

Acupuncture: An effective treatment for painful diabetic neuropathy

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ARTICLE POINTS

1 Painful diabetic neuropathy remains a distressing and disabling complication of diabetes.

2 Acupuncture is used to treat many conditions and is becoming increasingly popular for treating pain.

3 In this study, 86% of participants experienced pain reduction following a 6-week course of acupuncture.

4 Current treatment regimens may be ineffective or have a high incidence of side-effects in those already enduring polypharmacy.

KEY WORDS

- Diabetic neuropathy
- Pain
- Acupuncture therapy

Introduction

Painful diabetic neuropathy (PDN) is a distressing and disabling complication of diabetes. Treatment regimens include, for example, the application of film dressings, simple analgesics, tricyclic antidepressants, anticonvulsants and opiate derivatives. However these treatments can be ineffective or have a high incidence of side-effects in those already enduring polypharmacy. Acupuncture, as a non-pharmacological therapy, has some inherent advantages over conventional therapies. This article discusses the benefits of treating PDN with acupuncture and uses data from the authors' own study (McClennon et al, 2005) to illustrate these.

D iabetic neuropathy can be defined as: 'The presence of symptoms and/or signs of peripheral nerve dysfunction in people with diabetes after other causes have been excluded' (Boulton et al, 1998).

The most common diffuse neuropathy is chronic distal symmetric sensorimotor polyneuropathy. This affects the lower legs and feet and can cause chronic neuropathic pain (Boulton, 2000). Neuropathic pain can cause significant morbidity and impairment of quality of life (Benbow et al, 1998). About 10% of people with diabetes develop painful neuropathy (Young et al, 1993); however, some studies suggest that the number of people with neuropathic symptoms is nearer 20% (Dyck et al, 1993).

Diagnosis of neuropathy

In our health district (Bolton), each GP surgery's patients receive diabetic foot screening from a podiatrist. The patient's general medical history is discussed and a neurological assessment is carried out. This includes the neuropathy disability score using a Neurotip (Owen Mumford, Oxford), a

128 kHz tuning fork, hot and cold rods and a tendon hammer, as recommended by Abbott et al (2002). The severity of neuropathic pain is assessed by completing the neuropathic symptom score (Figure 1). This helps to inform the decision whether or not to refer the individual for treatment of neuropathic pain.

Treatment of painful diabetic neuropathy

Local guidelines for the treatment of neuropathic pain are shown in Figure 2.

Improving glycaemic control

Tight glycaemic control has been shown to reduce the development of neuropathy (Diabetes Control and Complications Trial Research Group, 1995). Improving glycaemic control is, therefore, the first line of treatment for PDN in the authors' locality. Transient neuropathic pain, its causes and treatments in the newly diagnosed person with diabetes or those with recent metabolic disruption, such as ketoacidosis, is discussed with the individual. In order to assess glycaemic control and exclude other causes of

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1 Gabapentin is the only anticonvulsant licensed for the treatment of painful diabetic neuropathy (PDN).

2 Pregabalin is the first drug to be licensed specifically for the treatment of neuropathic pain.

3 The mechanism of action of acupuncture in relieving pain is not fully understood, but it is thought to stimulate the production of the body's natural pain killers – endorphin and serotonin.

neuropathic symptoms, biochemical parameters, such as HbA_{1c} and vitamin B₁₂ levels, and thyroid function are determined.

Film dressings

If the extent and site of pain are suitable, an effective treatment for neuropathic pain is a film dressing applied directly to the affected area (Foster et al, 1994).

Pharmacological therapies

Tricyclic antidepressants

Drugs such as imipramine and amitriptyline have been in use since the 1960s and their benefits have been documented (Low and Nelson, 1996). The drugs do, however, have some side effects, which include limited pain relief, drying of the mouth and drowsiness.

Anticonvulsants

Although anticonvulsants also have an established role in the treatment of PDN (McQuay et al, 1996), gabapentin remains the only one licensed for the treatment of PDN in the UK. Pain scores were found to be drastically reduced when doses of up to 1800mg gabapentin were taken daily (Young et al, 1993), although reported side-effects included dizziness, somnolence, diarrhoea, headache and confusion.

Axsain cream

Capsaicin may be applied topically up to four times a day. The active ingredient of Axsain cream (Zeneus, Stevenage), capsaicin (derived from chilli peppers), may cause an increased burning sensation on application. The frequency of application thus limits its use.

Pregabalin

Pregabalin (Lyrica; Pfizer, Walton-on-the-Hill, Surrey) is the first drug to be licensed in the UK for neuropathic pain. Doses of 300mg pregabalin have been shown to produce significant improvement in symptoms when compared with placebo (Stacey, 2002). Twice-daily dosing was also shown to be of advantage in some people with PDN.

A brief history of acupuncture

The practice of acupuncture can be traced as far back as 1000BC in China. It is a part of traditional Chinese medicine. It has only been known to the West since the 17th Century. The term 'acupuncture' is derived from the Latin for 'needle prick' (the standard Mandarin word roughly translated to 'needle therapy'). The first 'needles' to be used were carved from stone (Wikipedia, 2006).

Question	Scoring guide	Score
Have you, in the past 6 months, had any pain or discomfort in your legs, feet or both when you are not walking?	Burning, numbness or tingling= 2 Fatigue, cramping or aching= 1 Other= 0	
Where is this pain or discomfort most felt?	Feet= 2 Calves= 1 Thighs= 0	
When are these symptoms at their worst?	Night= 2 Various times of the day and night= 1 Day= 0	
Do these symptoms keep you awake at night?	Yes= 1 No= 0	
When you get this pain is there anything you can do to make it better?	Yes, walk= 2 No, or standing up= 1 All others= 0	
Total neuropathy symptom score (out of a total of 9)		

Figure 1. Neuropathy symptom score for assessing severity of neuropathic pain.

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1 People with PDN are referred to the acupuncture service from foot screening podiatrists, GPs, practice nurses, diabetologists and diabetes specialist nurses.

2 Acupuncture is contraindicated in pregnant women, people with epilepsy, and people with needle phobia or metal allergies.

3 A full pain history taken during the initial appointment is crucial to differential diagnosis of the pain.

4 An acupuncture course comprises six weekly visits during which needles are inserted into six acupuncture points bilaterally and left in place for 20 minutes.

5 The short-form McGill pain questionnaire is completed before and after the course of treatment, and the scores are compared and entered in the database.

Acupuncture theory suggests that needles puncture the skin at specific points and tap into channels called meridians. These channels carry the body's energy ('chi'), which has to flow freely to create harmony within the body. A blockage of chi is thought to produce painful symptoms. Acupuncture theory holds that these symptoms may be reduced or eliminated by restoring the balance of chi (Wikipedia, 2006). This may seem at odds with Western medicine, but it is used to treat many conditions and it is increasingly popular for treating pain.

Its mechanism of action in relieving pain is not fully understood, but it is thought that acupuncture stimulates the body to produce its own natural pain killers, primarily endorphin and serotonin. Serotonergic pathways have been implicated in pain relief, and have been found useful in relieving pain in neuropathy (Goodnick et al, 2000). Serotonin is synthesised in the central nervous system – its synthesis has been shown to increase following acupuncture (Han et al, 1979).

Acupuncture may also affect the vibration perception threshold (VPT) in the foot (Nwabudike and Ionescu-Tirgoviste, 2000). In a study of 46 patients with chronic painful peripheral neuropathy, 34 of the 44 participants who completed the study noticed an improvement in their painful symptoms following a course of acupuncture (Abuaisha et al, 1998); however, it is worth noting that this study demonstrated no significant difference in VPT following treatment.

To the best of the authors' knowledge, many studies are currently in progress that aim to investigate the effectiveness of acupuncture for a number of symptoms, such as osteoarthritis of the knee, chronic low back pain and chronic headache.

The acupuncture service Referral and assessment

People with PDN are referred to the acupuncture service by podiatrists, GPs, practice nurses, diabetologists and

diabetes specialist nurses following foot screening.

Before the initial appointment two information sheets are posted to the patient. The first gives information on painful neuropathy and a simple explanation of possible causes and available treatments. The second gives information about acupuncture, including a brief explanation of the uses of acupuncture and how it is thought to work. It also lists groups of people for whom acupuncture would not be suitable. These include pregnant women, people with epilepsy, and people with needle phobia or metal allergies (Acupuncture Association of Chartered Physiotherapists, 2000).

The initial appointment is a 1-hour session during which the individual completes and signs a consent form. A full and complete pain history is taken and a patient record is completed. The patient record contains up-to-date medical information, including current and previous occurrences of and treatments for PDN. While recording the drug history, the podiatrist may make recommendations on the correct administration of current drug regimens. A full pain history is crucial to allow differential diagnosis. The following parameters are documented: site, timing, duration, pain relief, distribution, acute or chronic pain, sleep deprivation. It is important to explain to people that they may not experience total or even partial pain relief, although approximately three-quarters of participants reported some reduction in pain in a study by Abuaisha et al (1998).

A short form of the McGill questionnaire is completed and scored at this first appointment. The original McGill questionnaire was not used because of time constraints, and results from the short form have been shown to correlate well with those from the original long form of the questionnaire (Melzack, 1987). Initially a visual analogue scale (a 10cm linear scale) was used to assess pain. Patients were asked to record their pain on a scale of 0–9 (0, no pain; 9, worst pain) at weeks 1

Starting doses

***Imipramine**

25 mg od, titrate up to 50–75 mg od

***Amitriptyline**

10 mg od, titrate up to 50–75 mg od

****Gabapentin**

300 mg od 3 days
300 mg bd 3 days
600 mg tds thereafter

*****Pregabalin**

75 mg bd
150 mg bd after 7 days if no improvement
Up to 300 mg bd after 7 days if no improvement

Other treatments available for painful diabetic neuropathy

- Opiates
- Mexiletine (Boehringer Ingelheim, Bracknell)
- Other anticonvulsants, such as carbamazepine

Abbreviations used: od, once a day; bd, twice a day.

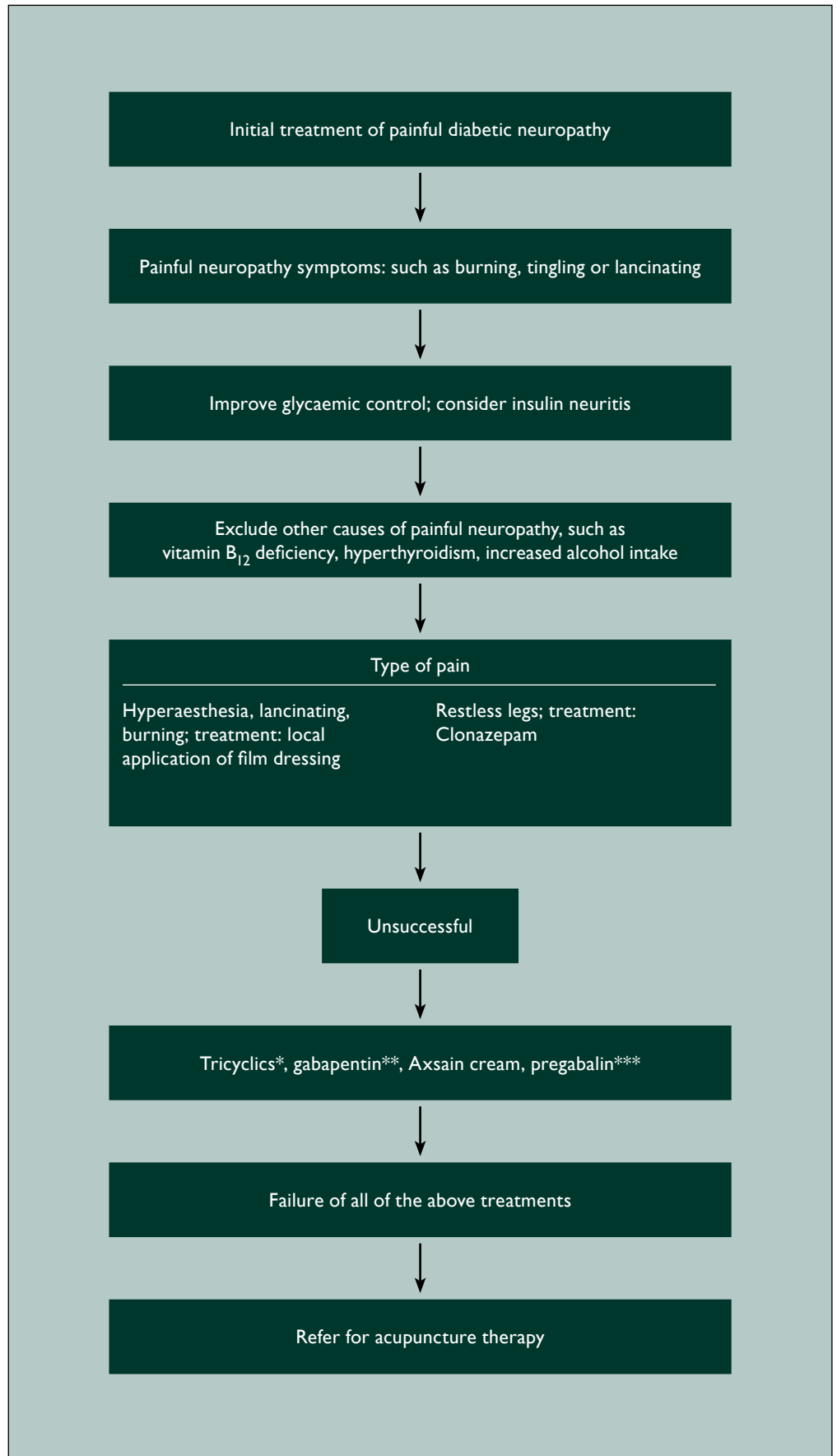


Figure 2. Local guidelines for the treatment of painful diabetic neuropathy. Progression along this pathway indicates failure of treatment of painful diabetic neuropathy at each stage.

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1 Mean pain scores in a study (n=88) were 20.1 before the acupuncture course compared with 10.7 post-acupuncture.

2 Seventy-six per cent of participants experienced pain reduction following their course of acupuncture, although in most cases, symptoms were reduced rather than eradicated.

3 Twenty-nine per cent remained on monthly 'top up' acupuncture.

4 Ten per cent reduced or ceased PDN medication by the end of the course of acupuncture.

5 It is suggested that these findings support the use of acupuncture as first-line treatment for PDN.

and 6. However, this was subsequently omitted from the patient appointment as it was felt that it did not add to the information gained from the McGill questionnaire.

Symptoms of neuropathic pain

The symptoms of neuropathic pain vary enormously, with many of those affected being, in the author's opinion, unable to describe the pain exactly. The wide range of symptoms can develop spontaneously or in response to a particular stimulus. Most symptoms are reported to be more severe nocturnally (Watkins et al, 1996). Commonly reported symptoms include burning, shooting or lancinating pain, paraesthesia, aching and allodynia. The site of pain may also vary tremendously, but early symptoms usually affect toes and then spread proximally to involve the lower leg. The hands may also become affected.

Acupuncture treatment plan

The needles are inserted into six acupuncture points bilaterally. These points are chosen for their pain relief properties (Abuaisha, 1998). Most patients feel very little discomfort upon insertion of the needles, but occasionally some experience acute pain. The needles are left in situ for 20 minutes. The acupuncture is then repeated weekly for five further visits, using the exact same acupuncture points and leaving the needles in for 20 minutes. At week 6 the pain questionnaire is completed again and the scores at weeks 1 and 6 are compared and recorded in the database.

Bolton Diabetes Centre study

Aim and method

In 2004 we conducted a study to determine the effectiveness of acupuncture in treating PDN (McLennon et al, 2005). We looked at 88 people with diabetes who received acupuncture over a 6-week period (47 were female, mean age was 51 years and 7 had type 1 diabetes). Participants were assessed using the procedures

outlined above and the scores were recorded on McGill questionnaires at weeks 1 and 6.

Results

The results were analysed using Student *t*-tests.

- Mean pain scores were 20.1 pre-acupuncture treatment compared with 10.7 post-acupuncture treatment.
- Seventy-six participants experienced pain reduction following their course of acupuncture. However, it is important to note that in most cases symptoms were reduced rather than completely eradicated.
- Twenty-nine remained on monthly 'top up' acupuncture.
- Ten reduced or ceased PDN medication by the end of the course of acupuncture.

Discussion

Acupuncture, like other complementary therapies, has generated great interest among practitioners of Western medicine for use in pain relief. A number of studies have shown that acupuncture has a place in the NHS for the treatment of chronic pain (McClennon et al, 2005; Walker, 2001). Acupuncture is most often used as a second- or third-line treatment when everything else has failed.

In our clinics, acupuncture has played a role in enabling patients to improve their quality of life through better sleep patterns and reduced pain. Some people in the study experienced great relief of symptoms either during or immediately after treatment, whereas others only noticed an improvement after the sixth and final treatment. Only 12 of the 88 participants obtained no improvement. Some patients still required medication in conjunction with the acupuncture.

Acupuncture cannot be regarded as a cure for PDN, but the results of our study indicate that it is effective in improving pain relief, sleep and wellbeing. In another study, 85% of patients reported an improvement in pain, sleep, mobility and mood (Walker, 2001).

Conclusion

PDN remains a challenge, and further research is required to find the most effective treatment. Acupuncture offers a relatively safe, non-pharmacological alternative to conventional treatments. Our findings support the contention that acupuncture be used as first-line treatment for PDN. Our aim is to further develop our acupuncture service in the future. We hope that our experience will encourage others to introduce acupuncture as a treatment for PDN. ■

Abbott C, Carrington AL, Ashe H et al (2002) The North West Diabetes Foot Care Study: incidence of, and risk factors for, new diabetic foot ulceration in a community-based cohort. *Diabetic Medicine* **19**(5): 377–84

Abuaisha BB, Costanzi JB, Boulton AJ (1998) Acupuncture for the treatment of chronic painful diabetic neuropathy: a long-term study. *Diabetes Research and Clinical Practice* **39**(2): 115–21

Acupuncture Association of Chartered Physiotherapists (AACP; 2000) *Acupuncture Association of Chartered Physiotherapists – Guidelines for Safe Practice*. AACP, Peterborough

Benbow SJ, Wallymahmed ME, MacFarlane IA (1998) Diabetic peripheral neuropathy and quality of life. *The Quarterly Journal of Medicine* **91**(11): 733–7

Boulton AJ (2000) The pathway to ulceration: aetiopathogenesis. In: Boulton AJ, Connor H, Cavanagh PR (eds) *The Foot in Diabetes*. 3rd edn. John Wiley, Chichester: 19–31

Boulton AJM, Gries FA, Jervell JA (1998) Guidelines for the diagnosis and outpatient management of diabetic peripheral neuropathy. *Diabetic Medicine* **15**(6): 508–14

Diabetes Control and Complications Trial Research Group (1995) The effect of intensive diabetes therapy on the development and progression of neuropathy. *Annals of Internal Medicine* **122**(8): 561–8

Dyck PJ, Kratz KM, Karnes JL et al (1993) The prevalence by staged severity of various types of

diabetic neuropathy, nephropathy and retinopathy in a population-based cohort: the Rochester Diabetic Neuropathy Study. *Neurology* **43**(4): 817–24

Foster AV, Eaton C, McConville DO et al (1994) Application of OpSite film: a new and effective treatment of painful diabetic neuropathy. *Diabetic Medicine* **11**: 768–72

Goodnick PJ, Breakstone K, Wen XL, Kumar A (2000) Acupuncture and neuropathy. *American Journal of Psychiatry* **157**(8): 1342–3

Han CS, Chou PH, Lu CC et al (1979) The role of central 5-HT in acupuncture analgesia. *Scientica Sinica* **22**(1): 91–104

Low DR, Nelson JP (1996) A review of antidepressants for the treatment of painful diabetic neuropathy. *Journal of British Podiatric Medicine* **51**: 89–96

McClennon J, Green J, Robinson A (2005) Acupuncture – an alternative treatment for painful diabetic neuropathy. *5th Scientific Meeting: The Diabetic Foot Study Group. 7–10 September, Athens, Greece*

McQuay HJ, Tramer M, Nye BA et al (1996) A systematic review of antidepressants in neuropathic pain. *Pain* **68**(2-3): 217–27

Melzack R (1987) The short-form McGill Pain Questionnaire. *Pain* **30**(2): 191–7

Nwabudike LC, Ionescu-Tirgoviste C (2000) Acupuncture in the treatment of diabetic peripheral neuropathy. *Diabetes* **49**: 628

Stacey B (2002) *Pregabalin Open-Label Trial in Chronic Pain*. Poster presented at the 10th World Congress on Pain, San Diego, CA, 22 August 2002

Walker S (2001) A nurse-led acupuncture service for painful diabetic neuropathy: 2. *Journal of Diabetes Nursing* **5**: 59–62

Watkins PJ, Drusy P, Howell S (1996) *Diabetes and Its Management* (5th edition). Blackwell Science Ltd, Oxford

Wikipedia (2006) *Acupuncture*. <http://en.wikipedia.org/wiki/Acupuncture> (accessed 07.12.2006)

Young MJ, Boulton AJM, MacLeod AF, Williams DR, Sonksen PH (1993) A multicentre study of the prevalence of diabetic peripheral neuropathy in the United Kingdom hospital clinic population. *Diabetologia* **36**(2): 150–4

‘Peripheral diabetic neuropathy (PDN) remains a challenge, and further research is required to find the most effective treatment. Acupuncture offers a relatively safe, non-pharmacological alternative to conventional treatments. Our findings support the contention that acupuncture be used as first-line treatment for PDN.’