Blood Stasis in the Brain: An Integrative Approach to the Treatment of Stroke

Abstract

Stroke is highly prevalent and can be expected to increase along with life expectancy and the rate of metabolic syndrome. Acupuncture, with its associated techniques and the system-oriented thinking of Chinese medicine, can be of use during all stages of the disorder: acute onset, recovery, rehabilitation, chronic care and secondary prevention. This brief introduction presents a seven-step algorithm for post-stroke assessment and treatment planning, along with key points for differential diagnosis and treatment. The emphasis is on using historical Chinese medicine concepts, together with biomedical pathology as it is currently understood, to apply techniques that are familiar or easily grasped by most acupuncturists.

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Introduction

One of the most interesting things about using acupuncture in the treatment of stroke, which I have been doing for about 13 years now, is the extraordinary way the theory has evolved over the last two millennia. Our models of aetiology and treatment have ranged from external wind-stroke to Liver yang upwardly attacking, with a left turn in the 20th Century to scalp acupuncture that addresses functional locations in the brain. Today, biomedical imaging techniques can provide detailed information about the location and effects of blood clots and spilled blood in the brain, while contemporary Chinese approaches incorporate clearing blood stasis and opening misted orifices, as well as also taking lesion location into account.

In my work practising, teaching and researching acupuncture in a hospital that provides acute and subacute post-stroke care, all of these models are potentially useful as ways to understand what is happening in a given patient's body at a particular time. Below I discuss the main events of a stroke, clinically speaking, along with traditional and contemporary interpretations of the event, and a few thoughts on how the combination can be applied in the acupuncture clinic. I proceed more or less chronologically, from acute onset through recovery, rehabilitation, chronic care and secondary prevention (which is very important - 26 per cent of primary stroke patients will suffer a second event within five years[1]). It is a huge topic so much will necessarily be missed out or compressed, but I hope to convey how useful this work is and how much of it uses diagnostic and treatment skills most acupuncture practitioners already use on a daily basis.

My purpose for this article is to encourage acupuncturists to deploy their skills in helping patients and/or loved ones who have suffered a stroke. Stroke is a highly prevalent disease, the societal burden of which can be expected to increase along with improvements in stroke survival rate,[2] as well as increases in life expectancy and the prevalence of metabolic syndrome. The work is not always easy – it involves a lot of clearing phlegm, punctuated by sunburst moments small and large, and the occasional heartbreak of a refractory case or a sudden turn for the worse. But cleaning-up work can be very satisfying – and with loved ones we are along for the ride anyway. For practitioners whose clinics are easily accessed by car and/or wheelchair, it is important to know that treatment is most potent in the first few months post-stroke, but can still be useful years or even decades after the event.[3]

Qi rushing up

One of the most durable clinical features of stroke across Chinese medical history is the description of 'qi rushing up', dating back at least to the *Nei Jing* (Inner Classic), chapter 62: 'If the Qi flow can be reversed, the patient lives, if not, s/he dies.'[4] Without attempting to 'explain' traditional clinical findings, it should be noted that the two main types of stroke (ischaemic and haemorrhagic, or clogged and burst brain arteries respectively) are both characterised by elevated intracranial blood pressure. Moreover, the two conditions are differentiated by (amongst other things) the degree, mechanism and results of this increase.

In ischaemic stroke, although the mechanism is not well understood, systemic blood pressure usually increases after stroke, and there may be

some physiological value to the rise, which often resolves spontaneously.[5] Where an artery is clogged and the downstream tissues are suffering from lack of oxygen, increased pressure may push blood through alternate routes (provided by the Circle of Willis). Increased pressure may even in some cases dislodge the clot, though in other cases it results in a burst, or 'haemorrhagic transformation' – one of the more spectacular illustrations I know of the Chinese medical principle that blood stasis can lead to bleeding.

In haemorrhagic stroke by contrast, the systemic rise in blood pressure can be greater, does not spontaneously resolve and appears to worsen rather than ameliorate the condition.[6] Additionally, the systemic rise is complicated by a local rise of pressure in the head, since blood is entering the inflexible skull and not leaving. If too much pressure builds up in the cranium, then fresh blood cannot enter, the brainstem is compressed against the base of the skull and the patient will die. This mechanism often kills traumatic brain injury patients such as Natasha Richardson.[7] Trepanning was undertaken as early as 6500 BCE[8] to relieve intracranial pressure in this situation, and cutting the skull is still the main therapy to relieve pressure.

"Within 10 days of a stroke, I always take it as a primary treatment principle to 'raise the clear and descend the turbid'."

Needless to say, acupuncture is not the first consultation called for in these urgent cases. The main reason for an acupuncturist to consider ischaemic versus haemorrhagic stroke in the acute onset period would be in the unlikely event that an ambulance should be slow in coming after a stroke has occurred in the home or clinic. Anybody speaking, behaving or feeling poorly can be quickly assessed for stroke using the acronym FAST.[9] If the situation changes rapidly and the patient loses consciousness or reports a 'worst-ever' headache, then haemorrhagic stroke should be suspected. In this case I would consider acupressure at Jianjing GB-21 (with thumbs directed towards Yongquan KID-1) or nipping the Shixuan (M-UE-1) fingertip points with a fingernail, while monitoring respiration and calling urgently for medical transport. In the absence of a terrible headache suggesting elevated intracranial pressure, it is not possible to make a diagnosis based on clinical signs alone. In that instance I would not intervene other than to keep the patient safe and inquire as to what they are experiencing, so as to be able to report quickly to medical personnel.

Raising the clear, descending the turbid

Ischaemic strokes, which constitute some 87 per cent of strokes in the West,[10] happen over the course of seven to ten days. During the initial injury, an artery becomes clogged and an 'ischaemic core' of cells immediately downstream from the clog lose their oxygen supply and die within eight minutes. From that point forward, an additional two million cells per minute will continue to die off – those whose oxygenation is sustained only partially by other arteries. These oxygen-deprived cells throw off lactic acid, glutamate and other metabolic waste at a high rate as they struggle and eventually die, creating inflammation and toxic oedema that further challenges the struggling cells around them.

Into this bleak scenario, enter acupuncture. One of the strongest threads of acupuncture research on stroke is a body of mechanisms research (much of it conducted on rats[11] and some on humans[12]) suggesting that strong stimulation of scalp points (usually electro-acupuncture at Baihui DU-20) increases intracranial circulation which, although deadly in haemorrhagic stroke, is beneficial in ischaemic stroke as it brings oxygen to and clears metabolic waste from the struggling cells. It also increases subsequent 'angiogenesis' - the growth of new blood vessels to supply the injured area.[13]

Clinically speaking, within 10 days of a stroke, I always take it as a primary treatment principle to 'raise the clear and descend the turbid'. I typically do this using elements of Shi Xue-min's 'xing nao kai qiao' or 'activate the brain, open the orifices' strategy,[14] with electrical or manual stimulation at Baihui DU-20 and Shenting DU-24, and careful in-and-out needling at Fengfu DU-16 with a one inch needle. The needle should not be manipulated vigorously, but at Fengfu DU-16 it is possible to get a strong deqi sensation through careful listening and minimal rotation – a few degrees in each direction, once or twice. Needling Renzhong DU-26 is also a cornerstone of Dr. Shi's approach, with in-and-out 'pecking' technique (lifting and thrusting without rotation, quite deep but not touching the bone) until the eyes water. I use this whenever possible and often see a considerable increase in awareness, but there is also a considerable risk of frightening or alienating the patient, so caution should be used. For haemorrhagic stroke, some advocate avoiding needles in the head altogether, for fear of moving or raising qi and restarting bleeding. For this reason I exercise caution, communicating closely with the patient's doctors to make sure the condition is stable, and needling lightly. However, many haemorrhagic strokes are rooted in deficiency – the Spleen not managing the blood – and actively benefit from an increase of qi once the acute phase has passed and pressure has normalised. All post-acute haemorrhagic stroke patients have pooled blood in the area that now needs to be cleared. I therefore consider that most stroke patients can benefit from gentle needling to descend turbidity and raise clear yang, once they are medically stable and at least 48 hours after the event. This

often coincides with when they are moved from intensive care to ordinary hospital beds. For mild and moderately severe ischaemic stroke patients, this is usually about two days; it is usually it is longer for haemorrhagic stroke patients.

The other main elements of the 'xing nao kai qiao' early-stage treatment are Sanyinjiao SP-6 and Neiguan P-6. These are needled before the head points described above, and I often add Hegu L.I.-4 to root the qi and descend turbidity, and/or Zusanli ST-36 in cases of ischaemic stroke with deficiency.

I encourage treating patients and loved ones as soon as possible post-stroke, though not of course needling without their doctors' permission. If needles are not an option, consider acupressure - by which I mean guiding or activating qi through careful palpation of the channel. Acupoints are not elevator buttons; they do not have functions that happen automatically when we press them. Instead, I consider that effective acupressure involves four steps: 1. Lightly brushing the skin along the channel with the thumb or other finger to find the point energetically, often a hollow or sticky feeling under the finger-pad; 2. Moving in more deeply to find the centre of the channel, much as one finds the center of the pulse; 3. Connecting with one's own dantian, focusing on the intended movement (or nourishment, stabilisation, etc.), and observing with the mind's eye as that movement transacts directly in the channels; 4. Concluding and withdrawing contact slowly and deliberately. The cycle should take between three and 10 minutes per point, depending on how many points are to be treated.

Restarting the qi machine

A common clinical feature of stroke is disruption of bowel function. Well over half of stroke patients present with constipation, while some 20 per cent present with faecal incontinence, which can be primary or secondary to medication for constipation. While discussions of this high prevalence can be found in the biomedical literature as a logistical consideration in post-stroke care, its experiential and health impacts are rarely given the emphasis we practitioners of Chinese medicine might like. Post-stroke constipation is epic by any ordinary standard: for my PhD study[15] our team had to devise a new severity index to measure disruption of bowel function, as conventional ones did not capture the magnitude of the problem. Nearly half of the patients had no bowel movements at all during a five-day period. For practitioners of Chinese medicine this constitutes a medical emergency, a disruption of the qi ji or qi mechanism, in which food and fluids are not being transformed and transported so that the patient is lethargic and healing cannot take place. This disruption is usually signalled by the exceptionally thick tongue coat that is typical post stroke. Twentieth century master Jiao Shu-de, who was well known for his treatment of stroke, reported learning by experience that both the tongue coat and the hemiparesis recover when 'the bowel qi is free and normalized, the center burner can regain its function of conducting, moving and transforming, and the source of qi and blood engenderment and transformation is sufficient'.[16] It is worth noting, though, his caution not to move the bowels excessively or indiscriminately, as the local Yangming repletion is in most cases secondary to systemic vacuity.

> *Post-stroke constipation is epic by any ordinary standard...*

As an acupuncturist unable to use herbs in the hospital, I have spent long hours pondering the clinical solution to this particularly knotty qi disruption. My toolkit of diagnostic and treatment approaches, ranged from gentle to forceful, looks like this:

- Round rubbing (patient lying supine): Using two hands, one on top of the other and with quite firm pressure, the practitioner, patient or family member follows the course of the large intestine as though it were a large clock drawn on the abdomen, pausing for a deep breath by the patient at the lower abdomen (six o'clock). This physically moves the bowels as well as warms the centre to activate transformation and transportation. For patients with upper extremity weakness or paralysis, guiding the weak hand under the strong also makes this into a therapeutic combination of tactile stimulation and purposeful movement.
- Warming mingmen and dantian: If there are signs of cold, or if there is qi vacuity with an absence of heat, then heating pads, hydrocollator packs, warm compresses or even a loving pair of hands warming the lower abdomen can be extremely helpful in restarting sluggish peristalsis. For this 'warming hands' qigong, it is best for the practitioner to sit facing the side of the patient's bed, with the patient supine (or reclining semi-upright in a hospital bed). The lower hand sits flat and snug under the back at Mingmen DU-4, while the front hand cups the lower abdomen at Guanyuan REN-4. With a calm, focused mind, a straight back and relaxed breathing into one's own dantian, a surprising amount of heat can be generated between the practitioner's palms. At home, moxa may also be used on Mingmen DU-4, Pishu BL-20, Shenshu BL-23, Guanyuan REN-4, Qihai REN-6, Zhongwan REN-12, Tianshu ST-25 and Daheng SP-15. Treating constipation with this warming approach can also be very useful in other neurological conditions such as spinal cord injury and multiple sclerosis. Constipation is often mistreated as excess heat, likely because any stool remaining too long

in the large intestine will become dry and malodorous; practitioners who focus on moving qi and clearing heat will miss the primary diagnoses of qi insufficiency and/or cold.
- Auricular acupuncture and/or acupressure: Constipation, Large Intestine, Sympathetic, Point Zero and Liver. Note that metal or magnetic beads or tacks should never be retained post treatment on stroke patients, as a stat MRI is always a possibility, which would result in disaster.
- Acupuncture treatment by pattern (moving qi stagnation, transforming phlegm, supplementing yin/blood as necessary) plus the 'clock' points (Guanyuan REN-4/Qihai REN-6/Zhongwan REN-12, and Tianshu ST-25 or Daheng SP-15). Caution must be used when needling Daheng SP-15, as it lies directly over the large intestine, which may easily be perforated if the abdomen is distended and taut.
- Electrical stimulation (two Hertz, amplitude as tolerated) with the electrodes attached from Tianshu ST-25 to Tianshu ST-25 and from Shuidao ST-28 to Shuidao ST-28. This method may alarm practitioners who may be concerned about connecting across the spinal cord with electricity. In this technique, the midline is crossed well in front of the spinal cord (electricity is lazy and will not wander backwards). However some practitioners may prefer to connect Tianshu ST-25 to Shuidao ST-28 unilaterally, which is also fine. Daheng SP-15 and Fujie SP-14 may also be used, if there is sufficient loose adipose tissue into which to needle.

Other disruptions of the qi mechanism are also common, and it is also often important to address the following:

- Urinary retention and faecal incontinence may both be treated through electrical stimulation (two Hertz) from Fuliu KID-7 to Fuliu KID-7 (again, this crosses the midline, but well below the spinal cord; cautious practitioners may prefer connecting Fuliu KID-7 to Yingu KID-10 on the same side). Mike Cummings mentions this treatment in a recent blog: a study of it was unusually well accepted by 'skeptics' because it was presented as stimulation of the sacral nerve rather than acupuncture.[17]
- Both urinary retention and faecal incontinence may also be addressed by the warming strategy described above. As noted above, there should be either cold signs or vacuity signs with an absence of heat.

All of these signs of disruption of the qi mechanism may persist years or even decades post-stroke, and yet are treatable in our clinics. It is worth noting that constipation is an important risk factor for stroke: the biomedical understanding of the risk is in terms of straining on the toilet, which raises intracranial blood pressure. Chinese medicine aetiologies are more varied, including stagnation of qi and failure to descend (which may engender or complicate insomnia, another key risk factor for another stroke). Given the high incidence of recurrence, prevention is arguably the most important treatment principle post-stroke.

Constitutional factors

Biomedicine draws a distinction between embolic strokes, which involve local obstruction caused by a floating piece of debris formed outside the brain, and thrombotic strokes where there is systemic buildup of atherosclerotic plaque with local proliferation at the stroke site causing an acute clog. In general (and with some overlap), prognosis for recovery is better where the problem is only local. It may be edifying for acupuncturists to note that strokes caused by an embolus formed in the heart are 23 per cent more likely to cause aphasia than other embolic strokes, for no reason that has yet been experimentally elucidated.[18] Broadly speaking, the local/systemic distinction is quite clear through an East Asian medical diagnostic lens. Systemic stagnation of phlegm and/or blood is plainly apparent in many stroke cases. Its severity, and the degree to which it is complicated by concurrent qi vacuity, are strong predictors of improvement in my experience, with or without treatment. Here are the main constitutional types as they appear to me at this point:

Systemic phlegm-damp

This is the easiest pattern to recognise. These patients appear waterlogged, and are usually heavy in both form and bearing. One feels instinctively that no wind or heat was needed to carry the phlegm up to their misted orifices – it just rode the rising tide of damp. The tongue has a thick, slimy white coat and the pulse has a slippery quality, but may not be forceful, as qi or yang vacuity often underlies the damp.

- It is for these patients (and these alone, in my opinion) that Fenglong ST-40 and Yinlingquan SP-9 should be used together. If there is no damp (ie. water untransformed by yang that is palpable in the tissues or audible in the digestive system) then Yinlingquan SP-9 can be counterproductive, as draining water from fluids already thickened can further thicken them (when food is left on a dirty plate, fluid and movement are needed before drying is appropriate). I use Fenglong ST-40 and Yinlingquan SP-9 together, for patients where phlegm coexists with signs of standing water. For these patients, the atherosclerotic plaque can be thought of as 'slippery' and possible to 'wash off' – if only enough movement can be introduced. Introducing movement, however, is difficult to accomplish if the stroke is severe, or when obesity and premorbid deconditioning

complicate rehabilitative activities. When patients with severe lower extremity weakness are also overweight, it is a challenge to engage the limb without overloading it. Other patients are so deconditioned that they cannot sit upright without losing consciousness, so rehabilitation begins with lying on a 'tilt board'. Systemic phlegm-damp patients often have full-blown diabetes, as well as congestive heart failure or other cardiac symptoms; their blood pressure may be high or low.

- In addition to Fenglong ST-40 and Yinlingquan SP-9, I generally treat these patients with the same warming and transforming therapies described above, as well as activating points based on constitution, which may include Taibai SP-3, Zusanli ST-36, Qihai REN-6 and Zhongwan REN-12 to supplement qi (I keep treatments small and focused during the recovery phase - usually 8 to 12 needles), and/or Lieque LU-7 and Shuifen REN-9 to circulate fluids. I also like to teach the family to warm and activate the Kidney channel by chafing upward with the base of the palm from Yongquan KID-1 to Jiaoxin KID-8, or activate transformation and transportation by chafing downward from Zusanli ST-36 to Fenglong ST-40.

Systemic phlegm-heat

Heat may or may not be plainly apparent in these patients. However as noted above, in the absence of standing water, phlegm represents a pathological amalgam of yin substance and yang evaporative activity (whether distinct heat signs are seen or just sticky phlegm). While most acute post-stroke tongue coats are alarming, those of patients with phlegm-heat are the most dramatic: they have the sliminess of the cold phlegm coating, but dryness gives the coat extra structural integrity that allows for thickness, and heat gives vivid hues of yellow, orange or brown unmatched in any other population I have seen. The pulse is simultaneously slippery and wiry, reminding us that congested fluids also obstruct the qi. I also associate a slippery/wiry pulse with atherosclerosis due to hypertension, in which the atherosclerosis is not merely a deposit of untransformed nutrients (as in the patients above) but the vessels' attempt at self-protection from the pounding by blood cells at high pressure. This is of course a vicious cycle, as coated vessels present more resistance, requiring ever more pressure to adequately oxygenate the tissues. This cycle is a main driver of stroke aetiology, at least in the populations I see. It seems to have a strong relationship with 'metabolic syndrome', the epidemic of belly fat and dysregulation of cholesterol and sugar metabolism that soft-drink and snack manufacturers argue is unrelated to consumption of sweets.[19] In addition to the slippery-wiry pulse, a common sign associated with this type of stroke is what my colleagues and I call the 'inner tube tongue', which has puffed-up edges and a sunken center. If I saw both in a patient or family member I would urgently work up stroke risk factors and advocate exercise and dietary modification at the very least (I speak more about prevention towards the end of this piece).

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- Treatment of this pattern requires fluid circulation above all. Movement and hydration are what normally circulate our fluids – and both are in terribly short supply post-stroke. Patients are bedridden or sedentary, and often on restricted or thickened liquids due to impaired swallowing. I encourage as much hydration as possible, and nourish yin with Sanyinjiao SP-6 and/or Zhaohai KID-6, and consider tuina as a key treatment method, including the abdominal round rubbing and Kidney and Stomach channel chafing described above. I also favour dynamic rocking and swinging techniques that send wave-like movements through the channels and blood vessels.
- In terms of acupuncture, when I identify a treatment principle of 'circulate fluids' I invariably use the technique of yin/yang, left/right and upper/lower channel balancing identified with (if not entirely originated by) the late Richard Tan.[20] A basic 'circulate fluids' treatment might be as shown in Figure 1, with Yangming and Taiyin points forming the core of the treatment, and Shaoyang/Jueyin points added to further move qi and regulate fluids. I select points based on symptoms (e.g. Zhigou SJ-6 if there is constipation) as well as relative insufficiency or stagnation of qi, again totalling between eight (for weaker patients) and 12 points (for patients with more stagnation).
- I find this approach extremely useful in stroke prevention as well as treatment, although I consider it contraindicated if there is dizziness and profound vacuity (as it is rather moving). It is best used when seeing a patient more than once a week, in which case the 'polarity' of the treatment can be switched so that for each extremity yin and yang channels are alternated.

	Right Side	Left Side
Upper Extremity	Yangming points: • Hegu L.I.-4 • Shousanli L.I.-10 or Quchi L.I.-11 Additional/ Alternate points: • Waiguan SJ-5 or Zhigou SJ-6	Taiyin points: • Taiyuan LU-9, Lieque • LU-7 or Chize LU- Additional/ Alternate points: • Jianshi P-5 or Neiguan P-6
Lower Extremity	Yangming points: • Zusanli ST-36 • Fenglong ST-40 Additional points: • Yanglingquan GB-34	Taiyin points: • Sanyinjiao SP-6 • Taibai SP-3 or Yinlingquan SP-9 or Xuehai SP-10 Additional/ Alternate points: • Taichong LIV-3

Figure 1: An example of a basic 'circulate fluids' strategy

Systemic blood stasis

This is an important pattern in stroke, although it complicates the other two more often than it occurs on its own. Systemic blood stasis is diagnosed in stroke patients the same as in any others: rough pulse, dusky tongue, dark/distended sublingual veins and spider veins or macules (particularly on the lower extremities, which may be red or dusky around the ankles). It is the nature of blood stasis to complicate local or systemic stagnation of qi and/or fluids. Therefore, systemic signs tend to appear in combination with the phlegm patterns described above, on a spectrum from more phlegm to more blood stasis, with most patients presenting with both but some showing much more signs of one than the other. In the absence of significant amounts of phlegm, systemic blood stasis can arise in relation to smoking, cardiovascular deconditioning and/or organic disease (e.g. hepatitis, congenital heart disease).

Another important aetiology has been described very well by Sharon Weizenbaum as 'poor quality blood'.[21] If we think of blood as the vehicle for carrying qi to the tissues, in which the bright red colour of oxygenated haemoglobin shows us that yin flesh has been successfully 'impregnated' with the yang capacity for action, then a dusky tongue is a sign that the relationship of yin and yang has been damaged. Swollen ankles or other damp signs constitute yin water untransformed by yang, while hypertension, insomnia and tinnitus are signs that yang is 'leaking' upwards and outwards. Water signs without any sign of yang rising suggest insufficiency of yang complicated by blood stasis - essentially an early subclinical version of congestive heart failure. With yang rising signs, one should look directly to the quality of the blood, which is failing to hold yin and yang together. Its quality may be degraded due to any combination of dryness, cold, heat, stagnation and inactivity. All of these factors contribute to the pattern of blood 'deficiency'. For the populations I see, inactivity and longstanding bi syndrome are important causes of these patterns, along with smoking, metabolic syndrome and chronic stress, inflammation and dehydration.

- Herbally, based on Sharon's work I now think more often of carrying yang back into the blood with formulas such as *Dang Gui Si Ni Tang* (Tangkuei Decoction for Frigid Extremities) and *Wen Jing Tang* (Flow-Warming Decoction), rather than just moving or supplementing. For smokers, I find Dang Gui (Angelicae sinensis Radix) and Mu Dan Pi (Moutan Cortex) key herbs for unpacking vacuity and stasis.
- Using acupuncture, I treat systemic blood stasis using the channel balancing approach described above. A basic 'circulate blood and fluids' treatment might be: Right Hegu L.I.-4, Waiguan SJ-5 and/or Zhigou SJ-6 balanced with Taichong LIV-3, Ququan LIV-8 and Sanyinjiao SP-6 or Xuehai SP-10, and left Taiyuan LU-9, Jianshi P-5 or Neiguan P-6, balanced with Yanglingquan GB-34 and Xuanzhong GB-39, Qiuxu GB-40 and/or Zulinqi GB-41. Again, selection is based on symptoms as well as the predominance of phlegm or blood stasis, stagnation or vacuity. The needle count is often slightly higher (usually 10 to 12 points) given that blood stasis is even harder to transform than phlegm. If the patient is weak, I will use lighter gauge needles, retain for a shorter period, or use a concurrent supplementing method (warm packs on the centre if there is cold, or supplementing Guanyuan REN-4 / Qihai REN-6). Again, severe dizziness or debility of qi are contraindications of such treatment.

Treatment planning for recovery and rehabilitation

In biomedical care, there is a clear distinction between medical treatment that supports the patient's organic recovery from stroke, and rehabilitation therapy that coaches the patient in regaining functional independence in their 'activities of daily living'. All of the diagnostic and treatment approaches described above belong to 'recovery', which in my opinion should be prioritised until seven to 10 days post stroke, unless the stroke is mild. In the sections to follow, I describe the main goals of functional rehabilitation and how I aim to support with acupuncture treatment. Each patient's deficits will differ, and most will shift considerably over the course of treatment, meaning that treatment goals change accordingly. For all but the most mildly affected patients, there are more deficits requiring rehabilitation therapy than can be addressed in one treatment. For example, the most common type

of stroke (ischaemic stroke of the middle cerebral artery) typically presents with constipation, urinary retention, upper and lower extremity motor deficits (upper worse than lower) and difficulty swallowing. If the stroke was on the left side, there will likely also be aphasia.

The manual developed for my 2015 PhD study is at its core a set of priorities for treatment planning during stroke rehabilitation, along with suggested treatment principles and methods such as those described in the sections above. Below I include these priorities, phrased and ordered as a list of clinical questions. These are the basic questions I ask myself when approaching any stroke patient. They point directly to treatment goals, of which one, two or even three may be accommodated in a single treatment. (This depends largely on the goals, how closely they overlap, and how large or complex I want the treatment to be; in general simpler is better.)

1. Does qi flow to the head need regulation?
2. Is the qi mechanism functioning?
3. Are there constitutional factors that need to be addressed for this patient to heal?
4. Are there problems with speech or swallowing?
   - These deficits are addressed together because they often co-occur, and there is considerable overlap in treatment. They are addressed first because of their enormous impact on the patient's quality of life and ability to recover.
5. Are there problems with balance and trunk stability?
   - These distinct but related capabilities are not affected in all strokes, but if they are, physical therapists work on them before even lower extremity recovery. An unstable patient with leg strength is actually at greater risk of falls than she would be without leg strength.
6. Lower extremity function - can the patient walk?
   - If the terrible choice were to be presented in either/or terms, one would choose leg over arm function so as not to be wheelchair bound. As it happens, leg function returns first in a majority of stroke patients, so it makes sense to start there.
7. Upper extremity function
   - Upper extremity rehabilitation is often complicated by spasticity, which begins to develop approximately a month post stroke in joints that do not move much; it is more easily prevented than treated. Commonly, the most pressing treatment priority for paretic upper limbs is not movement but pain of the shoulder joint, which easily becomes subluxed when rotator cuff function is disrupted by laxity and/or spasticity of its component muscles.

This basic clinical algorithm is appropriate for use at any stage post-stroke. During hospitalisation, treatment should be three times per week or more if possible, though any treatment at all is of use. For outpatient care, three times per week is optimal but two is adequate. It may be a challenge for busy practices to accommodate multiple treatments per week at a price the patient can afford, particularly as stroke patients often take more time in terms of getting in and out of the clinic. However, treatment plans can be made in advance and updated as needed, rather than conducting a full intake at each session. Also, stroke patients are also often available at 'off-peak' times.

Aphasia and dysphagia

These two areas are arguably the most complex in post-stroke care, and will not be adequately covered in a single article. Aphasia itself comprises a broad set of disorders involving reception and processing of language as well as the cognitive ability to produce it, while dysphagia (as well as dysarthria, physical difficulty with the production of speech) results from weakness, spasticity and/or poor coordination of muscles anywhere from the lips, tongue and cheeks to the upper and lower pharynx.

- Dr. Shi Xue-min's 'xing nao qai qiao' approach, described briefly above, can be useful.[22] Dr. Shi teaches a special needle technique – rapid back-and-forth rotation with a light and vibrant touch at Sanyinjiao SP-6 and Neiguan P-6, then 'pecking' at Renzhong DU-26 until the patient's eyes water. For aphasic patients I advocate using one's own preferred method of acquiring and activating qi at Sanyinjiao SP-6 and Neiguan P-6, then adding Zhaohai KID-6 with the intention of opening up the Ren Mai (Conception Vessel) into the throat, and Jianshi P-5 and/or a proximal deep Tongli HE-5 (palpable as a nervy cleft on the heart channel, at about the level of Neiguan P-6). I learned this latter point from Jason Robertson, who said that Wang Ju-yi told him to regard clogged vessels in the brain as clogged luo-connecting vessels of the Heart. One then has the option of needling Renzhong DU-26, though in the first few treatments I usually use gentler options such as Baihui DU-20 and Shenting DU-24, and Lianquan REN-23.
- Jiao's 'Speech 2' area[23] (a three centimetre line running downwards from two to five centimetres below the parietal tubercle) corresponds to Broca's area, and is used for patients who can understand language but have trouble with word finding. 'Speech 3' is the posterior two centimetres of a four centimetre line extending posteriorly from a point just below Shuaigu GB-8, 1.5 centimetres above the auricle; it corresponds to Wernicke's area and is used for patients who have trouble understanding language. I like to thread a 32-gauge one-inch needle into the appropriate area prior to the patient's speech therapy (or practice with family) and leave it in place during the therapy,

stimulating it during breaks. I do not do this for Speech 1, which would involve needling through muscles that will be used during therapy.

- For dysarthria, difficulty swallowing or any speech problem that has not improved with three to five of the above treatments, I strongly advocate a treatment strategy I learned from Shi Xue-min, which I was later amused to find in the *Zhen Jiu Da Cheng* (Great Compendium of Acupuncture and Moxibustion). The points seem to circle and activate the throat and base of the tongue: Fengchi GB-20, Wangu GB-12, Yifeng SJ-17, Jinjin (EX-HN 12) and Yuye (EX-HN 13) and Lianquan REN-23. To treat Jinjin and Yuye, rather than hold the tongue with gauze and needle into its base, I access the same point by needling from outside in. This a simple trick I learned at a rehabilitation center in Guangzhou and I cannot believe I did not think of it sooner – the point is easily palpable as an achy cleft in the base of the tongue. For good measure I add an 'upper Lianquan REN-23' immediately above the hyoid bone into the base of the tongue, it seems to complete the triangle of points with Jinjin and Yuye, and I often feel a surge and shift of qi when needling into it.
- If I had dazzling insights on the relationship between zang-fu patterns and speech and swallowing deficits, I would share them, but with acupuncture to date I have found the most benefit from the more palpatory, channel-based approaches. For dysarthria and dysphagia I ask the SLP (speech-language pathology) therapist which areas are weak, tight or badly coordinated, and palpate distal points of Lung, Heart, Spleen and Kidney channels according to their associated territories (larynx, tongue, lips and cheeks, and throat/base of tongue respectively). When palpating, I look for an empty, blocked or 'sludgy' feeling under the fingers.
- One key piece of advice I have for acupuncturists treating patients with either aphasia or dysarthria that do not respond to the approaches above is that both sometimes respond well to restoring qi flow between the chest and the neck – what might loosely be termed the 'Windows of the Sky area', following Nguyen van Nghi's designation of a set of points (including Futu L.I.-18, Tianyou SJ-16, Tianzhu BL-10, Fengfu DU-16, Tianfu LU-3, Tianchuang SI-16 and Tianrong SI-17) that address qi blockage and counterflow associated with head and neck symptoms. In such cases there is a sludgy dullness of the tissues in this area on palpation, which lightens with proper distal and local treatment. Most often I start with tuina, acupressure and distal needling to open the circulation in the areas of dullness, once identified through careful palpation. Zhaohai KID-6, Taixi KID-3 and Lieque LU-7 are main distal points for the throat and Gongsun SP-4, Neiguan P-6 and Hegu L.I.-4 for the lips and tongue. Other yang channel points are as for neck pain, particularly including Fuyang BL-59 and Kunlun BL-60, Xuanzhong GB-39 and Houxi SI-3. If manual and distal work seems to restore flow and there is functional improvement post-treatment, I continue with that approach. If obstruction and/or symptoms remain, I choose perhaps four of the most obstructed-feeling local points, plus distal and systemic points as needed, for a total of 12 to 20 needles. This is more needles than I usually use for stroke patients, and I therefore use a small gauge needle (36 or 38 rather than 34) with frequent re-stimulation and short retention (10 minutes, even less if the pulse is forceless) so as not to deplete the patient.

Trunk stability

Trunk stability is an important predictor of functional recovery.[24] In severe strokes, it may be badly compromised and physical therapists will need to work with the patient seated before they can safely attempt walking. However, walking is such an important goal for the patient, both functionally and emotionally, that therapists attempt it as soon as possible and core strength deficits remain in many chronic stroke patients.[25]

For trunk stability I generally, look to the Extraordinary Vessels, as well as the yin and yang foot channels, as described below:

- Acutely impaired patients have a saggy, boneless look; imagine the therapeutic benefits of 'pumping up' the Du (Governing), Ren (Conception) and Dai (Girdle) Mai (Vessels) as well as the Spleen channel in these patients. I warm the mingmen and dantian areas, or needle with strong supplementation technique. I also supplement Baihui DU-20 and Taibai SP-3 or Gongsun SP-4, as well as Qiuxu GB-40, Yanglingquan GB-34, Fengshi GB-31 and Daimai GB-26.
- Patients first encountered during the chronic phase may still need the 'pumping up' treatment described above, or they may have regained basic uprightness but with twists or compensatory patterns that require closer diagnosis through functional observation. The exercises detailed in Jensen's article cited above[25] may help to identify patterns of mixed tightness and laxity. Palpate the Spleen channel/psoas in the lower abdomen, and the Liver/ Gall Bladder channel balance in the inner thighs and external obliques. I often find myself balancing these with the type of 'balance method' treatment described above. In this case, however, the points will typically be pairs of channels and/or Extraordinary Vessels, with shu-stream/yuan-source and he-sea points to supplement weak channels, and tight-tender ashi points, xi-cleft points and Extraordinary Vessel opening points to disinhibit tight channels.

In pontine and cerebellar strokes respectively, qi and blood can be directed to the pons area using Fengfu DU-16, and Jiao Shun-fa's scalp balance points can be used for the cerebellum (these are four-centimetre lines extending downwards from the level of Fengfu DU-16, 3.5 centimetres lateral to the midline[26]). These areas can also be targeted using ear seeds[27] at the pons and cerebellum locations specified in Terry Oleson's excellent auriculotherapy text.[28]

Balance

Balance and trunk stability impairments often co-occur, but may be experienced very differently by the patient. Trunk stability is a physical failure of the channels and the flesh to support the body, while balance is a breakdown of perceptual and functional feedback between the patient and the physical world's most compelling rule, gravity. Impaired balance may present as spatial disorientation with severe nausea, or may be secondary to trunk weakness. Strokes of the pons or cerebellum may present with balance and trunk stability as primary impairments. These arise from posterior circulation deficits, and I associate them with deficiency aetiologies and poor outcomes.

- In general I treat both balance and trunk stability deficits by strengthening the Kidney channel, and Du, Ren and Dai Mai, along with other systemic, functional and symptomatic treatments described above and below as appropriate.
- Phlegm and damp are prominent in most (but not all) cases of nausea and dizziness. These may need to be cleared and transformed using Tongli HE-5, Jianli P-5 and Neiguan P-6, as well as the Spleen/Stomach points discussed in the section on phlegm above.
- In patients with balance problems I use bilateral needling exclusively, with a larger number of smaller gauge needles. I also retain them for a full 30 minutes, though carefully checking the pulse to make sure the patient does not become too depleted. This is also the approach I use for sensory problems, based on the modern conceptualisation that orderly bilateral placement of multiple stimuli from acupuncture needling can help the brain to recalibrate itself spatially.
- Shaoyang and Jueyin points are particularly helpful with balance. The Shaoyang constitutes the 'pivot' between yin and yang, and 'dizzy head' is a central feature of Shaoyang disorder in the *Shang Han Lun* (On Cold Damage).[29] Yanglingquan GB-34, Waiguan SJ-5 and Taichong LIV-3 are points commonly used post-stroke, and should particularly be incorporated for patients with balance problems.
- In a particularly gnarly balance problem known as 'pusher syndrome', some 10 per cent of patients feel that they are falling, and reflexively push with the strong leg onto the weak one, which is disastrous from a safety perspective. The main therapy for this is use of mirrors to recalibrate proprioception with visual orientation. I have also found that ear seeds at the Hypothalamus point[30] are very helpful in some cases (posterior hypothalamus function appears compromised in some pusher syndrome patients[31]).

Orderly bilateral placement of multiple stimuli from acupuncture needling can help the brain to recalibrate itself spatially.

Lower extremity function

Lower extremity paresis responds well to acupuncture and tuina therapy. As a general strategy:

- The natural course of recovery proceeds in general from proximal to distal, first flexors then extensors, and the course of treatment will usually take this route as well. You will want to check psoas, hamstrings, quadriceps, then calf muscles and tibialis anterior, then open up qi flow from the trunk through to the first area or two that are weak.
- Start by 'opening up' the leg with in and out needling at key points Huantiao GB-30 and Weizhong BL-40. This a Shi Xue-min technique, and needling should have an active, 'vitalising' spirit (as described above, or seen in Youtube videos[32]) even if the precise skill of his rapid twirling, lifting and thrusting is not reproduced. If working on the hamstrings or calves, retain Huantiao GB-30 and supplement Chengfu BL-36, Yinmen BL-37, Fuyang BL-59 and Shenmai BL-62 (and/or other empty points identified by palpation).
- To activate the psoas, needle proximal to Taibai SP-3 (Kiiko Matsumoto calls this SP-3.2), as well as Xiguan LIV-7, ashi points in the medial thigh and Wushu GB-27 and Weidai GB-28. For the quadriceps, or to strengthen the whole leg, use Biguan ST-31, Zusanli ST-36 and Jiexi ST-41 (in that order, with a strong sense of moving the qi down the channel).
- To recruit a flaccid tibialis anterior, needle Zusanli ST-36 and Xiajuxu ST-39 with 32 or 30 gauge needles, then connect them with electrical stimulation at one Hertz (continuous). If you have placed your needles well (and there is not too much 'sludge' in the channels), the foot will twitch, thus practising the much-needed function of dorsiflexion. Then, using half-inch needles, place one at the top and one at the bottom of the scalp lower extremity motor line (this is the top fifth of the motor line, which lies one centimetre behind Baihui DU-20 and runs to the temple[33]). Connect these two with another lead from the same e-stim unit, turning

up the current so that it is clearly felt, but mild. This simultaneous stimulation seems to re-synchronise the motor area and muscle.

Upper extremity function

Treatment principles for the upper extremity are similar to those for the lower extremity, in that they proceed from proximal to distal. However, in many strokes, the area of damage lies directly on the upper extremity motor area in the brain, meaning that recovery may be slow, incomplete or entirely absent as the damage to that location may be too extensive to repair or work around. As a rule of thumb, if there has been no return of movement at 21 days post-stroke, meaningful functional return is unlikely. However, if the patient can move their fingers at all, then regardless of how much time has passed since the stroke, some meaningful functional return may be possible with acupuncture treatment (this was demonstrated in a seminal study in 1993[34]). Conversely, I have found that even for patients who will not recover functional use of the arm, electro-acupuncture stimulation of the wrist and fingers may lead to some voluntary movement of the fingers which, even if not functional in the sense of allowing 'activities of daily living', has considerable psychological benefit.

- As with the lower extremity, assume that recovery will proceed from proximal to distal and from the flexors to extensors (though in the arm the order sometimes differs). Learn to check: shoulder elevation, protraction/retraction, abduction/adduction, then biceps, triceps, and wrist and finger flexion and extension. Because the arm has a large number of small muscles, I move qi into the limb by identifying empty/stagnant points by palpation along the channels.
- Hegu L.I.-4, Quchi L.I.-11 and Jianyu L.I.-15 are commonly used to open and supplement the limb, and they work well as a core treatment, along with Waiguan SJ-5. I substitute Shousanli L.I.-10 for Quchi L.I.-11 if the patient is qi deficient, and Zhigou SJ-6 for Waiguan SJ-5 if she is constipated. Also make sure to palpate the Lung, Small Intestine and Sanjiao channels in the upper arm, and the Pericardium and Sanjiao channels in the forearm.
- Shi Xue-min's opening points for the arm are Jiquan HE-1 and Chize LU-5. Note that Jiquan HE-1 can be needled from the front (near the extra point Jianqian M-UE-48) rather than through the axilla (check an anatomy book for the location of the brachial artery before trying this).
- The second fifth of the scalp motor line relates to the shoulder, elbow and forearm; the third fifth is entirely taken up by the hand. Either or both can be used alongside electrical stimulation of points on the arm, to focus on wrist extension, finger movement or general activation of the limb. Using 30- or 32-gauge needles, find a wrist extensor motor point around Sidu SJ-9 and needle perpendicularly into it. Then needle Hegu L.I.-4 and Baxie (M-UE-22). Place needles at the top and bottom of the upper extremity motor line (or the part you want to use) and stimulate those at one Hertz at a comfortable intensity. Then test the quality of your motor point placement by connecting the lead at Sidu SJ-9 to the point between the third and fourth metacarpals. This should ideally extend the wrist, but often it merely extends the index finger. If wrist extension is a priority, you may want to instead find a point above Sidu SJ-9. Run the e-stim at a comfortable level for five minutes each on Hegu L.I.-4 and the Baxie (M-UE-22) points, connecting each to Sidu SJ-9 in turn.
- A common treatment priority for upper extremity paresis patients is pain due to laxity and/or spasticity of one or more rotator cuff muscles. This needs to be assessed by careful palpation, with release of tight areas and supplementation (ideally with needle moxa or 'warm needle') of lax areas.

Post-stroke spasticity

Spasticity begins to set in approximately one month post-stroke, and is more easily prevented (through massage, mobilisation and acupuncture) than treated. When chronic stroke patients are already in a spastic state, careful consideration is required as to whether final goals are realistic, particularly if patients are wheelchair-bound. With multiple treatments per week progress is possible, but usually only if also supported by family members doing tuina or other form of massage.

- Increasingly, spasticity is being recognised as a stiffening of the fascia rather than just the muscles as was previously thought.[35] Acupuncture appears to modulate fascial tone through extended stretching of tissues, as they remain wrapped around the needle during retention (which increases the total length of the fibre beyond what ordinary physical stretching could do[36]). For treating spasticity I therefore recommend a local/distal/adjacent strategy. First I open the limb with shoulder and/or elbow points on the affected channels as appropriate (usually Jianyu L.I.-15/Quchi L.I.-11, Yunmen LU-2/Tianfu LU-3/Chize LU–5, or Quze P-3/Ximen P-4). Next I balance the treatment with constitutionally appropriate lower extremity points on related channels in the lower extremity and/or torso. Finally I needle into tight areas identified by palpation, with long retention and frequent re-stimulation to maintain tissue stretch. The pulse should be checked and if necessary adjunctive supplementing methods used to avoid depletion.

Primary and secondary prevention: stroke risk factors

Without frightening our patients, we should be aware that risk of recurrence has been estimated at three to four per cent per year[37] or twenty-six per cent at the five year mark.[38] To some degree therefore, a primary treatment goal post-stroke is to identify and reduce risk factors for recurrence. The sections on constitution above introduce the main aetiologies of stroke from an East Asian medical perspective, and acupuncturists are well equipped to reduce these factors. Additionally, from a Western perspective, 90 per cent of the risk for stroke is statistically accounted for by the following 10 factors:[39]

- History of high blood pressure*
- Current Smoking*
- Abdominal obesity*
- Diabetes
- Lack of physical activity
- Poor diet*
- More than 30 drinks per month or binge drinking*
- High ratio of blood fats known as apolipoprotein B (apo B, the main protein constituent of LDL or 'bad' cholesterol) to apolipoprotein AI (apo AI, the principal lipoprotein in HDL or 'good' cholesterol)
- Heart disease
- Psychosocial stress/depression

[*Haemorrhagic stroke is mainly predicted by the factors marked with an asterisk.]

Looking at this list, acupuncturists can take heart noting how much influence our treatment and lifestyle counselling can have in the majority of these areas, as well as known lesser risk factors such as constipation and insomnia.

Conclusion

As practitioners of acupuncture we can and should think of ourselves as well able to help patients who have suffered stroke, whether we encounter them at the recovery, rehabilitation or chronic phases; we can also help to prevent primary and secondary stroke. It is my hope that this brief introduction, simplified though it is, will show practitioners how greatly they help these patients, using primarily diagnostic and treatment techniques they already know and practice. Acupuncturists who wish to specialise in treating stroke and other neurological disorders will certainly wish to pursue further study. However it is hoped that the synopsis above will be of use should a stroke patient enquire, or a family member suddenly be in need of treatment.

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In June 2017 Claudia will be teaching a Mastery Seminar on stroke in the UK: see www.jcm.co.uk/news/seminars-events/. For more details see page 42 of this issue.

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