Acupuncture for central pain affecting the ribcage following traumatic brain injury and rib fractures — a case report

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Abstract
This case report describes the use of acupuncture in the management of chronic central pain in a 51 year old man following severe traumatic brain injury and multiple injuries including rib fractures. The patient reported rapid and significant improvements in pain and mood during a course of acupuncture treatment. Chronic pain following traumatic brain injury is a significant problem. Chronic pain after rib fractures is also commonly reported. Acupuncture is widely used in the management of pain but its use has been reported rarely in the traumatic brain injury literature. This case report suggests that acupuncture may be a useful option to consider in these patients. Outcome was assessed formally using a 0–10 verbal numerical rating scale for pain, and the Hospital Anxiety and Depression Scale (HADS) for psychological status before and after the course of treatment. These scales are widely used in clinical practice as well as in research involving patients with traumatic brain injury, although they have not been validated in this population. The changes in this patient’s outcome scores were not consistent with the benefits he reported. Treatment of this patient highlighted the difficulties of using standardised self rating scales for patients with cognitive impairment. The report also discusses the effects of acupuncture on this patient’s mood.

Keywords
Acupuncture, traumatic brain injury, central pain, rib fractures, outcome measurement, cognitive impairment, mood.
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Clinical Assessment
The patient described troublesome tingling pain in his right leg, below the knee, right forearm, wrist and hand, and extreme hypersensitivity of ribs on his right side. He reported that the ribcage pain was more severe in the morning, making showering and dressing an ordeal. He reported waking two or three times at night due to lower leg pain. He described feeling fed up, exhausted and tearful.

On examination, pronounced allodynia to light touch or thermal stimuli were noted throughout the right side, most severe over the ribcage. He cried out with pain from the ribcage during showering and dressing. Formal testing revealed impaired appreciation of light touch and temperature on the right side. Right sided hypotonia and weakness were evident, with mild inferior subluxation of the right glenohumeral joint and moderate reduction in upper limb movement and function. He was able to walk with one stick but demonstrated poor weight transference on to his right leg. The skin condition of his left shin was poor, with chronic swelling evident around this ankle.

The distribution of pain and hypersensitivity throughout the right side of the body, accompanied by right sided hemisensory disturbance and hemiparesis supports the diagnosis of right sided central pain.1 Local trauma secondary to multiple rib fractures and haemopneumothorax on the right side may account for the severity of pain in the ribcage region with nociceptive pain contributing to the overall pain presentation.

Treatment
The option of acupuncture was discussed with this patient. Despite executive dysfunction, he was competent to consent. He reported being nervous about needles but was keen to try anything that might reduce his pain. We selected classical Chinese medicine acupuncture points on the limbs to address his pain, for example upper limb points such as LI4 (Hegu), LI11 (Quchi), TE5 (Wuquian, EX-UE-9 (Bazie), and lower limb points such as LR3 (Taichong), GB34 (Yanglingquan), ST36 (Zusanli), SP3 (Taibai), SP5 (Shangqu). Points on the right thorax such as SP21 (Dabao) and locally tender (zhong ni) points were also used. The patient reported marked hypersensitivity on the right side and was anxious about being needled there, so fleshy, less sensitive points, such as LI11 were selected for needling on this side. These were complemented with relevant but more superficial and often more sensitive points on the left side, such as TE5. Classical points were also selected for their specific actions on anxiety including ‘the Four Gates’ ie bilateral LR3, LI4 as well HT3 (Shaobai), HT7 (Shenmen) and EX-4N-3 (Yintang).

The patient received a course of seven treatments over a period of six weeks, with initial treatments being more closely spaced. All points were needled for 25 minutes using Japanese needles 0.20mm diameter, of the appropriate length. All points were stimulated until the patient reported a sensation of dull ache, numbness, or tingling, described as de qi. No further stimulation was given. He was discharged home after the third treatment, and subsequently treated as an outpatient. Acupuncture was provided alongside his continuing physiotherapy, occupational therapy and speech and language therapy.

Outcome
The patient noted a rapid reduction in pain and anxiety during the course of acupuncture treatment. After the first treatment he reported that his arm pain had gone, although the tingling remained. He was discharged home successfully after the third treatment. By the fourth treatment he reported no hypersensitivity or pain in his arm or leg. Hypersensitivity in thorax remained, although this was less severe. By the seventh treatment he reported tingling in his right hand and occasional pain in the right side of his thorax, which were not troublesome. An 0-10 verbal numerical rating scale (NRS) of average pain level over the previous week dropped from 3/10 before treatment to 0/10 in arm and leg after treatment.1 Ribcage pain dropped from 3/10 to 0/10. Ribcage pain no longer interfered with activities of daily living such as showering. The patient reported a marked improvement in mood, general wellbeing and sleep: however, there was no change in his Hospital Anxiety and Depression Scale (HADS)3 scores which remained the same before and after treatment, at 9/21 for anxiety component and 7/21 for depression component. At six weeks and six months after the end of acupuncture treatment the patient remained pain free.

Discussion
Chronic pain following TBI is common,1 with an estimated prevalence ranging from 11% to 96%.e Pain...
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may exacerbate various behaviours common in early recovery of those with moderate and severe injury, such as restlessness, agitation, attention deficit and sleep difficulties, and may disrupt rehabilitation programmes. The cause of pain in these patients is complex, with contributions from nociceptive pain secondary to peripheral trauma, as well as central pain due to central nervous system damage. Central pain can be difficult to treat, and usually is approached by a range of medications such as opioids, antidepressants and anticonvulsant agents combined with physical therapy and injection therapy. Beneficial effects of acupuncture on central pain have been reported in stroke and in spinal cord injury.

Chronic pain after rib fractures is reported to be a significant problem, and there have been calls for more effective management. We have not found published reports of the use of acupuncture for pain following rib fractures. The nature of this patient’s ribcage pain resembled that described in patients with post herpetic neuralgia. A variety of case reports of variable quality have noted benefits from acupuncture in this condition. The use of acupuncture in patients with TBI has been discussed in short descriptive case reports, but these lack sufficient detail to allow rigorous evaluation of their findings. In view of the scarcity of evidence in these presentations, this case report seeks to examine the use of acupuncture for central pain following severe TBI and rib fractures.

Outcome Measurement

This case report highlights possible limitations to outcome measurement. Observation of the patient indicated that his ribcage pain caused the most severe behavioural responses. However, the verbal NRS scores indicated that the arm and leg pains were more severe than the ribcage pain. Moreover, a score of 3 out of 10 does not reflect a pain that is serious enough to severely limit function and to cause the patient to cry out in pain. NRS is a widely used outcome measure, demonstrating validity, sensitivity and good correlation with other pain measures. However, it only provides information about the sensory components of pain, and has not been validated in patients with TBI and cognitive impairment.

The HADS is another widely used outcome measure designed to assess anxiety and depression. It avoids the use of physical items in the scale and is useful for assessing psychological distress in patients with any kind of physical disability. It is used within the TBI population in clinical practice and research, but has never been validated for these patients. This patient reported reduced anxiety and improved mood, whilst the HADS score remained unchanged. Individuals with TBI may have a range of cognitive impairments, which can affect their ability to describe their subjective experience quantitatively using standardised self rating scales.

These self rating scales need to be used with caution in this population and may benefit from the addition of observational assessments of pain behaviours. Further evaluation of assessments specifically designed for individuals with acquired brain injury and cognitive deficits such as the Scale of Pain Intensity, and the Depression Intensity Scale Circles, may provide additional options for outcome measurement in this population.

Acupuncture, pain and mood

Immediately prior to his discharge home after five months in hospital, the patient reported increased pain and anxiety. Reduction in pain medication may have precipitated the increase in pain he reported, but his increasing level of anxiety could have been an additional cause. Anxiety is an emotion related to the future, involving monitoring the environment and anticipating potential threats. The patient was certainly concerned about how he was going to cope once he was discharged home. This enhanced sensory receptiveness may have caused an increase in his appreciation of pain leading to hyperalgesia. Studies have demonstrated that acupuncture may have analgesic and anxiolytic effects through several mechanisms, including the activation of antinociceptive pathways, deactivation of parts of the limbic system such as anterior cingulate cortex and amygdala, and activation of the parasympathetic nervous system. This case highlights acupuncture as an option to consider in other patients experiencing increasing pain and anxiety prior to discharge home.

At the end of the course of treatment the patient reported marked improvements in pain and mood. He also said that the treatment had done more than this, although he struggled to find words to express these changes. He stated:
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The acupuncture cleared my head. I feel it helped me register things, and so to look after myself better, not put myself in danger. I felt lost before [acupuncture] treatment – now I've got my head together and feel I can have a go at things. I've got a way I want to go now. I know the way I want to go.'

The mechanisms underpinning these comments are not clear. This patient’s executive dysfunction secondary to frontal lobe damage affected his ability to plan, reason and problem solve, and there are suggestions that mood may influence executive abilities in TBI. His comments certainly seem to indicate a more positive and hopeful outlook. In clinical practice a proportion of patients receiving acupuncture following major life threatening incidents such as TBI or traumatic spinal cord injury report feeling improved in ways they find difficult to express, such as a sense of increased hope, yet this is rarely reported in the acupuncture literature.

Summary

The addition of acupuncture to the standard rehabilitation programme provided benefits to this patient with central pain secondary to TBI and rib fractures. The effective management of pain in this population can be difficult, but is vital to ensure individuals are able to participate fully in rehabilitation. Acupuncture may be a useful option to consider within the overall management of central pain in other patients with TBI. The selection of outcomes measures needs to take account of the patient’s cognitive impairments. Newer measures specifically designed for this population show early promise. Finally, the experiences of individuals receiving acupuncture for symptoms following major traumatic life events requires further exploration.

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Reference list

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