to local, spinal cord and brainstem effects. Electro-acupuncture has profound effects on the hypothalamic-pituitary axis. The hypothalamic-pituitary axis not only produces the well-known neuroendocrine effects, but it is part of the central descending pain-inhibitory pathways involving endogenous opioids and most likely also plays a role in cholinergic anti-inflammatory mechanisms through the vagus nerve. In studies comparing EA with dry-needle acupuncture, EA produced greater brain changes on fMRI than dry needles and also elicited a better analgesic effect. Electro-acupuncture was more effective than dry-needle acupuncture in activating the release of circulating plasma concentrations of beta endorphins into the cerebrospinal fluid of horses. This effect is most likely associated with stimulation of the hypothalamus and release of beta endorphins from the pituitary. Beta endorphin while implicated in pain control, also has other systemic effects that may correlate with some of the findings seen with acupuncture. Beta-endorphin receptors are present on blood vessels and may contribute to the vasodilatation observed with acupuncture. They are also present in the gut and can alter motility.

Opioid peptides released by EA are frequency-dependent and differ from that released by dry-needle acupuncture. At low frequencies of 4 and 0.2 Hz for 20 minutes on select acupoints, beta endorphins are released whereas at high frequency of 200 Hz serotonin is released. Electro-acupuncture stimulation of certain acupoints associated with reproduction alters plasma levels of oxytocin, prolactin, follicle-stimulating hormone (FSH), luteinizing hormone (LH), estradiol and progesterone in sheep. Although the hypothalamic-pituitary axis is the major orchestrator of reproductive cyclicity in the mare and semen production in the stallion, and stimulation of the axis results in the release of many
neuroendocrine substances, little is known about how acupuncture interacts and “balances” reproductive function in the horse.

**Medical diagnosis**

In TCVM a diagnosis is made by collecting clinical data that includes a thorough history followed by evaluating the tongue, pulse, general appearance, body temperature, secretions and excretions, palpation of acupoints, and "shen". Shen refers to the outward manifestations of the vital activities of the horse. It includes evaluation of the animal’s eyes (glitter), ears (responds to environmental factors), position of the head, and response to the environmental stimuli. Tongue assessment includes evaluation of color, shape, and coating. Normal tongues are pink, not fat or swollen, and with a normal amount of moisture, not excessively wet. A pale, slightly wet and swollen tongue may be observed in older broodmares with delayed uterine clearance. A red tongue with a thick white coating indicates a heat pattern and may be observed in cases of metritis, inflammation or fever. Whereas a red tongue with no coating indicates a deficient heat pattern, which may be seen in cases with chronic inflammation or infection. Carotid pulse assessment is difficult to learn. It assesses the strength or quality of the pulses both superficially and deep, from right to left. Pulses are obtained by placing three fingers on the right and left carotid arteries at the base of the jugular groove of the horse. Each of the six sites corresponds to two of the 12 meridians and therefore correlates to a specific internal organ. Normal pulses are, of course, even in all six areas and from side to side. Old pluriparous mares with chronic endometritis tend to have deep pulses that can only be palpated with heavy pressure. This corresponds to an interior deficiency pattern. Young, maiden mares with endometritis tend to have superficial strong pulses that can be easily identified. Body heat is a subjective assessment, but very helpful when there is a clear “hot” body or “cold” body. Ear temperature is very helpful when assessing body heat, with a normal ear temperature being half warm (the half closer to the body) and half cool (ear tip). After the general attitude, tongue and pulse are inspected, specific acupoints on the meridians are palpated or “scanned”. This procedure is performed with a blunt needle cap gently pressing the specific acupoints on meridians to identify trigger points. Acupoints that show irritation when scanned correspond to either external ailments or internal disease.

After the body is scanned, and tongue, pulse, and temperature assessed, the name of the disease, often the major complaint, such as colic, diarrhea, cough, or lameness is determined. Then the pattern of disease is identified. This is the most difficult step for those trained in Western medicine and the most important. There are six systems for differentiating disease patterns. The theory of eight principles is used most commonly and is the foundation of TCVM diagnosis. It determines if the disease is an external or an internal problem, whether the pattern of disease is hot or cold or is in excess or deficiency. The pattern can then be categorized as being either Yin or Yang. Exterior, heat and excess belong to Yang while interior, cold and deficiency belong in Yin. From the perspective of TCVM, the exterior refers to the skin, hair, and muscles. The interior refers to the Zang-fu organs. The Zang-Fu diagnostic system, another method for disease pattern identification, identifies internal medicine problems. It determines which of the Zang-fu organs has either a deficiency-excess or heat-cold pattern. The latter system combined with the eight principles is used to diagnose reproductive problems.

There are four basic forms of energy that the TCVM practitioner looks for imbalance. Diagnosing the imbalance is the key to the treatment pattern of needles and points used. The four areas of imbalance are Qi, Yin, Yang, and blood. Qi is the word for energy in TCVM, referring to the energy of each body. Yin and Yang are the two halves of Qi. The blood in the body is symbolically the river of fluid that carries the Qi. The practitioner looks for either excess or deficiency of these elements, with excess being more common in younger animals, and deficiency more common in older animals. We can have excess in heat, dry, cool, and damp, and usually deficiency in the areas of energy discussed above. Qi is our energy, and the holding force in our bodies. Typical Qi deficient tongue and pulse patterns would be a pale, swollen or fat tongue, usually wet, and pulses weaker on the right side of the body. Basic signs of Qi deficiency are lack of stamina or energy, or of the body not “holding” either an organ or fluids – urinary incontinence, diarrhea, uterine prolapse.
Yin is our feminine energy, akin to our physiological air-conditioner, and is most active in the evening. Male or female, each body has Yin. Yin deficient patterns are diagnosed with a red or warm colored tongue, hot body, and pulses weaker on the left side. Cushing’s disease is often a liver Yin deficiency (although it can have other patterns of imbalance). Human menopause is often a kidney Yin deficiency, with hot flashes (broken air conditioner) and night sweats (worse at night when the Yin is most active).

Yang is our masculine energy, of which each body should have also regardless of gender. Yang is our heater, most active during the day, and Yang deficiency is diagnosed with a very pale tongue, and pulses weaker on the right, with the addition of a cold body/ears. The key to Yang diagnosis is that it looks much like Qi deficiency but it has the added factor of cold – ears and body cold.

Blood in TCVM language is the river of fluid that carries the Qi through the body. Blood deficiency is diagnosed with a dry, dull looking tongue which can be grey or pale in color, and pulses weaker on the left. It is not unusual for Yin and blood deficiency to be seen together, as the heat from Yin deficiency can dry up the river of fluid. Both have pulses weaker on the left. If the river of blood dries up, our Qi cannot flow as easily. Blood is also the nourishment to all our tissues, most evident through the skin. Poor flaky skin can be blood deficiency or Yin deficiency. Often with our processed diets, blood deficiency can have its roots in micro-damage to the intestinal tract causing lack of nutrient absorption.

In summary, tongue, pulse, body temperature, and sensitivity to acupoints combine to make up the basic TCVM examination, and diagnosis is made based on these findings combined with history. The simultaneous simplicity and complexity of TCVM can be very frustrating for any veterinarian because these concepts sound quite ridiculous and nonsensical to the scientific mind. There have been many medical studies in the human field performed in an attempt to help scientifically understand how acupuncture works, and to help examine the significance of the energetic model of body systems for allopathic medicine.

Treatment

Treatment strategy is based on pattern differentiation. Tonification is used for a deficiency pattern, and sedation is used for an excess pattern. Warming acupuncture techniques such as moxibustion or hot herbs are used for a cold pattern, while cooling acupuncture techniques are used for a hot pattern. Certain acupoints have cooling effects whereas others have heating effects. Studies in humans indicate that correctly diagnosing the traditional Chinese medicine pattern is the most important parameter for successful outcome in treating infertility problems in women. For veterinarians trained in Western medicine identifying TCVM patterns for reproductive problems is difficult because terminology is unfamiliar as is evaluation methods. If the pattern diagnosed is incorrect, inappropriate acupoints may be stimulated resulting in a poor response.

Traditional Chinese Veterinary Medicine is directed at balancing the body so it is paramount that a thorough physical and acupuncture examination be performed to determine the disease pattern. Nutritional and environmental factors need to be discussed and questions on type of stabling, time outdoors, paddock space, traveling and competitions need to be addressed. Events occurring prior to presentation can contribute to the imbalance. Pain interferes with reproductive function and has been shown to adversely affect hormonal profiles in women. Mares that experience a dystocia, are anesthetized and hung by their hind legs, mares that raced on synthetic tracks or mares with front foot pain may exhibit irritation when acupoints overlying the sacrum, loin or hips are palpated. These mares may accumulate intra-uterine fluid because drainage is impeded due to lack of movement. When the author identifies significant musculo-skeletal, foot or dental problems in a subfertile mare, she involves a veterinarian trained in chiropractic techniques, a veterinary dentist or podiatrist to assist in alleviating the pain.

This author combines Western medicine with TCVM and has the most acupuncture experience treating chronically infertile mares with intra-uterine fluid accumulations, lymphatic lacunae and angiosis. Mares with acute bacterial endometritis are treated with uterine lavage, intra-uterine antibiotics and...
oxytocin and rarely is acupuncture used in this group. Mares designated for acupuncture treatment have both a reproductive examination consisting of a thorough history, an ultrasonographic examination of the reproductive tract, a vaginal examination, uterine culture and cytology and a TCVM examination consisting of evaluation of the tongue, pulse and scanning of acupoints over the body to identify painful trigger points. Acupoints chosen for treatment typically include those that are painful on palpation, classic reproductive acupoints and acupoints for musculo-skeletal problems, if the mare exhibits lameness or pain. Treatment selection routinely includes placement of a dry needle first in Bai-Hui. The point is located at the top of the croup on the midline and following needle insertion sedation commonly occurs in the animal making it easy to place remaining needles. Needles are placed bilaterally into paired acupoints over the back and at least three bilateral pairs (i.e., BL 23 right –BL 23 left; Shen-shu right–Shen shu left) are stimulated by electro-acupuncture at a frequency of 20 Hz for five to ten minutes. The frequency is then increased to 100 to 120 Hz for ten to 15 minutes. Some mares do not tolerate this level of stimulation so the electrical current needs to be decreased to a tolerable level. Electro-acupuncture is routinely used by the author for infertility problems in mares as it has been shown to be more beneficial than dry-needles in the release of endorphins, epinephrine, catecholeostrogens and growth factors from the hypothalamic-pituitary axis in rats and women. Mares treated around breeding for intra-uterine fluid retention, lymphatic lacunae or angiosis typically receive two treatments at 48 to 72 h intervals before breeding and then are treated twice at 48 h intervals after ovulation but before day five of diestrus. Clinical impression is that uterine tone improves, uterine edema and fluid accumulation decreases after three to five acupuncture treatments. This protocol was developed by veterinary acupuncturists in central Kentucky.

“Cookbook” points for infertility

Correctly identifying the disease pattern is paramount for choosing the appropriate acupoints. Acupuncture “cookbooks” are available. These are lists of prescriptions of the more common acupuncture points used for the more common diseases. But, similar to Western medicine where drugs may be given without a proper diagnosis, “cookbook acupuncture” can give mediocre or disappointing results if an accurate Chinese diagnosis is not made.

The kidney and liver meridians are the primary meridians controlling reproduction. In TCVM, the kidney meridian is responsible for conception by controlling the ovaries. The liver meridian controls the uterus and cervix. Other meridians involved in reproductive function include spleen, triple heater and conception meridians (Ren channel). Many veterinarians trained in acupuncture put mares on specific herb formulations for infertility. This author has no experience with herbs, and herbal therapy must be prescribed very carefully by an experienced, trained herbalist.

Ovarian abnormalities and endometritis can be divided into six TCVM patterns: kidney Qi deficiency, liver-kidney Yin deficiency, spleen-kidney Qi deficiency, Qi-blood stagnation, liver Qi stagnation and phlegm-damp obstruction. The last three patterns are patterns of excess. Kidney Qi deficiency and liver-kidney Yin deficiency are associated with abnormalities of the ovaries and chronic endometritis. Many of the recommended acupoints are used for each condition.

For kidney Qi deficiency, the tongue is pale, wet with a thin white coating and the pulse is deep and weak, being more evident on the right. Clinical signs include anestrus, anovulatory follicles silent estrus and poor body condition. Points used for kidney Qi deficiency include Bai-Hui, Yan-Chi (traditional acupoints located midway between the tuber coxae and Shen-Peng; point is specific for ovarian conditions), Shen-shu, BL-23, GV-1, GV-3 and GV-4; EA bilateral Yan-Chi, Shen-shu, BL 23. Mares with liver-kidney Yin deficiency have a light red tongue, dry mouth, dry hair coat, dry flaking hooves and deep pulses that are weaker on the left. Ovaries may be inactive with irregular follicular growth. Endometritis is chronic. Recommended therapy: EA bilateral acupoints: Yan-Chi, Shen-shu, Shen-Peng, and BI-23; EA at 20 Hz for ten to 15 minutes followed by 80-120 Hz for another ten to 15 minutes. Other points to consider include: Shen-jiao, LIv-1, SP-6, Sp-9, Sp-1, BL-20. It is very difficult to insert needles in acupoints SP-6 and SP-9 in Thoroughbred mares without getting kicked as they are located on the inner thighs. The author has used these points in quiet mares of other breeds.
Spleen-kidney Qi deficiency is observed in older broodmares with chronic uterine inflammation. The tongue is pale, swollen and wet and the pulse is deep and weak. The author observes this condition most commonly in older, pluriparous mares that accumulate fluid after natural mating. Recommended acupoints: BL-20, ST-36, BI-19, BL-23, GV-3, GV-4, Kid-1, SP-6, SP-9, BL-20, BL-21, Shen-shu, Shen-Peng, Shen Jiao.

Mares with Qi/blood stagnation have a purple tongue and wiry pulse. Endometritis is acute to sub-acute, anovulatory follicles and irregular estrous cycles may be present. Recommended therapy: EA bilateral Shen-shu, BL-18, BL-19.

Liver Qi stagnation is seen in nervous, high strung Thoroughbred mares. The tongue is purple or red, the pulse is taut and string-like in consistency. Estrous cycles may be abnormal in length. Recommended therapy: EA bilateral acupoints Yan-chi, Shen-shu, BI-18, BL-19, Shen-Peng at 20 Hz for ten to 15 minutes followed by a frequency of 80-120 Hz for ten to 15 minutes.

Phelgm-damp is most common in obese, old, Warmblood mares with intra-uterine fluid. The tongue is pale, thick with a greasy coating. The pulse is slippery. Recommended therapy: EA Bai-hui to GV-1, Yan-chi (bilateral), Feng-long (ST 40; bilateral) and BL-19 (bilateral).

Concluding remarks

There is minimal scientific evidence that acupuncture improves reproductive function in the mare. If acupuncture is to be respected as a treatment modality it is imperative that controlled studies be designed to evaluate its effects on plasma hormones, uterine contractility and pregnancy outcome. Consistent protocols in regards to number and frequency of treatments, timing of treatments around breeding and early pregnancy need to be developed. Studies need to be conducted on animals with abnormalities as performing acupuncture studies on “balanced”, healthy animals may not reveal any valuable information. A proper diagnosis is paramount to success, however, learning how to evaluate and diagnose an animal’s condition using TCVM can be difficult for those trained in Western medicine. Although a “cookbook” of acupoints was presented in this text, each animal needs to be thoroughly evaluated as disease patterns will differ between individuals. Using the same protocol for a group of mares will likely produce poor results. Veterinarians interested in pursuing acupuncture for reproductive problems need to take a basic course from one of the schools in North America. This provides basic knowledge and should then be followed with working with an experienced acupuncturist for a minimum of 40 to 60 hours to improve one’s ability to properly diagnose specific abnormalities. Maintaining detailed records on each case and reviewing them with other veterinary acupuncturists is helpful in the learning process.

References
