

Intercostal block with cryotherapy

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Summary

A retrospective survey of 70 patients treated from 1982 to 1984 for chronic intercostal pain with cryotherapy to the intercostal nerves is presented. The results with patients suffering from postherpetic neuralgia are so poor that the authors cannot recommend this form of treatment for this condition. The results with patients suffering from thoracic surgical scar pain are significantly better ($P < 0.005$) and support the use of the cryoprobe for this condition.

Introduction

Several reports have appeared regarding cryotherapy for the treatment of thoracotomy scar pain in the postoperative period (1-4). Few reports appear in the literature regarding the use of cryotherapy for the relief of chronic pain (5).

The common causes of chronic thoracic pain include pain from thoracotomy scar, postherpetic neuralgia, nerve root pain due to vertebral collapse and carcinoma. Previous reports of cryotherapy to the intercostal nerves for chronic pain do not include the cause of pain and it is difficult to assess the effectiveness of this treatment for a specific condition. Since the procedure may have to be repeated every two to four weeks it is also important to evaluate patient acceptance (5).

Method

Over a three year period (1982 to 1984) 70 patients were treated in the Pain Clinic at the University Hospital of Wales with cryotherapy to intercostal nerves for a variety of conditions.

Intercostal nerve block was performed in the prone position on an operating table. Intravenous sedation and analgesia was provided with fentanyl (0.01 - 0.02 $\mu\text{g}/\text{kg}$) and Diazemuls® (Kabi Vitrum) (0.1 mg/kg). With aseptic technique, the skin and tissues were infiltrated down to the rib using lignocaine 1% with 1:400,000 adrenaline. Under x-ray control the caudad edge of the rib at the rib angle, 4-6 cms lateral to the spinous process, was located using a 12 swg Medicut® cannula. The cryoprobe was inserted through the cannula and 'walked under' the rib at an angle of 45° to the skin.

Two freeze/thaw cycles of 2.5 min were performed at each space. No preliminary nerve stimulation was used.

TABLE I Causes of intercostal pain in the study group

Cause of pain	No. of patients (%)
Scar pain	34 (48.6)
Postherpetic neuralgia	17 (24.3)
Carcinoma	5 (7.1)
Root pain	6 (8.5)
Miscellaneous	8 (11.4)

Cryotherapy was applied at the sensory level of the pain, and one intercostal space above and below that level.

The average duration of time to complete the procedure was 45 min (range 30-60 min). All patients were treated as day cases and discharged 2-3 h after the procedure. Chest X-rays were only taken if a pneumothorax was suspected.

After treatment each patient was sent a questionnaire to assess the degree and duration of pain relief, their opinion on the procedure and the duration of the pain before treatment.

Results

Fifty eight patients replied, a response rate of 82.8%. However, not all patients responded to every question, and this explains the difference in numbers in our results. Four patients had died from carcinoma before receipt of the questionnaire. The vast majority had suffered chronic pain for more than six months before being treated, and almost half for over two years. Ages ranged from 31 to 87 years.

The two main groups of patients were those suffering from scar pain (48.6%) and postherpetic neuralgia (24.3%) (Table I). A few patients suffered from carcinoma (7.1%) or root pain (8.5%). The results from the two largest groups of patients were subjected to statistical analysis using the Mann-Whitney U test to compare the effectiveness of treatment.

There was considerable variation in the duration of pain relief. The thoracotomy scar pain patients obtained a longer duration of pain relief than the postherpetic neuralgia patients ($P < 0.005$, Table II) who obtained little or no relief. The quality of pain relief was significantly better in the scar pain group ($P < 0.004$, Table III).

The procedure was described as painful by 25% of patients, as uncomfortable by 37%, and as neither painful nor uncomfortable by only 38%.

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TABLE II Duration of pain relief after cryotherapy

Duration of pain relief	Patients with scar pain (n=26)	Patients with postherpetic neuralgia (n=14)
0-1 weeks	5	11
1-2 weeks	0	0
2-4 weeks	3	0
4-8 weeks	8	0
8-12 weeks	4	0
12-24 weeks	1	2
6-12 months	5	1

TABLE III Quality of pain relief following cryotherapy

Quality of pain relief	Patients with scar pain (n=33)	Patients with postherpetic neuralgia (n=15)
Complete	4	1
Considerable	9	10
Some	10	2
Minimal	4	2
None	6	9

Only 48% of patients were prepared to repeat the treatment, 52% of patients were not. Among the reasons for reluctance to undergo a repeat treatment was inadequacy of pain relief (10), pain during the procedure (4) and a desire for general anaesthesia (4).

There were very few side effects reported. Two reported giddiness and lightheadedness, two complained of slight swelling at the site of the procedure and one reported a 'tickly cough' lasting two weeks after treatment.

Discussion

Application of the cryoprobe to the peripheral nerves has been shown to cause Wallerian degeneration with destruction of intracellular contents but with minimal disruption of the endoneurium and other connective tissue elements. Thus there is complete motor and sensory loss, which recovers over a period of weeks (6,7).

The efficacy of pain relief appears to depend on the original cause of the chronic pain. Postherpetic neuralgia is due to the herpes zoster virus affecting the posterior spinal root ganglia with the loss of large myelinated fibres and a relative increase in small unmyelinated fibres. This damage may extend into the spinal cord. In the acute stages the disease process may be a peripheral disorder with associated vascular disturbances, which may respond dramatically to sympathectomy and neuronal blockade. Following the period of acute infection, neuronal damage is not limited

to the peripheral nerve and peripheral nociception alters to that of a central deafferentation disorder.

There is no certain cure for postherpetic neuralgia, and attempts at alleviating this condition with local anaesthetics and neurolytic agents have been marginally successful for short periods of time; these regimes have not been subjected to the rigours of controlled trials. In our experience ablation of the intercostal nerves with cryotherapy is not a widely effective treatment for thoracic postherpetic neuralgia.

It has been postulated that scar pain is caused by damage to large nerves, painful trigger points in the incision and perhaps central factors (8). With thoracic scar pain there is effective pain relief in a substantial proportion of patients following cryotherapy and a greater level of patient acceptability which is important in patients where the procedure has to be repeated every 4 to 8 weeks. However, many of these patients needed only one treatment. It may be that in the case of postherpetic neuralgia it is impossible to break a long established pain cycle. It is generally assumed that the longer the duration of pain before treatment the less successful the treatment; but many of the scar pain group had pain of considerable duration before referral, and responded to this form of therapy.

The quality and duration of pain relief was superior in those patients with scar pain when compared with those with postherpetic neuralgia in this survey and cryotherapy to intercostal nerves appears to have a valuable role in the management of post-thoracotomy scar pain.

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