

THE USE OF ACUPUNCTURE IN THE TREATMENT OF ACQUIRED BRAIN INJURY

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INTRODUCTION

The theory of Chinese medicine is quite different from that of western medicine. The formation and development of Chinese medical theory was greatly influenced by ancient Chinese philosophy and much of the unique terminology that is still used is reliant on metaphor and what borders on poetic descriptions of systemic effect and function rather than the compartmentalization of individual pieces and their action. Chinese medicine is a functional, systems-based medical paradigm and due to this difference in phrasing and cultural perspectives it becomes necessary to explain some basic Chinese medical theories that developed over the last 3000 years before going into its specific applications in acquired brain injury or traumatic brain injury (TBI) management.

Terms such as “Yin” and “Yang” were used from observation that objects or phenomena in nature, the human body included, consisted of two opposite yet interdependent relative properties. Yin generally referring to the more substantial or dense components of something and Yang to the more motive and functional properties. These phenomena being in a state of constant change between balance and imbalance. Chinese physicians held that the natural world was integrated into the human body and phenomena in the body reflected the phenomena that could be found elsewhere in nature. Thus, diseases were viewed to be caused by the same imbalances found elsewhere in nature and conditions were described as “dampness” or “wind” disorders. These can be brought into modern Western contexts with a thorough understanding of the intended meaning. The term “Qi” describes the foundational tenant that the body has an animating force which flows throughout and when it is obstructed one's health degrades. I have used the phrase “vital function” throughout most of this document to try to give some meaning to it, to the more technical minded perhaps it is helpful to relate it to action potential, ATP production (which is directly effected by acupuncture), or quantum potential. The last of these I feel more fully embodies the larger spectrum with which the term is used.

The traditional Chinese medical views of the body are in line with modern anatomy, however the terminology of the internal organs differ in meaning from conventional definition , conveying a generalization of the physiological functions of the human body. Chinese medicine acts primarily as a functional medicine, focusing on the processes and interactions between the systems of the body. As the body is viewed as a completely interdependent system, dysfunction of the any of the organ systems can in time prevent the proper functioning of the brain. Conversely any disorder or trauma to the brain can also interfere with the function of the other organ systems.

The channel or meridian doctrine is also essential for Chinese medical theory. Meridians and the collaterals (“Jing” and “Lou”) are the pathways of information, energy, blood and fluid circulation which extend throughout the body, often following myofacial lines and intersections. Meridians and the organs systems are shown on the superficial human body at specific acupuncture points. Acupuncture is a traditional method to remove obstructions and regulate flow in this information network by stimulating the points with needles, moxibustion or other methods. This method and it's actions is what is to be discussed.

ACUPUNCTURE ACTIONS ON THE BRAIN FOLLOWING INJURY:

Oriental medicine practitioners differentiate and classify aspects of brain injury into different syndromes or patterns according to their clinical symptoms. The most common of these can be found later in this document. TCM physicians believe that traumatic injury will rupture the integrity of the body's natural protection system, permitting the invasion of external disease, leaking of essential vital function, energy, blood and fluids and introducing blood extravasation. All of these will directly disturb normal vital function and blood circulation and induce pain. The brain is considered to be a special case in Chinese physiology and known as one of the “extraordinary” organs. According to Chinese medical theory, the essence fluid of the Kidney produces the marrow that forms the brain as the “sea of marrow.” The brain performs thinking and memorization functions, however physicians attributed the heart as the organ which regulates the whole system, superseding the mental activity of the brain. This may simply reflect the large emphasis that was placed on emotional states and health, however, modern research into the field of neurocardiology has shown some interesting developments that lend credence to this idea. The brain also is considered to be the cleanest organ within the body. Should it become polluted by trauma, the rest of the body becomes more prone to disease. After severe head trauma, these factors may affect the organ systems, blocking the “aperture of the Heart” - our emotional wellbeing and clarity- and hurting the body's primary force for life activities.

More and more evidence supports that acupuncture is able to stimulate the central nervous system and the brain. Its ability to release endorphins within the system and produce an analgesic effect has been well documented. Acupuncture can also create the release of other chemicals, which influence the body's self-regulating systems and promote natural healing abilities. A 2010 study demonstrated acupuncture to effectively trigger a local increase in the extracellular concentration of ATP, ADP, AMP and adenosine, (1) a key component in energy exchange in metabolic processes. By increasing ATP the body is better able to create not only a well-recognized analgesic effect but also contributing more usable energy and innate healing potential within the body.

Specific brain regions have also been shown to be influenced by acupuncture points using fMRI techniques, with different points influencing different brain regions and point along meridian systems having tendencies toward particular areas. (2-4) In a meta-analysis of fMRI studies done mapping areas of the brain influenced by acupuncture it concluded “Two third (64%) of 25 studies showed that acupuncture treatments were associated with more activation, mainly in the somatosensory areas, motor areas, basal ganglia, cerebellum, limbic system and higher cognitive areas (e.g. prefrontal cortex). Three studies showed also more deactivations in the limbic system in response to acupuncture.” (5) The limbic system is associated with most of the body's emotional processing and acupuncture's regulatory effect on this region is likely the reason it can be helpful in mental-emotional conditions or concerns following a brain injury. An example of these brain region activations being point dependent was shown in a study that found the point KI-3, located posterior to the medial malleolus was shown to enhance connectivity between the superior temporal gyrus and postcentral gyrus, while GB-40, located anterior to the lateral malleolus, enhanced connectivity between the superior temporal gyrus and anterior insula (6). These studies are limited however, and further research seems essential to fully map how acupuncture effects on the brain.

ROLE OF ACUPUNCTURE IN NEUROPLASTICITY AND NEUROGENESIS

Acupuncture has also been shown to have a direct influence on neuroplasticity and neurogenesis. This is the brain's ability to create new neural connections and even new nerve cells. Until recently it was thought that any neuron loss due to injury or aging in adults was permanent. It is now known that neural stem cells are still active in certain parts of the adult brain, the dentate gyrus of the hippocampus and the subventricular zones, and neurogenesis is possible into all major types of neural cells: Neurons, astrocytes, and oligodendrocytes. though it is at a significantly slower rate than in children.

A recent study showed that acupuncture induces cell and neuroblast differentiation in the hippocampus, providing evidence that it may be useful as a neurogenesis-stimulating therapy. There has also been a demonstrated effect on cAMP signaling, a transcription factor important in proliferation, differentiation, and survival of neural precursor cells, as well as regulating neurotrophic factor that supports the growth, differentiation and survival of neurons. Several acupuncture points have been shown to influence neuronal proliferation:

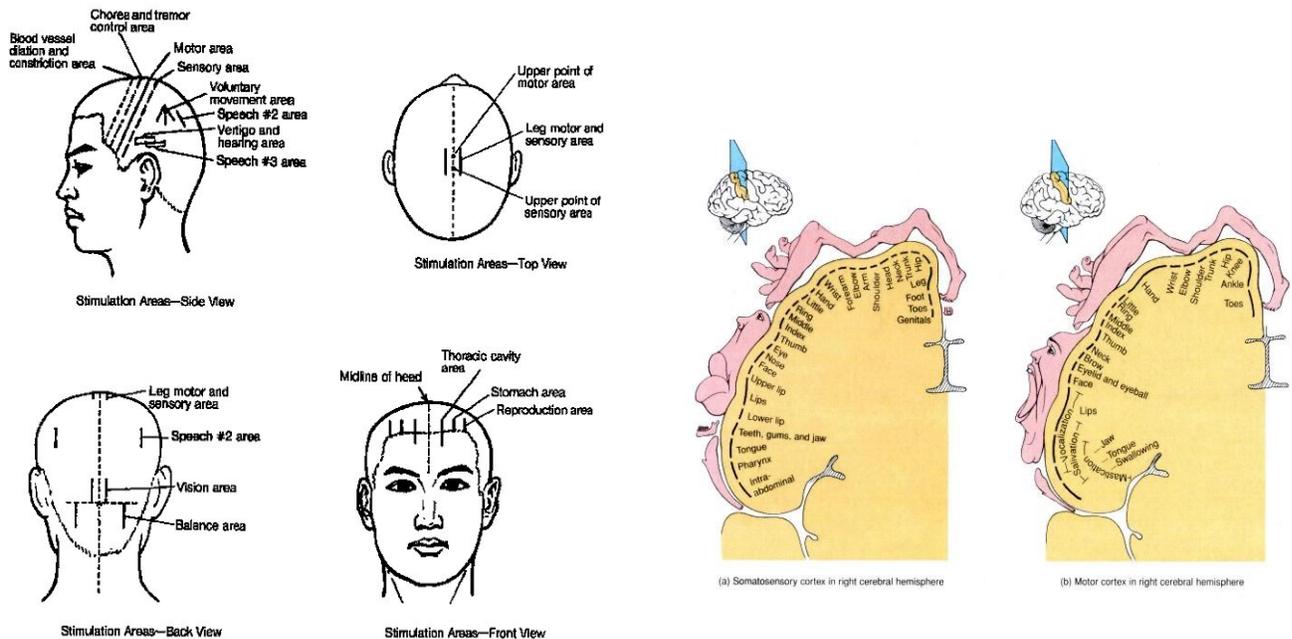
-ST36		-GV8
-GV20	-CV12	-LI11
-PC6	-CV6	-SJ5
-HT7	-SP10	-GB30
-CV17	-GV16	

One of the most studied and clinically used points among these is ST36, located on the anterior tibia muscle. Stimulation of ST36 is used for a wide range of conditions affecting digestive system, cardiovascular system, the immune system, the nervous system, and has been widely used for brain disorders. In addition to the above listed actions, ST36 upregulated the expression of neuropeptide Y, which promotes the proliferation of neuronal precursor cells and appeared to lessen the neuropathologic effects of stress in rats. (7)

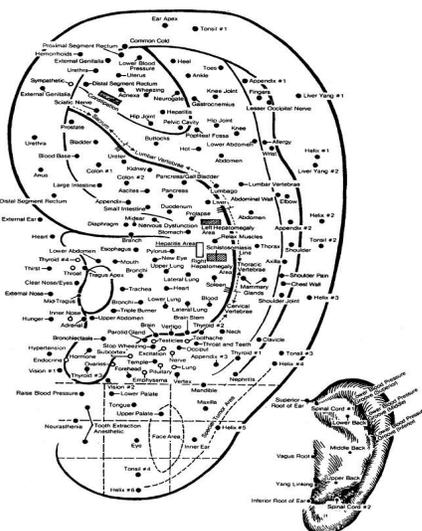
A recent study examined the role of acupuncture on brain tissue after cerebral ischemia (loss of blood supply to an area of the brain). This study showed a greater proliferation and differentiation of neural stem cells in the brain and an ability to increase blood flow and decrease cell death. Two points on the head, GV-20 and GV-26, regulate cells which “increase the release of nerve growth factors (NGFs) to make nerve cells survive and axons grow, synthesize neurotransmitters, (and) metabolize toxic substances. While the use of GV-20 and GV-14 increased neural repair after ischemic damage. They also activate bodily self-protection and reduction of nerve cell death in and near the site of injury. Needling points along the midline of the torso, often referred to as the conception vessel, also showed to increase growth factors [basic fibroblast growth factor, epidermal growth factor and NGF messenger RNA] in the subventricular zones and dentate gyrus (8)

SCALP AND EAR ACUPUNCTURE IN BRAIN INJURY TREATMENT

Most acupuncture points are located on the trunk and limbs. However, the points over the head play an important place in traditional brain injury management with acupuncture. Specific scalp acupuncture systems and protocols are a relatively newly developed, promising method to treat severe brain injury and its related symptoms (9-11). Several of “systems” exist, including needling over the sensory-motor humunculi along the parietal lobes to increase both movement and sensory feedback. Often immediate benefit can be found from this method. Future research may be aimed at scalp acupuncture and its effects on the release of neurotransmitters and neurohormones.



One of the largest growing researchers in to the use of acupuncture following trauma is the United States military. With the huge rise in traumatic brain injuries and reports of PTSD in the last decade several programs have been put in place and it seems positive results have encouraged more being instituted. Using a newly branded form of “battlefield acupuncture” (12) it relies highly on established intricate auricular systems that involve specific points on the ear correlating to regions of the body. (13-14). The left image below is a standard chart of auricular acupuncture points, the right image are the 6 points generally used with the “battlefield acupuncture” protocol. Another protocol that uses all ear points is the NADA protocol, which uses 5 points in each ear and has years of clinical backing for its use in addictions treatment, trauma/PTSD, stress maintenance and mental disorders. (15)



POINT SELECTION METHODS:

Brain injury cases, as are most disorders from an Eastern medicine perspective are differentiated into excessive and insufficiency types. Cases with symptoms of Blood stasis and “phlegm” accumulation belong to the excessive type, while those with symptoms of insufficiency of vital force, blood, and Kidney/adrenals are grouped as insufficiency types. These are describe below. The acupuncture points used are selected accordingly. For example, PC-8 and KI-1 are the points to be stimulated for excessive cases with syncope and dizziness. However, combining acupuncture and moxibustion at GV-20, CV-6 and ST-36 is the treatment for those insufficiency cases with similar symptoms. Additionally, points may be selected based on one's “constitution” or internal pattern differentiation as determined by the practitioner through traditional diagnostic methods including pulse and tongue diagnosis and symptom “clusters”. Additionally, it is worth mentioning that it would not be uncommon for an acupuncturist to additionally prescribe an herbal formula to address each case, however, that material is beyond the scope of this document. The following are brief explanations of some of the most common patterns found following a brain injury with some of the possible additional specific symptoms that may need to be addressed in a treatment:

Stasis or “Phlegm” Obstructing the Brain Pattern

The term “phlegm” in Oriental medicine usually refers to a stickiness or lack of clarity. It may refer to what we think of in the West pertaining to the sticky substance that accumulates in the respiratory system, but there are also conditions described as phlegm in the joints (as in some manifestations of arthritis), and phlegm in the mind, referring to a lack of clarity in thinking or speech. Common symptoms of this pattern include:

- unclear thinking,
- a feeling of haziness, fuzziness, or clouding of thought
- unclear speech
- agitation and restlessness
- headache
- dizziness and heaviness of the head
- a dark facial complexion
- and symptoms may be tend to be worse at night.

The tongue may be a dark or purplish color and the pulse will feel wiry and choppy or fine and choppy. The acupuncture prescription will be focused on opening and freeing the flow of the “orifices”, meaning the eyes and the brain through which the “Shen” or mind manifest - this implies dispersing any “phlegm” accumulation present, quickening the blood to improve blood flow to the brain and remove vascular stasis that may be present, and “arousing the spirit”

This pattern may be compounded with symptoms such as insomnia, impaired memory, extreme agitation, or severe blood stasis symptoms (see the next pattern) and the point prescription will be adjusted accordingly.

Stagnation & Blood Stasis Pattern

Qi stagnation is a term used to describe to describe any blockage in the natural flow of energy and action potential in the body. It can be either physical blockages or related to an emotional stagnation where one is not emoting effectively and it builds up inside oneself. Chronic stress can cause this condition. It can often manifest as either pain or emotional abruptness. Blood stasis refers to a more substantial stagnation in the body and if often a concern after a traumatic event where there has been leakage or loss of blood and as it heals some old stagnant blood remains at the trauma site. It can often be evident from a localized sharp, stabbing pain. If blood stasis is present and not addressed it can act as a significant barrier to healing. Common symptoms of this pattern include:

- Mood swings
- Emotional depression
- Scanty speech or no speech
- Difficulty thinking or slow speaking
- Decreased memory power
- Piercing headache following a traumatic injury to the head
- Ribsides and chest distention and pain

The tongue may be a dark red color with possible red or purple spots and a thin white or yellow coat. The pulse will feel wiry and choppy. The acupuncture prescription will be focused on rectifying or reconciling the condition of stagnation, improving blood circulation and transforming the present stasis. This pattern may be compounded with symptoms such as a bitter taste in the mouth, agitation, blood deficiency symptoms (see secondary symptoms of Heart-Spleen depression pattern), cold hands and feet, or insomnia and restlessness and the point prescription will be adjusted accordingly.

Ascendant Liver Hyperactivity Pattern

In Chinese medical physiology the Liver handles much of the physical and emotional stress the body takes on, emotional suppression can build up and as these things accumulate the excess energy needs to go somewhere and it can often come out in bursts of high energy release. This is often what is happening in this pattern as the accumulated energy quickly ascends upward to the face and head. There also tends to be an underlying depletion of the body's resources due to the allocation so much energy toward the suppression process. Conditions such as hypertension, being prone to anger, and a red face and ears can be common signs of this. Common symptoms of this pattern include:

- Emotional impulsivity and rashness
- Agitation and restlessness
- Easy to anger and irritability
- Pounding headache
- Possible vomiting of white foam or bitter bile following a traumatic injury to the head

The tongue may be a dark red color with a yellow coat. The pulse will feel wiry and rapid. The acupuncture prescription will be focused on subduing the Liver and the ascendant energy, increasing blood flow and transforming any accumulated stasis present.

This pattern may be compounded with symptoms such as nausea, vomiting, constipation, epileptiform symptoms, insomnia, or impaired memory and the point prescription will be adjusted accordingly.

Heart-Spleen/Pancreas Depression Pattern

The Heart organ is considered the ruler and the seat of the emotional self. The Spleen/Pancreas organ is in charge of transforming and transporting our food into usable energy and action potential. When the two of these become depleted they can show the following symptoms:

- Fatigue
- Forgetfulness
- Heart palpitations
- Worry & anxiety
- Depression
- Irritability
- Possible headaches and dizziness following a traumatic head injury

As this pattern progresses there may also appear secondary symptoms of a blood deficiency pattern.

common symptoms of this include:

- Insomnia
- Pale white or sallow yellow complexion
- Pale lips and fingernails
- Cold hands and feet
- Possible loose stools

The tongue may pale but slightly dark, enlarged with a possible central crack and a thin coat. The pulse will feel wiry, fine, and a moderate (slightly slow) rate. The acupuncture prescription will be focused on nourishing the Heart and Strengthening the Spleen/Pancreas, rectifying or reconciling stagnation, and resolving depression.

This pattern may be compounded with symptoms such as severe impaired memory, concomitant blood stasis signs, bitter taste in the mouth with irritability, or a bland taste in the mouth with a thick white tongue coat and the point prescription will be adjusted accordingly.

Kidney Vacuity Pattern

The Kidney organ system also correlates to the adrenal glands, the bone marrow and the “sea or marrow”, a phrase used to describe the brain in Chinese medical physiology. The Kidney system in the deep source of innate energy, correlates to hereditary, congenital and deep immunological conditions. Many of the signs of aging are also correlated to the Kidney organ system functions becoming depleted. Common symptoms of this pattern include:

- History of traumatic injury to the head with a listlessness, apathetic or lethargic spirit
- Slow difficult thinking
- Decreased visual acuity
- Markedly decreased memory power
- Dizziness
- Vertigo
- Tinnitus*
- Deafness
- Low back and lower leg soreness and limpness

The tongue may pale with a thin coat. The pulse will feel fine and weak. The acupuncture prescription will be focused on supplementing the Kidney system, fortifying the brain, boosting the marrow and astringing the “essence”.

This pattern may be compounded with symptoms such as tidal fever and an burning sensation in the bones, heart palpitations, agitation and restlessness, piercing headache due to stagnant blood or epileptiform symptoms and the point prescription will be adjusted accordingly.

*It is noteworthy that tinnitis is a common ailment following a head injury and can often be due to tight musculature in the neck and base of the skull and may not necessarily be related to a deficient condition of the Kidney organ system.

TREATING SPECIFIC SYMPTOMS - HEADACHE:

Among the various brain injury clinical symptoms, chronic headaches is one of the most common complaints and will thus be used as an example to introduce how acupuncture can be used for specific symptoms. It also acts as a good example of how a single symptom or disease can be considered to stem from one of various etiologies from the perspective of Chinese medicine. Chinese medical theory relates the head is the place where all “Yang” (motive) meridians of the upper and lower limbs meet. Trauma and other factors can cause stagnation and of vital function and blood in the head and in the meridians that transverse the head. In such cases, headaches occur.

When viewed from a Chinese medical perspective a headache can have many different causes, and different qualities to the headache in accordance to the underlying cause. Each of these is confirmed by other symptoms that relate to the pattern differentiation. Here are 10 of the most commonly listed patterns correlating to headache and their qualities:

Blood Stasis Pattern: Persistent, fixed stabbing headache, possibly worse at night, worse with menses

External Wind-Cold Invasion Pattern: Headache accompanied by stiffness of the neck and back

External Wind-Heat Invasion Pattern: Distending or “splitting” headache

Wind-Dampness Invasion Pattern: Headache with feeling of heaviness, worse with damp or cloudy weather, may be worse after eating

Ascendant Liver Hyperactivity Pattern: Throbbing/distending headache with dizziness and vertigo, may be better with light activity, worse with heat/better with cold, worse with anger OR relaxation, better with sexual activity, worse before or during menses

Kidney Yin Vacuity Pattern: Headache with a feeling of emptiness of the head and dizziness/vertigo, may be worse at night, worse with sexual activity

Kidney Yang Vacuity Pattern: Headache accompanied by a cold body, may be worse at daytime, worse with cold, worse with sexual activity

Qi Vacuity Pattern: Constant dull headache aggravated by overexertion, may be worse during daytime, better after eating

Blood Vacuity Pattern: Dull headache with dizziness and vertigo aggravated by overexertion, may be worse at night, better after eating, worse after menses

Phlegm Obstruction Pattern: Headache with dizziness, heaviness of the head, worse after eating

In general deficient conditions feel better with pressure applied to the area, while excessive conditions feel worse when pressure is applied.

Once the pattern is determined, the headache is also differentiated according to where it is located and the meridians that correlate with that area. The selection of acupuncture points is based on the combination of local points and distal points accordingly. These are as follows:

Occipital region/nape of the neck: relates to the meridian of Foot-Taiyang. GB-20 and BL-10 are the local points punctured; BL-60 is one of the distal points that may be considered.

Forehead and supraorbital region: relates to the meridian of Foot-Yangming. Puncturing the local points of ST-8 and Yintang combined with distal points LI-4, ST-44, ST-43 may be considered.

Temporal region: relates to the meridian of Foot-Shaoyang. The points GB-8, TW-5, GB-41 may be considered.

Parietal region and top of the head: relates to the meridian of Foot-Jueyin. The points GV-20, SI-3, BL-67, and LR-3 may be considered.

From this information an effective acupuncture treatment prescription can be determined. As you can see the treatment is much more specific to the patient's individual concern than many other treatment methods and can often yield quick, sometimes immediate results, with the correct point selection.

DISCUSSION:

The development of Traditional Chinese Medicine is based on the empirical experience on clinical applications of natural products and acupuncture. Chinese medicine has been used effectively for at least 3,000 years and has accumulated rich clinical application experience.

Although there are increasing number of patients and physicians in the United States and other Western countries accepting Chinese medicine as an alternative form of medical treatment, there have been no large-scale, well-controlled studies done evaluating Chinese medical management of brain injury.

Acupuncture is a safe treatment modality which seems to have no obvious side effects; however, there are no large-scale controlled studies done yet on acupuncture management of brain injury related problems. It is additionally a very cost-effective treatment strategy that can easily be implemented into rehabilitative programs. Clearly, this is an area of research that can meld Chinese medicine and Western medicine in an attempt to best optimize patient outcome following a brain injury.

How ultimately Chinese medicine will be integrated into the rehabilitative management of persons with brain injury is yet to be seen. Though patients could undoubtedly benefit from such an integration. Practitioners should remain open to treatment strategies such as Chinese medicine that potentially assist their patients' recovery and/or function and commensurately advocate for these areas of intervention to be more critically assessed through high quality controlled research studies.(17)

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