THE DIAGNOSIS OF REFLEX SYMPATHETIC DYSTROPHY USING AN ALGOMETER

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Thirty-three patients with reflex sympathetic dystrophy were studied prospectively to ascertain the pressure-pain threshold of affected and unaffected limbs. The affected side had a lower threshold which was found to be statistically significant.

In all 18 patients with upper limb involvement, the pain threshold was reduced on the affected side, but this applied to only 11 of the 15 with leg involvement. This difference may be because patients with lower limb symptoms had been referred later in the course of the syndrome. We showed by repeated tests that after an average of 49 days there was a slow return to normality.

The estimation of pressure-pain thresholds may help in the earlier diagnosis of reflex sympathetic dystrophy.

The diagnosis of reflex sympathetic dystrophy (RSD) is usually easy in patients with the typical history of minor injury followed by prolonged pain, swelling, stiffness and colour changes, and the characteristic features on a plain radiograph of the affected area. However, it is more difficult to make the diagnosis in patients who have an atypical history with, for example, pain but no swelling or vasomotor instability and no radiographic changes, and in those who may have some of these symptoms as a direct consequence of their original injury.

As time is of the essence, in terms of relieving pain and restoring function, simple, objective, reproducible tests are needed to confirm the diagnosis.

Isotope bone scans reveal characteristic changes in RSD (Kozin et al 1981) but this technique has its limitations. The patients are exposed to ionising radiation and there are often delays before the scan can be performed and the result reported, especially for menstruating women.

Skin temperature changes to cold stress testing were reported to be abnormal in patients with RSD but this technique failed to distinguish between those patients and another group with poorly defined chronic pain (Cooke et al 1989). This test requires a sophisticated thermography system which is rarely available.

Changes in the skin potential and conductance to various sympathetic stimulants have also been reported but this method also requires special equipment and some expertise in carrying out the test, and its interpretation (Cronin and Kirschner 1982).

Pressure-pain thresholds have been measured with a simple instrument called a dolorimeter (Atkins and Kanis 1989). They obtained readings in a group of 12 patients with RSD following Colles’ fracture and compared them with a group of 12 age-and-sex-matched controls. A ratio of the threshold values on the affected and unaffected sides was calculated and found to be helpful in diagnosing RSD. The average ratio was less than 0.6 in patients with a clinical diagnosis of RSD and 0.98 in normal volunteers. Furthermore, there was no overlap between the two groups.

PATIENTS AND METHODS

We undertook a prospective study of 33 patients referred from fracture clinics throughout Merseyside with a diagnosis of RSD. This diagnosis was made only if the patient had severe, persistent pain and a clear history of a precipitating event. In addition, the patient had to have either swelling, stiffness, vasomotor instability or abnormal sweating and characteristic changes on an isotope bone scan.

Patients were excluded from the study if their symptoms had been present for more than six months or
if they had received specific treatment for RSD, such as sympathetic blocks.

We measured the pressure-pain threshold on the affected and unaffected limb respectively using a Somedic alometer. This is a commercially available clamp with rubber-tipped jaws attached to a pistol grip handle; a flexible cable connects the clamp to the main body of the instrument.

The jaws are placed over the dorsal and volar surfaces of an interphalangeal joint. We used the thumb for upper limb involvement and the great toe for those with lower limb symptoms. Pressure is increased in a controlled fashion, and is displayed electronically. The patient has a button switch and is asked to press it when the perceived sensation changes from pressure to pain. At this point the pressure is recorded and no further increase in the pressure applied. The unaffected side is examined first, then the affected side, and three measurements are taken on each side and averaged.

The average threshold values for the affected and unaffected sides were compared using a paired t-test, and recorded as a ratio of the affected side divided by the unaffected side.

RESULTS
Pressure-pain thresholds were determined in 33 patients, 22 women and 11 men, with an average age of 55 years (SD 10). The upper limb was involved in 18 patients and the lower limb in 15; on the right side in 18 and the left in 15. The average time from injury to initial assessment was 15 weeks (SD 4.3).

The mean pressure-pain threshold was usually lower on the affected side, and tended to be lower in the leg (Table I). There was more variation in pressure-pain threshold on the affected side.

Lower limb involvement. The 15 patients who were assessed had an average age of 54.7 years (SD 7.6). There were nine women and six men. The right limb was affected in seven patients and the left in eight. A fracture was the precipitating event in 11 patients, an operation in three and a soft-tissue injury in one. The average time from injury to assessment was 17.2 weeks (SD 3.9). The pressure-pain threshold was lower on the affected side in 11 of the 15 patients.

Upper limb involvement. The 18 patients included 13 women and five men; their average age was 54.5 years (SD 12.2). The right limb was affected in 11 patients and the left in seven. The precipitating trauma was a fracture in 14 patients, a dislocation in one and a soft-tissue injury in three. The average time from injury to first assessment was 13.9 weeks (SD 4.0).

The threshold on the affected side was lower than on the unaffected side in all 18 patients.

Follow-up test. The pressure-pain threshold was measured again, in 32 patients, an average of 49 days after entering the study and starting treatment. The mean values for the pressure-pain threshold at the second assessment are presented in Table II.

DISCUSSION
A clinically reproducible test which facilitates early diagnosis of RSD will help the management of such patients, since early diagnosis and treatment is important if pain is to be relieved and normal function restored.

Our study confirms that there is a significant lowering of the pressure-pain threshold on the affected side in patients with RSD. Like Atkins and Kanis (1989) we found that the ratio of the thresholds on the affected and unaffected sides gave complete accuracy in identifying patients with RSD of the upper limb. However, in lower limb cases, this ratio gave only 73% accuracy.

One of the four lower limb patients with a ratio of more than one had generalised sensory loss to the affected foot as the sequel of an earlier compartment syndrome, and this may have caused the spurious result. Two of the other three had ratios above one, but they fell within the range of normal values. There is no obvious explanation for the misleading result in the remaining patient.

The mean ratio for patients with lower limb involvement was 0.77 and the 95% confidence interval for this ratio is 0.77 ± 0.17. To eliminate overlap with the normal range, 0.77 can be set as the cut-off figure. Any patient who has a ratio of 0.77 or less is then very likely to have RSD though the diagnosis cannot be excluded in patients with a ratio of between 0.77 and 1.0.

What factors can account for the apparent difference between the upper and lower limb thresholds? This may reflect a true difference in the changes produced by this condition at the two sites or it may represent a normal difference in their relative sensitivity. If the latter is true,
then smaller alterations to the threshold values in the hand are more easily detected.

The other variable which was noticeably different between the two groups was the time lag between injury and referral for initial assessment. This was much longer in those with lower limb involvement. It may be that they had reached a more advanced stage and that the neurological changes were resolving. This explanation is supported by the observation that on re-testing the patients after an average interval of 49 days the difference in pressure-pain threshold between the limbs had disappeared in those with lower limb involvement and was reduced in those with upper limb involvement.

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REFERENCES


