ELECTROACUPUNCTURE IN THE TREATMENT OF POST-TRAUMATIC SYMPATHETIC DYSTROPHY (SUDECK'S ATROPHY)

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SUMMARY
Twenty patients with established post-traumatic sympathetic dystrophy were treated with electroacupuncture after physical therapy with or without oral medication had failed to produce satisfactory relief of symptoms. Of these patients 14 (70%) experienced marked and permanent improvement. No complications were encountered. The possible mechanisms involved are discussed.

Following injury to an extremity a proportion of patients develop pain, swelling, tenderness, stiffness and vasomotor disturbances in the limb (Mitchell, Morehouse and Keen, 1864; Homans, 1940; Kleinert et al., 1973), an entity commonly called Sudeck's atrophy (Sudeck, 1900) or post-traumatic sympathetic dystrophy. The mechanism involved is poorly understood (Richards, 1967). The intensity of the pain can vary from mild to extremely severe and may result in disability. Many patients recover gradually with physiotherapy and analgesic drugs (Kleinert et al., 1973; Mayfield, 1975). However, in resistant cases, other methods have been advocated, including repeated stellate ganglion block (Kleinert et al., 1973), cervical sympathectomy (Barnes, 1953), regional administration i.v. of a sympatholytic drug (Hannington-Kiff, 1977), and the local continuous instillation of anaesthetics (Omer and Thomas, 1971)—all with varying effects. The purpose of this paper is to report our experience in the use of electroacupuncture in the treatment of this condition.

PATIENTS AND METHODS
In the period May 1978 to December 1979, more than 3000 patients with hand injuries were admitted into the Orthopaedic Unit, Queen Mary Hospital, Hong Kong and 20 developed persistent pain, tenderness, swelling and stiffness of the hand despite at least 1 month of treatment with analgesics and intensive physiotherapy (active exercises, gentle passive mobilization, massage and ice-packs). These patients were assessed by one of the authors (S. P. C.) and it was decided to try acupuncture with electrical stimulation. Physiotherapy was continued.

There was an equal number of men and women and their ages ranged from 24 to 77 yr. The initial injuries included fractures (nine patients), crushed hands (four patients), lacerations or cuts (four patients) and sprain (three patients). Electroacupuncture was started 1–6 months following the initial injury and was carried out by one of the authors (C. S. C.) as follows. The written consent of the patient was obtained after careful explanation of the technique. All acupuncture needles were autoclaved. They were inserted through the skin after preparation of the skin with antiseptic. Acupuncture loci were used for the insertion of the needles, as it is well known that the loci are associated with nerves or rich nerve endings. Only loci on the affected limb were used. However, the loci used were not selected as precisely as recommended in the Chinese acupuncture texts, but based on a knowledge of the regional innervation, and at the site of maximal complaint. Four loci were used at each session of treatment. After insertion the needles were grouped into two pairs, so that each pair lay along the course of a regional nerve or blood vessel. The needles were connected to a stimulator which was powered by a 9-V dry battery. A monophasic electrical pulse of 50 Hz was passed for 20–30 min. Pulse duration was 0.4 ms. The intensity of the current was adjusted to give maximal stimulation without discomfort or pain. Altogether 5 to 10 sessions were given to each patient, on either consecutive or alternate days.

The range of movement of joints and the power of gripping and pinching were assessed by an
occupational therapist both before and after treatment. The degree of swelling and the extent of erythema and tenderness were noted. The patient's subjective assessment of the degree of pain relief was graded as "marked" (with complete relief or two-thirds of pain relieved), "some" (between one-third to two-thirds of relief), and "nil" (with less than one-third improvement).

RESULTS

Immediate results

No patient became worse after acupuncture and there were no complications. Improvement usually became evident after the third session of treatment. The degree of pain relief obtained is presented in table I. The two patients who did not respond to treatment had a fracture of the lower end of the radius with laceration of the median nerve, and a badly crushed forearm with adhesions around the nerve.

Alterations in the power of gripping and pinching, before and after electroacupuncture, were recorded in 10 patients. Nine had marked subjective decrease in pain, and in eight muscle power improved markedly. The remaining patient had no subjective decrease in pain and muscle power showed a minimal increase. The correlation between subjective relief of pain and increase of muscle power was good.

On the other hand, the improvement in range of movement was unimpressive. Of 10 patients in whom the range of movement was recorded, only three showed any improvement.

Swelling was decreased to a variable degree, indicated by wrinkling of skin (figs 1 and 2). Erythema decreased at the same time.

Late results

In March 1980, the condition of the patients was re-assessed, that is from 3 to 22 months after electroacupuncture. Information on 17 patients was obtained. All the patients showing "marked" and "some" pain relief initially had either retained this degree of improvement or had improved further.

Of the two patients showing no improvement initially, one had an exploration which revealed a badly lacerated median nerve at the wrist. The other patient had died in a fire.

<p>| Table I. Subjective improvement in pain relief at end of course of electroacupuncture |
|-----------------------------------------------|---------------------------------|-----------------|-----------------|</p>
<table>
<thead>
<tr>
<th>Number of patients</th>
<th>Worse</th>
<th>No improvement</th>
<th>Some improvement</th>
<th>Marked improvement</th>
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DISCUSSION

Acupuncture loci may be located by variations in d.c. skin conductance (Reichmanis, Marino and Becker, 1976) and since many acupuncture loci are distinct local conductance maxima they can be determined objectively. However, not all acupuncture loci may be objectively determined. It is recommended that the method of loci location described above be used for the selection of points for acupuncture, including the point(s) at the site of maximum discomfort.

The passage of the electric current during electroacupuncture may act locally to relax the post-capillary sphincters, thus improving the local circulation and thereby relieving local oedema and swelling. That the relief of pain in these patients should be improved is not difficult to understand from the recent discovery of endogenously released morphine-like substances. Acupuncture stimulation sends ascending impulses to the brain, causing release of endorphins and encephalins. These are bound to specific morphine receptors located in the periaqueductal grey area, resulting in activation of a descending inhibitory pain pathway which modulates pain transmission (Bonica, 1977; Yang and Kok, 1979). Since most Chinese patients have faith in acupuncture as a form of therapy, psychogenic factors play a role also.

Once the pain decreased the patients started to exercise more actively, thus decreasing the oedema and stiffness. The vicious cycle of post-traumatic sympathetic dystrophy was broken; the power of grip and pinch improved. However, the range of movement had not improved significantly at the end of treatment. This is not surprising since, in a hand injury, injury to bone, tendon and scarring can cause stiffness apart from the pain and swelling and even in those patients without these concomitant injuries, stiffness may take several weeks to resolve.

Only two patients (10%) in this series showed improvement of less than 33% and were noted as showing no improvement because a placebo could achieve a similar result (Beecher, 1959). One of these patients was found to have a lacerated median nerve at the wrist which probably explained why electroacupuncture failed. The overall result of "marked" improvement in 70% of patients and "some" improvement in another 20% was remarkable and compared favourably with the results from other methods of treatment of this condition (Omer and Thomas, 1971; Kleinert et al., 1973).

REFERENCES

ELEKTROAKUPUNKTUR BEI DER BEHANDLUNG VON POST-TRAUMATISCHER SYMPATHETISCHER DYSTROPHIE (SUDECK-ATROPHIE)

ZUSAMMENFASSUNG

ELECTROACUPUNTURA EN EL TRATAMIENTO DE LA DISTROFIA SIMPÁTICA Y POSTTRAUMÁTICA (ATROFIA DE SUDECK)

SUMARIO
A veinte pacientes con distrofía simpática y postraumática se les trató con electroacupuntura, después de que la fisioterapia, con o sin medicamentos orales, hubiera fracasado en producir un alivio satisfactorio de los síntomas. Catorce de estos pacientes (70%) experimentaron una marcada y permanente mejoría. No se encontraron complicaciones. Se discuten los posibles mecanismos involucrados.