

Acupuncture treatment of phantom limb pain and phantom limb sensation in amputees

David Bradbrook

Summary

Three case histories are presented in which amputees with acute or chronic phantom limb pain and phantom limb sensation were treated with Western medical acupuncture, needling the asymptomatic intact limb. Two out of the three cases reported complete relief of their phantom limb pain and phantom limb sensation. Acupuncture was successful in treating phantom phenomena in two of these cases, but a larger cohort study would be needed to provide more evidence for the success rate of this treatment technique for this indication.

Keywords

Acupuncture, amputee, phantom limb pain, phantom limb sensation.

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Introduction

Phantom limb pain (PLP) and phantom limb sensation (PLS) are common complaints among patients after amputation, both in the short and long term.¹ Jensen and colleagues defined PLP as painful sensations referred to or located within the absent limb, and PLS as any sensation in the absent limb other than pain.² Surveys have shown that approximately 70% of amputees suffer from burning, cramping, pinprick, stabbing, itching or other sensations of pain in the first few weeks following amputation.¹ There is also evidence that in 5-10% of amputees, PLP and PLS can become chronic.³ The sudden lack of afferent input following an amputation results in a number of changes at both the peripheral and spinal level. Melzack has hypothesised that changes in the receptive fields of the limb as well as the cortical reorganisation that is observed following limb amputation are related to both PLP and PLS.⁴ This may explain why many amputees gain relief from PLP and PLS by rubbing their intact limb, thus stimulating normal afferent input at peripheral, spinal and cortical levels.

In patients with PLS, the image of the limb can represent the pre-amputation limb in shape, length and volume, but the sensation is usually strongest around the areas that have the greatest representation in the somatosensory cortex, such as hands and toes. The dimensions of

the phantom sensation may also change over time. Approximately one third of amputees experience a process of telescoping, ie a perception that the leg is progressively shortening in a proximal direction, starting with the distal portions (ie the toes or foot), and eventually resolving up to the level of amputation.⁵

Acupuncture has previously been shown to benefit patients with PLP and PLS.⁶ The case studies that follow describe three amputees with different levels of amputation. The setting was a prosthetic rehabilitation clinic which provides phased care after surgery, including in the first phase training in wheel chair transfers, exercises to maintain muscle length of the stump or pelvis and to strengthen the prime movers, as well as education in scar management. This is followed by gait training with a measurement for the prosthesis within four weeks and fitting of the finished prosthesis by eight weeks. The care takes place both before and after discharge from hospital. The author used acupuncture on selected patients while working in the clinic for six months in a rotating post. All patients received acupuncture to the intact limb to stimulate a normal afferent input to the nervous system and elicit an analgesic effect, thereby reducing the intensity of the subject's PLP and PLS.

Changes in the intensity of the patients' PLP and PLS were measured using a Visual Analogue

Case report

Scale (VAS) of zero to ten.⁷ Previous studies have shown this to be reliable and repeatable in measuring phantom phenomena and changes following acupuncture.^{8,9}

Case 1

Presentation and history

The first case is a 34 year old man complaining of PLP and PLS in the toes of his left amputated foot. He had been suffering from bilateral foot pain for the majority of his life due to congenital bilateral talipes. Numerous operations to correct the talipes had been carried out as a child, including an arthrodesis of his left mid tarsal joint. These had been unsuccessful in reducing his pain, and the patient underwent a transtibial amputation following medical advice. Approximately one month after the successful surgery, prosthetic rehabilitation had been completed, but the patient was complaining of PLP and PLS in the toes of his amputated limb. He described PLP as a painful, cramping feeling and the PLS as pins and needles, together with 'bunching up' of his toes. These symptoms were all felt on the plantar surface of the patient's phantom toes and were aggravated by sitting still. He also reported that the PLP and PLS reduced in intensity when he was wearing the prosthesis, but returned to their previous levels as soon as he removed the prosthesis. He was able to gain only minimal relief from a dorsal column stimulator, which had been fitted two years earlier to reduce ankle pain during walking.

This patient had received acupuncture previously for an episode of hip pain, with good results, and was willing to try it again for the present symptoms.

Physical examination

On examination (see Figure 1) the patient's stump was in excellent condition and his scar was mobile. The left knee joint had full range of movement and was pain free. The right ankle was normal, a fact that was attributed to the success of his prosthetic rehabilitation. At baseline, the VAS score for PLP was nine, and for PLS it was three.

Treatment

The intact right leg was treated with acupuncture using a Western approach.¹⁰ Points were selected



Figure 1 Case 1, showing the appearance of the left transtibial amputation stump.

firstly for their putative general analgesic properties, and secondly for their anatomical position in relation to the subject's areas of PLP and PLS – mirroring the position of symptoms on the left side. Five acupuncture points were needled separately in turn, for 30 seconds each, stimulating each at 15 seconds to achieve *de qi*. The points LR3 and SP6 were treated using 0.20x15mm Seirin needles, and points ST36, ST37 and ST32 were treated using 0.30x30mm Seirin needles. The points are illustrated (treated simultaneously) in Figures 2 to 4. Treatment was repeated weekly for a total of four sessions.

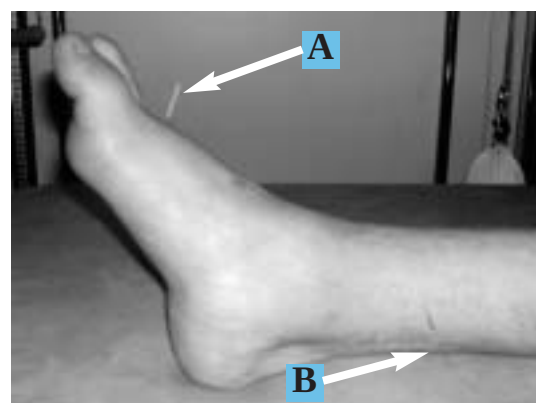


Figure 2 Case 1, showing needles placed in LR3 (arrow A) and SP6 (arrow B) in the right leg.

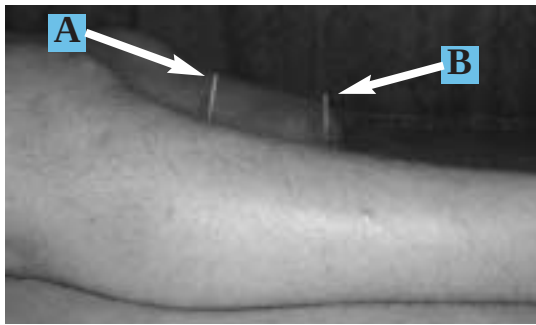


Figure 3 Case 1, showing needles placed in ST36 (arrow A) and ST37 (arrow B) in the right leg.

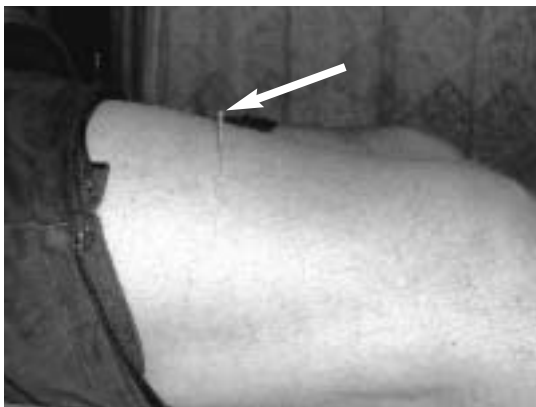


Figure 4 Case 1, showing needles placed in ST32 in the right leg.

Outcome

During the initial treatment, the patient reported a tingling in his phantom toes, particularly with the insertion of the needle at LR3. The patient also experienced *de qi* during the stimulation of ST32 and a gradual relief of the cramp and sensations in his phantom toes.

Immediately after treatment the patient reported a PLP VAS score of two and a PLS score of one. At the end of the four sessions using the same acupuncture points, the PLP and PLS VAS were both zero. He continued to be symptom free for the remaining two months of prosthetic rehabilitation. As a result of the successful amputation and normalisation of sensation in his left phantom foot and ankle with the elimination of pain, this patient is currently considering transtibial amputation on the remaining leg.

Case 2

Presentation and history

The second case study is a 68 year old woman in

whom a myeloma of the left pelvis was diagnosed in 1999. Her previous medical history included a hysterectomy for cervical cancer. Following two unsuccessful operations to remove the myeloma, a decision was made early in 2001 to perform a left hemipelvectomy amputation. Recovery from surgery was slow because of recurrent wound infections and delayed healing, and therefore prosthetic rehabilitation had not been completed by early 2003. By this time, she had been suffering from PLP and PLS for two years, mainly exacerbated by wearing the prosthetic limb. These exacerbations were relieved momentarily by rubbing the intact limb, but lasted for between five minutes and three hours. The PLP was situated in the anterolateral aspect of the phantom thigh. The pain was said to be 'cramp-like' and constant during an exacerbation. She explained her PLS as a feeling that her left amputated leg was 'twisted' constantly throughout the day (ie externally rotated 90°). This was not painful, and could also be relieved momentarily by rubbing the thigh of the intact limb.

The patient had not previously received any acupuncture or TENS treatment for this or any other condition.

Examination

On examination the scar was fully healed and free from major adhesions. The intact limb showed normal power and range of movement. She had a low exercise tolerance and fatigued quickly, finding it exhausting to walk after amputation at such a high level. At the time of treatment, she was experiencing an exacerbation of her symptoms following prosthetic rehabilitation. Her PLP VAS score was seven, and her PLS score was five. She was enthusiastic at the prospect of acupuncture, although it was anticipated that the outcome of acupuncture treatment would be poor due to the chronic nature of her condition.

Treatment

I anticipated that this patient would probably be a strong reactor, and therefore approached treatment with caution. Details of treatment were the same as in Case 1 above (shown in Figures 2 to 4).

Outcome

The patient reported an astonishing response.

From the moment the first needle was inserted into LR3, she experienced *de qi* which she described as extreme relaxation, with warmth and tingling around the needle site. As needles were inserted in succession into SP6, ST36 and ST37, she described the PLP as 'un-clamping' and 'diminishing', and the PLS as 'reducing in length' as the treatment progressed. Upon inserting the final needle into ST32, she reported complete relief of her PLP and the absence of any PLS throughout, and a feeling as if her leg had retracted into her body (telescoping as described above). The speed with which the PLS diminished was quite remarkable, and the author is currently unaware of any previously documented case where this effect has been triggered by acupuncture.

This patient's VAS scores immediately after treatment for PLP and PLS were both zero. She experienced complete cessation of symptoms following one acupuncture treatment and did not require any further acupuncture. She was able to continue with her prosthetic rehabilitation symptom-free for the remainder of her treatment.

Case 3

Presentation and history

The third case is a 19 year old man who had been involved in a road traffic accident two months prior to his referral for physiotherapy prosthetic rehabilitation. The accident left him with an 'open book' fractured right pelvis, a displaced fracture of the right femur requiring external fixation and a comminuted fracture of the right tibia and fibula. Due to the severity of the fractures to the tibia and fibula and the compromised blood supply, a right transtibial amputation was performed. Unfortunately the vascular compromise was worse than first thought, so the wound broke down and the femoral fracture failed to reunite. He subsequently underwent a right transfemoral amputation.

During recovery, management of pain, including in the low back and pelvis, was a major problem, and he was given gabapentin, amitriptyline, diclofenac and oral morphine. He described PLP as an 'electric shock pain down the back of the phantom leg', and 'severe cramp in the phantom toes'. He described the PLS as the feeling of his phantom toes 'crossing over one another'. He said that he had tried TENS previously for his lower

back pain, with no effect, and he relied on analgesic drugs. His PLP and PLS were exacerbated by sitting still or being unoccupied.

Examination

The scar was very uneven and adherent. The patient had an extremely unstable pelvis and stiff lumbar spine. His balance was very poor for a young man and he had little objective and functional trunk stability. His PLP VAS score was eight and his PLS score was six. He appeared to be sceptical about the ability of the acupuncture to relieve his pain.

Treatment

I did not think that this patient would be a strong reactor to acupuncture because of the complexity of his injuries, nor that full symptom relief would be quickly achieved. After the success of the first two case studies, I decided to use the same acupuncture points on the intact limb as in Case 1, with the same treatment schedule.

Outcome

After the initial treatment, although he had not experienced *de qi*, the patient reported a significant decrease in his symptoms, and reported a PLP VAS score of three and a PLS score of two. This improvement in VAS scores was encouraging and he began to believe in the treatment. When he returned a week later, he reported that his PLP and PLS had remained tolerable for two hours after the treatment and then returned to previous levels. I reassured him that we may need to repeat the treatment three or four times to increase the duration of relief. However, after three more sessions with the same treatment, his symptoms had not changed, reporting a PLP VAS score of seven and a PLS score of eight during an exacerbation. There was no significant carry-over effect after each treatment. This patient appeared to remain extremely focused on pain and dependent on his medications. However, he subsequently became very accomplished in the use of his prosthetic limb and is fully independent.

Discussion

Cases 1 and 2 were examples of the successful use of acupuncture to relieve the symptoms of PLP and PLS. The points used were pain specific and

caused strong *de qi* in both patients.

The scientific literature on acupuncture suggests that it has central actions that are relevant to the mechanisms thought responsible for PLP and PLS.^{1,11,12} It is plausible that acupuncture can be expected to have an analgesic and reorganisational effect on PLP and PLS within the central nervous system. It is unclear however, from the short observation period of this study whether the effects are of short term or long term duration. As seen in Case 3, lack of success may relate to multiple trauma and revision of amputations. It is possible that this method of acupuncture may only be effective after single trauma or after non-traumatic amputation, and that cases of this type might respond to a different approach, since the technique used had no lasting effect. It is debatable whether the needles should have been left in for longer to achieve a lasting effect, or whether more or different points might be appropriate for the amputee with multiple trauma.

In conclusion, PLP and PLS have been shown to be successfully treated with acupuncture in two out of three cases. It is clear that a larger study is needed to gain further insight into the limitations and benefits of acupuncture for PLP and PLS.

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