

A Multifaceted Approach to the Acupuncture Treatment of Neuromuscular Facial Conditions

Abstract

Conditions such as Bell's palsy, temporomandibular joint (TMJ) syndrome and trigeminal neuralgia can have a major impact on the neuromuscular function of the face. These conditions can involve symptoms such as ptosis of the eyelid, loss of facial muscle function, pain, neuropathy and allodynia. Using a multifaceted approach to treating these conditions can yield more effective treatments and longer lasting results than a singular approach. This article focuses on three conditions: Bell's palsy, trigeminal neuralgia and TMJ syndrome to illustrate how scalp acupuncture, motor points, transverse sub-muscular needling, facial cupping and full-body acupuncture can treat the underlying condition, restore function and relieve pain.

As a practitioner and instructor of facial rejuvenation acupuncture, I have received many calls over the past 12 years from individuals seeking help for various conditions affecting the facial muscles, nerves and overall function of their face. My skills in needling the face and utilising facial motor points, sub-muscular needling, scalp acupuncture and facial cupping have provided me with an effective framework to treat patients with neuromuscular facial conditions. The same techniques that are used to raise a saggy jawline or relax a furrowed brow can be used to treat a drooping eyelid (ptosis) due to stroke or Bell's palsy. By combining different modalities, I have been able to help patients regain lost motor functions in their face and relieve conditions such as temporomandibular joint (TMJ) syndrome, trigeminal neuralgia and the effects of stroke and Bell's palsy. This article will focus on the use of facial acupuncture, submuscular needling, facial cupping, motor points and scalp acupuncture in the treatment of three specific conditions; TMJ syndrome, trigeminal neuralgia and Bell's palsy.

Basic techniques

The first step in treating any facial condition is to identify the underlying TCM patterns involved (see below for condition-specific pattern differentiations). Once a pattern diagnosis has been made, the appropriate body points are inserted, then scalp, motor and submuscular points can be used to either stimulate or relax a muscle group. Once all needles are removed, facial cupping can be used to further the effectiveness of the treatment.

Scalp acupuncture

Scalp acupuncture is a modern acupuncture method.

It began in the late 1950s and was popularised in the 1970s.¹ It is primarily used to stimulate areas of the brain in order to facilitate the functions governed by those areas. It is based on neuroanatomy and therefore, in the case of a stroke, the scalp is stimulated over the specific area of the brain that has been damaged. Scalp acupuncture is uniquely suited for conditions involving neurological issues. Scalp acupuncture can be mildly painful to some patients, therefore before performing it, I typically needle ear Shenmen and Shenting DU-24 in order to relax the patient. The two scalp areas used for treating neuromuscular facial conditions are:

- Motor area: used for paralysis or weakness in the face caused by stroke, multiple sclerosis (MS), Bell's palsy, or brain injury.
- Sensory area: for abnormal (hypo or hyper) sensitivity including tingling, numbness, loss of sensation and pain involved in conditions such as trigeminal neuralgia, TMJ syndrome, multiple sclerosis (MS) or shingles.

To treat facial neuromuscular conditions the lower (inferior) two fifths of the scalp are needled. For motor issues the opposite side to the affected area is treated, whereas for sensory issues the same side is treated. The needles are threaded quickly at a 15 to 25 degree angle through the loose areolar layer of the scalp, stimulated manually every 10 to 15 minutes or continuously through electrical stimulation, and retained for at least 30 minutes. Scalp acupuncture is contraindicated in cases where the fontanel is not closed, where blood pressure is high, or if the patient is very nervous, has a seizure disorder or is pregnant.²

By: Michelle Gellis

Keywords:
Bell's palsy, TMJ, trigeminal neuralgia, acupuncture, scalp acupuncture, motor points, facial cupping, neuromuscular facial conditions, submuscular needling, Chinese medicine.

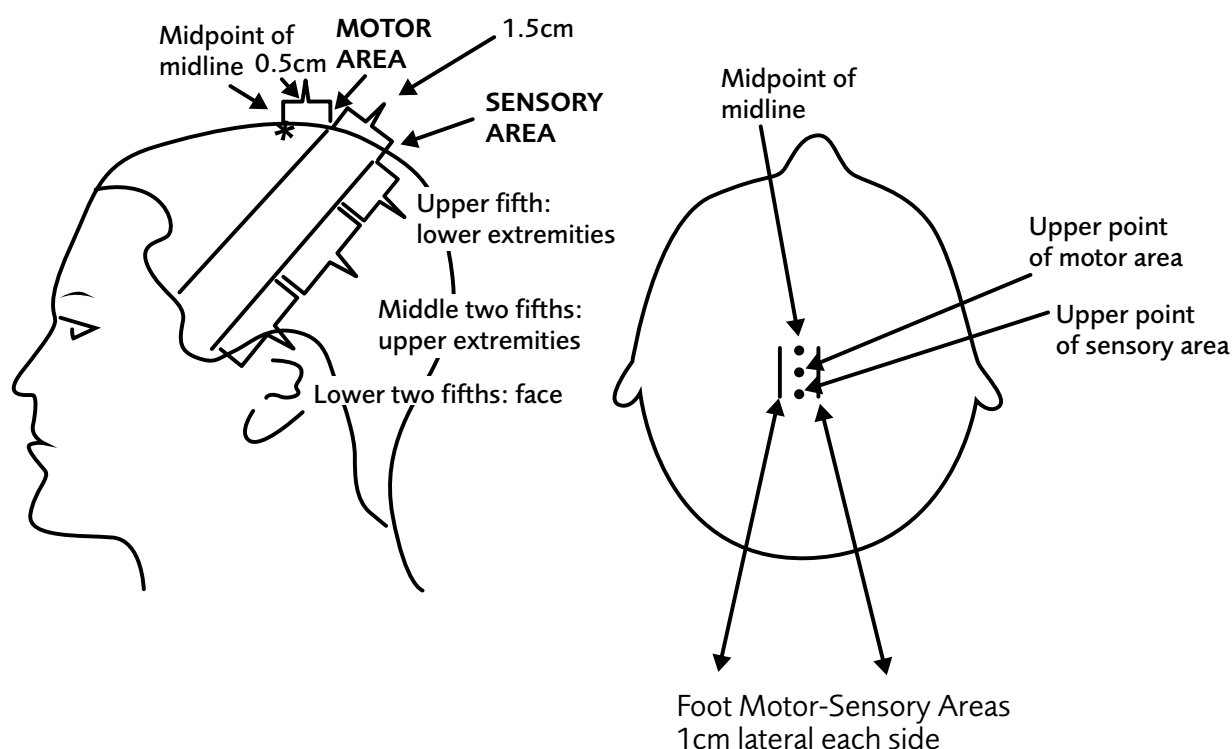


Fig 1: Scalp acupuncture: motor and sensory lines with landmarks for location.

Motor points

Once scalp acupuncture needles are in place, motor points are inserted. The use of motor points to treat pain dates back to the work of A.H. Bennett, M.D. in 1882.³ More recently, the work of several researchers has built the foundation for the growing use of motor points by acupuncturists to restore muscle function.⁴ Motor points are located at the most electrically excitable part of the muscle where the motor nerve bundle is attached. More specifically, a motor point is defined as 'the skin region where an innervated muscle is most accessible to percutaneous electrical excitation at the lowest intensity. This point, on the skin, generally lies over the neurovascular hilus of the muscle and the muscle's band or zone of innervation.'⁵ When a muscle is in spasm, it has lost its ability to function properly. Correct needle insertion into the muscle's motor point will cause it to 'jump', which resets the muscle to normal function. When a muscle is in flaccid state, it has also lost its ability to fire properly. By stimulating the motor point, the flaccid muscle can return to a functional state. Many motor points correspond with traditionally documented acupuncture points, such as Yangbai GB-14 for the frontalis muscle and Quanliao SI-18 for the zygomaticus major muscle.⁶ They are often located in the belly of the muscle. However, motor points are not the same as trigger points. Trigger points are tender points

in the muscle that most people refer to as 'knots', which can refer pain to other parts of the body.⁷ Motor points tend to contain a larger concentration of nerve endings than other areas in the muscle and are more electrically excitable.⁸ They are neuromuscular junctions and are anatomically specific.⁹ Motor points used in treating facial conditions are all innervated by the seventh cranial nerve, except those of the masseter and temporalis muscles. To determine which motor points to needle, one must identify which muscle(s) are affected. For example, if a patient cannot smile, there are four main muscles that may be affected. The zygomaticus major (which draws the angle of the mouth upward and outward), zygomaticus minor (elevates the upper lip), the levator labii superioris (elevates the upper corner of mouth) and the risorius (retracts the angle of the mouth laterally). Once the affected muscles have been identified, the corresponding motor points can be treated. Motor point needling is effective for many conditions involving paralysis. Needling a motor point helps a muscle to recover its length. Readers should note that learning to locate and needle facial motor points effectively typically requires special training, usually in a hands-on environment. Arnica gel is usually applied to the skin to prevent bruising, and a 0.16 millimetre gauge needle is inserted into the belly of the muscle and vigorously lifted and thrust until the muscle jumps.¹⁰

If performed incorrectly, stimulation of a motor point can cause damage to the facial nerves. Proper screening for contraindications such as neuropathy or concurrent use of anticoagulants, or thrombocytopenia or lymphoedema is essential.



Fig 2: Muscles of the face (Patrick J. Lynch, medical illustrator)

Submuscular needling

After motor points have been inserted and removed, if appropriate for the condition being treated, submuscular needles can be inserted. Submuscular needling is used to relax muscles that have become overly tense, and can further enhance the efficacy of motor points, or is used if the motor points are not easily accessible or are contraindicated. However, if the area being treated is very sensitive - as with trigeminal neuralgia - then this technique should not be used. The muscle to be treated is identified and then 0.14 or 0.16 gauge one inch needles are inserted from the insertion to the origin of the muscle in a transverse fashion underneath the muscle (see Figure 3). Examples of muscles that are frequently needled using this technique are the frontalis, masseter, temporalis, procerus and corrugator. The needles are retained for 10 to 15 minutes. As with motor points, proper training in the isolation of the muscles and correct insertion of the needles is recommended. Once the submuscular needles are in place, local points on the face can also be needled to address the particular condition and/or channel affected.



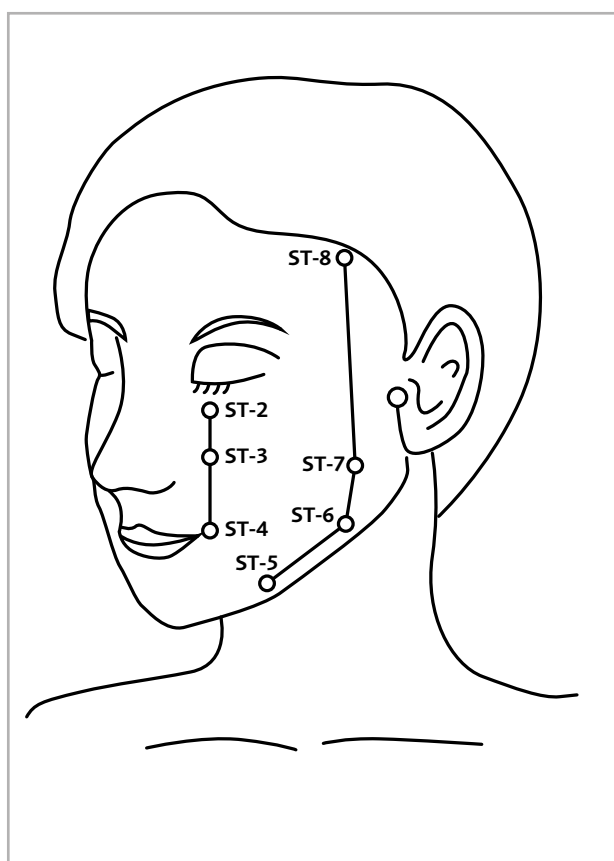
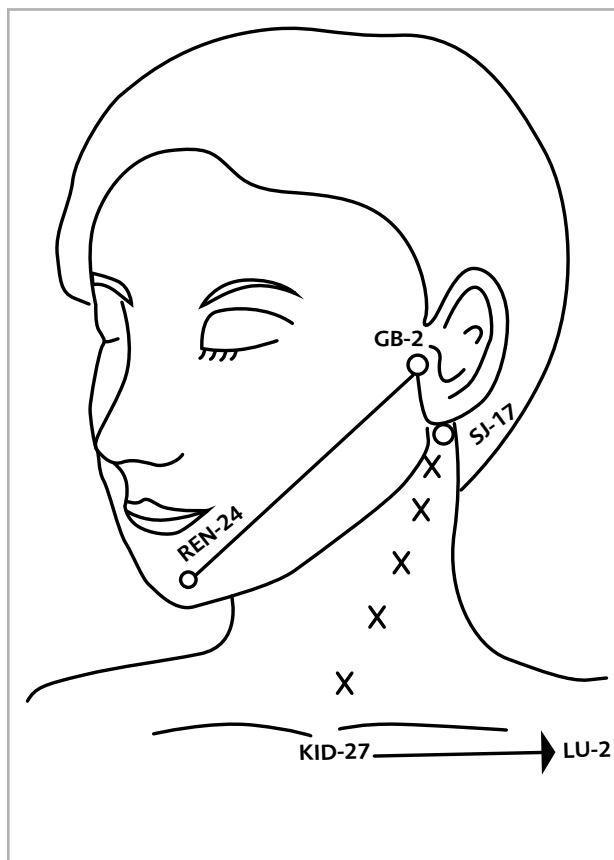
Fig 3: Submuscular needling of the frontalis muscle

Facial cupping

After all facial needles have been removed, facial cupping can be used as a final step in treatment. Facial cupping brings blood and qi to the muscles of the face and can both release tension in muscles (such as in TMJ disorder) and invigorate muscles affected by paralysis or weakness (such as in MS or stroke). Facial cupping has several benefits:

- Relax tight facial muscles
- Move out stagnant lymph, fluids and toxins to enhance the body's natural healing ability.
- Increase blood flow and circulation.
- Strengthen vascular integrity of the face¹¹

Facial cupping is different from cupping on other parts of the body. After applying argan, coconut or other non-comedogenic oil¹² to the face and neck, special small glass suction cups are moved along the acupuncture channels, down the neck under the clavicle and to the area of the lymph nodes at Yunmen LU-2 (see Figs 4 & 5). The cups are not left in place for very long, rather they are moved in a fluid motion, suctioning and releasing along channels and muscle groups. Cupping can easily irritate inflamed or damaged skin, and may be very uncomfortable to individuals with nerve pain. Therefore, facial cupping is contraindicated with allodynia, skin conditions such as herpes involving open sores, and with patients who bruise easily or are pregnant.



Figs 4 & 5: Examples of facial cupping (the circles are where the cups are applied, the lines where the cups are dragged, and the x's where the cups are applied and released).

The following are examples of how three specific conditions might be treated using the multifaceted approach presented above.

Temporomandibular joint disorder

Temporomandibular joint disorder involves problems with the jaw, jaw joint and surrounding facial muscles that control chewing and movement of the jaw. The TMJ is a hinge joint that connects the lower jaw (mandible) to the temporal bone of the skull. Several muscles can be involved in TMJ disorder.¹³ The temporalis muscle is a large, thin, fan-shaped muscle located on the side of the skull above and in front of the ear. Its origin attachments are the temporal lines, fossa and fascia, and it inserts into the coronoid process and anterior ramus of the mandible. It is a muscle of mastication and its role is similar to the masseter, which is to elevate the mandible. Although the masseter is more powerful, the temporalis is also an important chewing muscle. The temporalis starts at the temporal bone of the skull and passes all the way down beneath the zygomatic arch, attaching to the mandible. It assists the masseter in closing the jaw but it also retracts the mandible. The lateral pterygoid muscle, also shaped like a fan, is responsible for moving the lower jaw from side to side. It originates at its wide end at the lateral pterygoid plate, while the narrow end of the fan inserts into the anterior surface of the coronoid process. The masseter elevates and protracts the mandible. Its origin is the zygomatic arch and insertion is the lateral surface of the mandible. All three of these muscles work during mastication, but may also be continuously called on during periods of stress when the jaw is habitually clenched or when grinding the teeth. This clenching and grinding can result in headaches, which are myofascial in origin.

Aetiology

- Grinding or clenching the teeth (usually due to stress) which puts a lot of pressure on the TMJ
- Dislocation of the soft cushion or disc between the ball and socket joint
- Arthritis in the TMJ
- Injury to the jaw, TMJ or muscles of the head and neck – such as from a heavy blow or whiplash

Symptoms

- Pain or tenderness in the face, jaw joint area, neck and shoulders, and in or around the ear when chewing, speaking or opening the mouth wide
- Limited ability to open the mouth wide
- Jaw gets stuck or locks in the open- or closed-mouth position
- Clicking, popping or grating sounds in the jaw joint when opening or closing the mouth or chewing (which may or may not be accompanied by pain)
- A tired feeling in the face

- Difficulty chewing or a sudden uncomfortable bite – as if the upper and lower teeth do not fit together properly
- Swelling on the side of the face

Note that TMJ disorder may occur on one or both sides of the face.

Treatment

Since TMJ disorder can arise from trauma, arthritis or tension, the Chinese medicine diagnosis and treatment of the underlying cause will vary. In the case of arthritis, it is typically treated as bi (obstruction) syndrome, in which case it is necessary to first determine which type of bi-syndrome is present,¹⁴ and treat it accordingly. In the case of traumatic injury, the use of motor points, submuscular needling and facial cupping plus distal points will usually address the manifestation of the symptoms. Tension will usually involve qi stagnation (usually of the Liver), and point combinations such as the Four Gates, and auricular Shenmen, Liver and Sympathetic are helpful. Body points should be included to address any underlying patterns and the channels involved, which are typically the San Jiao, Small Intestine, Gall Bladder and Stomach.

Acupuncture points

Distal

- Hegu L.I.-4: command point for the face/jaw
- Waiguan SJ-5 & Zulinqi GB-41: Master/coupled point of the Yang Wei Mai (Yang Linking Vessel) - moves qi in the ear area
- If stagnant Liver qi: Taichong LIV-3 & Zhangmen LIV-13

Scalp

- Motor lower two fifths
- Sensory lower two fifths (if necessary for pain)

Motor

- Extra point Qianzheng (N-HN-20) to release the lateral pterygoid muscle
- Jiache ST-6
- Belly of temporalis muscle one cun anterior to Shuaigu GB-8
- Note that the medial pterygoid muscle is also involved in TMJ but cannot be reached through either motor points or submuscular needling

Submuscular

- Masseter, temporalis (see illustration)

Local

- Jiache ST-6 & Xiaguan ST-7: help relax masseter muscle
- Shangguan GB-3
- Tinggong SI-19
- Yifeng SJ-17
- Taiyang (M-HN-9)

Facial cupping

Facial cupping can be the most effective tool of all when treating TMJ disorder. Special consideration should be paid to Wangu GB-12, Yifeng SJ-17 and the entire Stomach channel on the face.

Trigeminal neuralgia

Trigeminal neuralgia (TN) is a chronic pain condition that affects the trigeminal or 5th cranial nerve, one of the largest nerves in the head. The trigeminal nerve is one of 12 pairs of cranial nerves that originate at the base of the brain. It has three branches that conduct sensations from the upper, middle, and lower portions of the face, and the oral cavity to the brain. The ophthalmic or upper branch supplies sensation to most of the scalp, forehead and front of the head. The maxillary, or middle, branch passes through the cheek, upper jaw, top lip, teeth and gums, and the side of the nose. The mandibular or lower branch passes through the lower jaw, teeth, gums and bottom lip. More than one nerve branch can be affected by the disorder. The disorder causes extreme, sporadic, sudden burning or electric shock-like face pain that lasts anywhere from a few seconds to as long as two minutes per episode. These attacks can occur in quick succession. The intensity of the pain can be physically and mentally incapacitating.

Aetiology

The presumed cause of TN is pressure from a blood vessel on the nerve as it exits the brainstem. This compression causes the wearing away of the protective coating around the nerve (the myelin sheath). The condition may be part of the ageing process: as blood vessels thicken with age they can come to rest and pulsate against a nerve. Symptoms of TN can also occur in people with multiple sclerosis, or may be caused by damage to the myelin sheath due to compression from a tumour. This deterioration causes the nerve to send abnormal signals to the brain. In some cases the cause is unknown.

Symptoms

- Episodes of severe, shooting or stabbing pain that may feel like an electric shock
- Spontaneous attacks of pain or attacks triggered by things such as touching the face, chewing, speaking and brushing the teeth
- Bouts of pain lasting from a few seconds to several minutes
- Episodes of several attacks lasting days, weeks, months or longer; there may also be periods of no pain
- Constant aching, burning feeling that is less intense than the spasm-like pain
- Pain in areas supplied by the trigeminal nerve, including the cheek, jaw, teeth, gums or lips, and less often the eye and forehead

- Pain typically affecting one side of the face at a time, though in rare cases it may affect both sides
- Pain focused in one spot or spread in a wider pattern
- Attacks that become more frequent and intense over time

Treatment

As with TMJ disorder, the treatment of the underlying cause will vary. If the symptoms are due to a structural abnormality (such as a tumour), treating the underlying Chinese medicine pattern may provide some relief, but the pain will most likely reoccur unless the structural issue is addressed. There are several TCM patterns that typically present in patients with trigeminal neuralgia. These are presented below along with suggested primary body points used in treatment:

- Exterior invasion of pathogenic wind-cold: Fengchi GB-20
- Liver and Stomach fire: Taichong LIV-3, Neiting ST-44
- Yin deficiency with empty fire rising: Zhaohai KID-6, Sanyinjiao SP-6

Acupuncture points

Distal

- Hegu L.I.-4 –command point for the face/jaw
- Zusanli ST-36

Scalp

- Sensory lower two fifths

Motor

- Due to the level of sensitivity and pain motor points are not utilised.

Submuscular

- Due to the level of sensitivity and pain submuscular needling is not utilised.

Points according to location of pain

- For pain in the supraorbital region:
Local: Taiyang (M-HN-9), Yangbai GB-14, Zanzhu BL-2, Yintang (M-HN-3)
Distal: Waiguan SJ-5, Hegu L.I.-4
- For pain in the maxillary region:
Local: Sibai ST-2, Quanliao SI-18, Yingxiang L.I.-20
Distal: Hegu L.I.-4
- For pain in the mandibular region:
Local: Jiache ST-6, Xiaguan ST-7, Jiachengjiang M-HN-18
Distal: Hegu L.I.-4

NB: For facial points use 0.14 or 0.16 gauge needles.

Facial cupping

In most patients with trigeminal neuralgia allodynia is present, making facial cupping contraindicated due to the pain involved when touching the skin. This can be ascertained through questioning and light palpation. If the patient's condition is such that it will allow for facial cupping, the treatment is recommended in order to increase blood flow to the facial nerves and muscles. If time allows, bilateral gua sha of the temporalis muscle with jade or other stone gua sha tools can provide enormous relief to tense temporalis muscles (application of oil may be necessary).

Bell's palsy

Bell's palsy is the most common cause of facial paralysis. It generally affects only one side of the face, but in rare cases it can affect both sides. The paralysis is typically temporary, but can also be permanent. Bell's palsy can affect eye blinking and closing, facial expressions such as smiling and frowning, the tear glands, salivary glands and the muscles controlling the small bone in the middle of the ear (stapes). As the facial nerve transmits taste sensations from the tongue, taste can also be affected.

Aetiology

The paralysis results from damage or trauma to seventh cranial nerve. Most often the symptoms, which usually begin suddenly and reach their peak within 48 hours, lead to significant facial distortion. In conventional medicine terms a viral infection such as viral meningitis or the common cold sore virus — herpes simplex — is believed to be causative.¹⁵ From a TCM perspective the following patterns are likely to be involved:^{16, 17, 18}

- Blood stasis - typically Liver blood stasis
- Wind invasion - either wind-cold or wind-heat
- Spleen qi deficiency

Symptoms

- Symptoms vary from person to person and range in severity from mild weakness to total paralysis, and may include:^{16, 19}
- Twitching, weakness or paralysis on one or both sides of the face
- Drooping of the eyelid and corner of the mouth
- Drooling
- Dryness of the eye or mouth
- Impairment of taste
- Excessive tearing in one eye
- Pain or discomfort around the jaw and behind the ear
- Ringing in one or both ears
- Headache
- Hypersensitivity to sound on the affected side
- Impaired speech
- Dizziness
- Difficulty eating or drinking

Treatment

After the pattern has been determined, body points can be used to address the underlying condition. The following points are suggested according to pattern:²⁰

- Blood stasis: Taichong LIV-3, Yanglingquan GB-34, Geshe BL-17, Ganshu BL-18, Xuehai SP-10, Sanyinjiao SP-6
- Wind invasion
 - Wind-cold: Lieque LU-7, Fengmen BL-12, Fengfu DU-16 (disperse)
 - Wind-heat: Hegu L.I.-4, Shaoshang LU-11, Dazhui DU-14, Fengfu DU-16, Fengmen BL-12, Fengchi GB-20 (disperse)
- Spleen qi deficiency: Zhongwan REN-12, Zusanli ST-36, Taibai SP-3, Sanyinjiao SP-6

Acupuncture points

Distal

- Hegu L.I.-4
- Zusanli ST-36

Scalp

- Motor lower two fifths
- Sensory lower two fifths (if needed for pain)

Motor

The choice of motor points is based on the presenting neuropathy.^{20, 21}

- Difficulty closing eye (orbicularis oculi affected)
 - motor point in Qiuhou (M-HN-8) and halfway between Sizhukong SJ-23 and Tongziliao GB-1
- Cannot raise eyebrow (frontalis affected) – Yangbai GB-14
- Cannot smile: several motor points involved, depending on angle of affliction. If zygomaticus major is affected use Xiaohai SI-18, or zygomaticus minor motor point between Sibai ST-2 & Juliao ST-3, or risorius motor point lateral to ST-4
- Have patient purse lips and blow out, look for crookedness in the mouth: if orbicularis oris is affected they will be unable to purse lips - use Heliao L.I.-19 and just lateral to Chengqiang REN-24^{3,5}

Submuscular

Procerus, corrugator, frontalis

Local

- For eye: Zanzhu BL-2, Yangbai GB-14, Tongziliao GB-1, Sibai ST-2
- For cheeks: Ju Liao ST-3, Xiao Hai SI-18, Ying Xiang L.I.-20
- For mouth: Xiaguan ST-7 towards Dicang ST-4, and Dicang ST-4 towards Xiaguan ST-7
- Renzhong DU-26

Facial cupping

Facial cupping can be an extremely effective tool when treating Bell's palsy. Special consideration should be paid to Wangu GB-12, Yifeng SJ-17 and all the yang channels on the face.

Summary

Using a multifaceted approach and combining different modalities and techniques when treating neuromuscular facial conditions increases both the overall effectiveness of treatment and the rate at which patients see results. Knowing which muscle groups are affected and understanding the underlying patterns involved in the condition are of utmost importance when planning a treatment of this type. Ideally patients should be seen at least twice a week until their symptoms abate, and in the case of Bell's palsy, the sooner the patient is seen after onset of the disease, the greater the likelihood of success.

Michelle Gellis is a licensed, board-certified acupuncturist. She is an adjunct faculty member and clinic supervisor at the Maryland University of Integrative Health in Laurel, Maryland. Michelle also teaches traditional acupuncture facial rejuvenation, facial cupping and facial gua sha classes, as well as classes on treating neuromuscular facial conditions. She may be reached at www.gellisacupuncture.com or email seaofchi@aol.com.

Endnotes

- Hao, J. & Hao, L. (2012). "Review of Clinical Applications of Scalp Acupuncture for Paralysis: An Excerpt From Chinese Scalp Acupuncture", *Global Advances in Health and Medicine*, 1(1), 102-121
- Hao, J., & Hao, L. (2011). *Chinese Scalp Acupuncture*. Blue Poppy Press: Boulder
- Bennet, A., (1882). *A Practical Treatise on Electro-diagnosis in Diseases of the Nervous System*. J.H. Vail & Company: New York
- Gunn, C.C., Milbrandt, W.E., Little, A.S. & Mason, K.E. (2002). "Dry-Needling of Muscle Motor Points for Chronic Low-Back Pain: a randomized clinical trial with long-term follow-up" *Spine*, 5, 279-291
- Callison, M., (2007). *Motor Point Index: An Acupuncturist's Guide to Locating and Treating Motor Points*. AcuSport Seminar Series: San Diego
- Liu, Y.K., Varela, M. & Oswald, R., (1975). "The correspondence between some motor points and acupuncture loci", *American Journal of Chinese Medicine*, 3, 347-358.
- Hong, C.Z. (1994). "Lidocaine Injection Versus Dry Needling to Myofascial Trigger Point", *American Journal of Physical Medicine & Rehabilitation*, 73, 256-263.
- Lomo, T. (1976) "The role of activity in the control of membrane and contractile properties of skeletal muscle" in Thesleff, S., (ed.). *Motor Innervation of Muscle*. Academic Press: London
- Walther, K.M. & Tichaloff, M. (1971). *Motor points. Electrodiagnosis and electromyography*. Licht, S., (ed.), Third Edition. Waverly Press: Baltimore, Chapter 6, p 153-170
- Lombardi, A.J. (2015). "Functional motor point acupuncture and motor inhibition", *Chiropractic Economics*, available at <<http://www.chiroeco.com/functional-motor-point-acupuncture-and-motor-inhibition/32238/>> [Accessed 27/12/2015]
- Gellis, M. (2011) "An ancient art for ageless skin", *Acupuncture Today*, 12(12) available at <http://www.acupuncturetoday.com> [Accessed 27/12/2015]
- To avoid clogging the pores of the skin.

- 13 Bhimji, S.S. (2015). "Temporomandibular Joint (TMJ) Syndrome (Temporomandibular Joint Disorder)", available at <http://www.emedicinehealth.com/temporomandibular_joint_tmj_syndrome/article_em.htm> [Accessed 27/12/2015]
- 14 Although it is beyond the scope of this article to fully detail the treatment of bi-syndrome, it is typically differentiated into patterns of wind, cold, damp and heat bi.
- 15 National Institutes of Health (2015). "Bell's palsy", Office of Communications and Public Liaison, National Institute of Neurological Disorders and Stroke, National Institutes of Health, Bethesda, MD, available at <http://www.ninds.nih.gov/disorders/bells/detail_bells.htm> [Accessed 15/12/2015]
- 16 Yin Yang House (2015). "Liver Meridian Disharmonies - TCM Theory" available at <https://theory.yinyanghouse.com/theory/chinese/liver_meridian_disharmonies#excess-lvbloodstag> [Accessed 27/12/2015]
- 17 Maciocia, G. (2005). *Foundations of Chinese Medicine: A Comprehensive Text for Acupuncturists and Herbalists*. 2nd edition, Elsevier Science Health Science division.
- 18 Kaptchuk, T.J., (2000). *The Web That Has No Weaver*. 2nd edition, McGraw-Hill: New York
- 19 Mayo Clinic (2015). "Diseases and Conditions Trigeminal neuralgia", available at <<http://www.mayoclinic.org/diseases-conditions/trigeminal-neuralgia/basics/symptoms/CON-20043802>> [Accessed 23/12/2015]
- 20 Sreeraj, S. R. (2015). "Electrical Stimulation - Motor Points and Application", available at <<http://www.slideshare.net/sreerajsr/electrical-stimulation-motor-points-and-application%20>> [Accessed 27/12/2015]
- 21 Yin Yang House (2015). "Acupuncture for Bell's Palsy - Treatment Protocols", available at <https://theory.yinyanghouse.com/treatments/acupuncture_for_bells_palsy> [Accessed 27/12/2015]