Non-invasive stimulation of the P6 (Neiguan) antiemetic acupuncture point in cancer chemotherapy

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Summary

The beneficial effects of transcutaneous electrical stimulation of the P6 antiemetic point (Neiguan) as an adjuvant to standard antiemetics was studied in over 100 patients in whom chemotherapy-induced sickness was not adequately controlled by antiemetics alone. Although the results were not quite as good as with invasive acupuncture, more than 75% patients achieved considerable benefit from what was a non-toxic procedure.

The use of large diffuse low impedence electrodes simplifies the technique. The 2 hourly application of Sea Bands prolongs the antiemetic action. Best results were obtained from the 2 hourly self-administration of 5 min of transcutaneous electrical stimulation of P6 using a simple battery-operated TENS machine (15 Hz) to activate a large, easy-to-place surface electrode and increasing current until Qi is elicited.

Introduction

In well controlled experiments the antiemetic action of low frequency (10-15 Hz) stimulation of the P6 (Neiguan) antiemetic point has been proven beyond reasonable doubt[1-4]. Ourselves[5,6] and others[7] have shown that P6 acupuncture (ACP) is a successful adjuvant to conventional antiemetics in patients having cancer chemotherapy.

The efficacy of a single ACP stimulation is limited to about 8 hours[6] but this can be prolonged by the 2 hourly application of acupressure[8]. Even the simple procedure of P6 ACP requires some technical skill and not unexpectedly many patients would prefer a non-invasive approach. This could be in the form of transcutaneous electrical stimulation (TCES) or acupressure applied by the patients themselves or using the commercially available Sea Bands[9]. We here report the findings in studies involving over 100 patients receiving cytotoxic drugs, designed to see if a non-invasive approach would be as good as traditional needling of the P6 point. In anaesthetic studies, TCES and acupressure are equally effective[4] but the action of both of these was shorter than that of ACP[4,9,10].

Method

As in reported studies[6,8] this was carried out in patients who, despite the use of standard antiemetic regimens experienced distressing nausea and vomiting after their first or subsequent courses of treatment. A variety of chemotherapeutic agents were used and most patients having highly emetic drugs, such as cisplatin, were treated in hospital. The adjuvant treatment was administered prior to the cytotoxic drugs and repeated at intervals either by the attendants or by the patient themself. In all these studies the existing antiemetic therapy was continued so that the objective was to assess the complementary effect of P6 stimulation in a multiple therapy approach to drug-induced sickness. The antiemetic drugs used were mainly metoclopramide, thiethyperazine, prochlorperazine and cyclizine with lorazepam and a steroid as adjuvants.

Three commercially available, battery driven, DC stimulators were used - Meridian, AM1 and Mini-Tens. The first two delivered a stimulus at 10 and 20 Hz, while with the latter only 15 and 20 Hz were available. The current delivered by each of these was measured and that which produced Qi (Chi) was noted. (This is a non-anatomically distributed sensation going up the arm or into the fingers.) A conducting copper or REC (rare earth cobalt) stud was used initially, but abandoned in favour of a large diffuse low impedence electrode. The neutral lead was attached to the Hegu point at the base of the thumb. The large electrodes (ECG or black carbonized rubber) did not require the accuracy of placement of the small studs and were used in the hope of evaluating self-administration of TCES.

As reported with ACP[8,12] the beneficial effect of 2 hourly acupressure, using commercially available Sea Bands, in prolonging the antiemetic action of TCES was also studied. In a small number of patients the use of acupressure alone was evaluated.

Our latest studies involved 2 hourly self-administered TCES of P6, using the large electrodes with the Mini-tens machine. In some patients it was possible to carry out a 'cross-over' study using different techniques with successive courses of chemotherapy. Likewise a

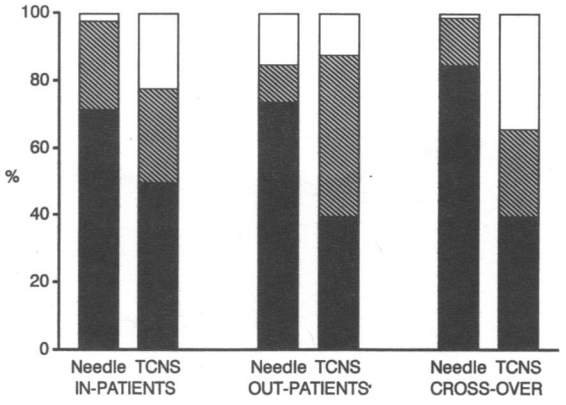

Figure 1. Frequency (%) of good ■ and ▨ moderate relief of chemotherapy-induced sickness produced by acupuncture and transcutaneous electrical stimulation (TCNS) of P6 (using small electrodes) in three series of patients

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Table 1. Comparison of findings with different methods of stimulation of the P6 point

	Good relief of symptoms	*Qi elicited*	*Current (mA) (mean±SD)*
Invasive ACP	97%	80-90%	
Non-invasive TCES			
Small magnetized electrodes	77%	70-80%	20.5±5.3
Large diffuse electrodes	87%	100%	7.6±1.6

cross-over study was possible with different sizes of electrodes.

In assessing the benefit of P6 stimulation patients (often with the help of nursing staff and friends) were asked to classify the effects on a simple 4 point scale[8] which is similar to the schemes used by others[11]. In presenting the findings the results are compared with those reported with ACP[5,6,8].

Results

Using the small REC or copper surface electrodes in both inpatient and outpatient studies invasive stimulation of P6 (Figure 1) produced significantly better results than the non-invasive approach ($P<0.001$). Most important are the findings in the 27 patients in whom both approaches were used in random order. Here the benefit achieved by needling was more marked ($\chi^2=23.38$; $P=0.0009$).

On pooling data, invasive stimulation (ACP) produced better results than TCES, but the latter still produced benefit in 77% of administrations (Table 1). On an individual patient basis 88% got considerable benefit from TCES compared with 96% with ACP.

Large electrodes

A randomized cross-over study of 30 administrations of large and small electrodes in 14 patients showed no significant difference ($\chi^2=3.194$, df=2; $P=0.2025$) in the benefit obtained with the two electrodes. These findings were confirmed (Table 1) in a larger non-crossover study comparing successive series of patients ($\chi^2=3.282$, df=2; $P=0.1938$). In a small cross-over study (11 patients, 18 administrations) identical results were obtained with the ECG and large black carbonized rubber electrodes.

Table 2. Prolongation of antiemetic action of invasive (ACP) or non-invasive (transcutaneous electrical) stimulation of P6 by acupressure, as shown by grade of benefit recorded at 8 and 24 h after initial treatment

Acupressure following: Acupuncture			*Transcutaneous stimulation*		
n	*8 h*	*24 h*	n	*8 h*	*24 h*
54	A	A	56	A	A
21	B	B	23	B	B
2	A	B	3	A	B
1	A	C	1	A	C
1	A	D	2	B	C

A, good; B, moderate; C, poor

Table 3. Transcutaneous electrical stimulation of P6 self-administered: day-to-day benefit in individual cases

Sex	*Age*	*Day 1*	*Day 2*	*Day 3*	*Day 4*	*Day 5*
M	35	A	A	A	A	A
M	31	A	A	A	A	A
M	46	A	A	A	A	A
F	40	C	B	A	A	A
M	19	C	A	A	A	A
M	48	A	A	A	A	A
F	42	B	B	B	B	
F	39	B	B	A	A	A
F	63	C	B	A	A	A
M	35	C	B	A	A	A
M	65	B	B	B	B	A
F	65	A	A	A	A	
F	55	B	A	A	A	A
M	14	C	B	B	B	A
M	36	A	A	A	A	A
M	20	C	A	A	A	A
M	45	C	B	B	C	B
M	35	B	A	A	A	A
M	31	A	A	A	A	A
M	46	B	B	A	A	A
M	19	B	A	A	A	A
M	48	B	C	C		
F	39	D	D	C	B	B
M	14	B	A	A	A	A

A, good; B, moderate; C, poor

One prominent feature of the use of large electrodes was the ease of elicitation of Qi. The mean current required to elicit this was also significantly less ($P<0.001$) with the large electrodes as was the scatter of readings (Table 1) in which all available data are pooled, shows no relationship between elicitation of Qi and the benefit achieved.

The findings when acupressure was applied after TCES are similar to those with ACP (Table 2). In each series the antiemetic action was prolonged for 24 h in more than 90% of patients.

Self-administration

Table 3 gives the day-to-day benefit in our first 24 cases all of whom were hospitalized and receiving cisplatin. No patient in this series failed to get some benefit from TCES, the results being very good in seven, good in 14 and poor in only three.

Table 4 gives the overall benefit in our total series of 41 administrations in which there were only two complete failures. By contrast, self-administered acupressure alone was ineffective.

We noted that the mean currents (±SD) used by patients on a self-administered basis (11.45±1.9 mA) was significantly greater ($P<0.05$) than when administered by the doctor.

Table 4. Overall patient benefit from self-administration of transcutaneous electrical stimulation

	TCES	*Acupressure*
Very good	13	3
Good	23	4
Fair	3	7
Poor and Nil	2	7

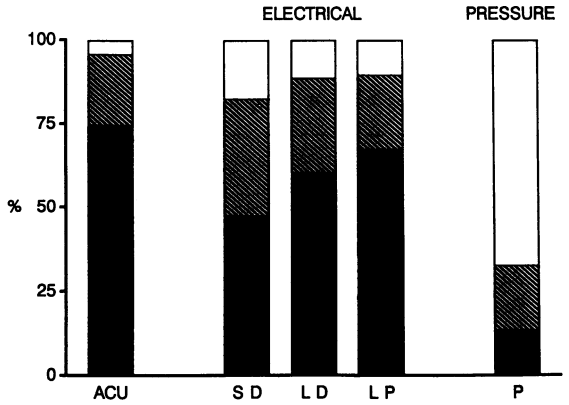

Figure 2. Frequency (%) of good ■ and ▨ moderate relief of chemotherapy-induced sickness associated with the use of invasive and non-invasive stimulation of the P6 acupuncture point. ACU, acupuncture; S, small electrodes; L, large electrodes; D, doctor-administered; P, patient-administered

Overall comparison of methods

The findings in the various studies are pooled in Figure 2. These are based on day-to-day results and show that while TCES of P6 does not produce the benefit derived from Neiguan point ACP, it is a useful non-toxic and cheap adjuvant to standard antiemetics in patients having cancer chemotherapy.

Side effects

Apart from a transient skin rash in two patients using the ECG electrode there were no other side effects in the whole study.

Discussion

Transcutaneous electrical stimulation of the P6 (Neiguan) point is clearly a compromise between the highly effective acupuncture and what can be adopted as a routine adjunct to treatment. Self-administration was easy for most patients and one hopes to develop a simplified stimulator which could make this technique more widely available. The only possible contraindication to its use would be in patients with cardiac pacemakers[13]. Skin rashes, although reported by others using the large electrodes[14] were not a major problem. The reason why patients used a higher current than their medical attendants is not clear - perhaps they felt that the stronger sensation would produce better results. The only implication of this is in battery life.

These studies were all completed before the introduction of the $5HT_3$ blockers as antiemetics[15,16]. The ultimate use of our technique, at least in the Western world, will depend on the efficacy and safety of these new drugs. Since transcutaneous electrical stimulation is relatively cheap, it should find a place when the cost of drugs is high in relation to availability of finances for medical care. There may be a number of patients who would prefer to avoid further medication and feel that self-administration of electrical stimulation of P6 would allow them to play some part in their own treatment.

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