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Cryotherapy for trigeminal neuralgia: A 10 year audit

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SUMMARY. **The outcome of treatment for trigeminal neuralgia was evaluated in 145 patients treated with cryotherapy, 265 patients treated with radiofrequency thermocoagulation and 65 patients treated with microvascular decompression. Median duration of pain relief was 6 months after cryotherapy and 24 months after thermocoagulation. Sixty-two per cent of patients were pain-free 5 years after decompression. When pain recurred after cryotherapy it affected the same sites as previously in 80% of patients. Repeated cryotherapy of mental and long buccal nerves, but not of infra-orbital nerves, gave more prolonged pain relief than initial cryotherapy. One third of cryotherapy and thermocoagulation patients had atypical facial pain after treatment. Psychometric testing suggested that levels of anxiety and depression were similarly reduced after the three treatment methods. Outcome data should be used to help new patients make informed choices about their treatment.**

INTRODUCTION

Lloyd *et al.* (1976) introduced cryotherapy for the treatment of trigeminal neuralgia and 15 years later the technique is still being used. Many oral and maxillofacial surgeons in Great Britain use cryotherapy for the relief of trigeminal neuralgia (Zakrzewska, 1990) but the technique is also used in Australia (Goss, 1984) and elsewhere in Europe (Politis *et al.*, 1988). Neurosurgeons, however, believe that there is little place for short term pain relief, except in debilitated patients (Zakrzewska, 1990).

Personal experience suggested that recurrence rates alone were not the sole criteria on which patients judged the success of surgery for pain-relief. A survey was therefore carried out to assess outcome after three established surgical treatments: cryotherapy, radiofrequency thermocoagulation and microvascular decompression, in patients treated in the period 1978 to 1987.

Long term follow-up is important because recurrence can occur after months or years. For example, Burchiel *et al.* (1988) have shown that 8.5 years after microvascular decompression, 58% of patients were pain free but that at 5 years 80% had been pain free.

MATERIALS AND METHODS

Assessment was performed of 475 patients with trigeminal neuralgia, of whom 145 had received cryotherapy, 265 radiofrequency thermocoagulation and 65 microvascular decompression. Mean follow-up was 45 months in all three groups (Table). The characteristics of the cryotherapy patients have been reported previously (Zakrzewska & Nally, 1988). Mean age, sex distribution and site of trigeminal neuralgia were comparable in all three groups and similar to those reported elsewhere in the literature (White & Sweet, 1969). What had not been assessed in previous surveys, either before or after surgical intervention, was the severity of the disease and its effect on quality of life.

Table 1 – Follow up times in months of patients in each group

Treatment group	Follow-up interval (In months) Mean	SD	95% Confidence Limits
Cryotherapy	44.8	25.2	48.9–40.7
Radiofrequency thermocoagulation	42.7	32.7	46.6–38.8
Microvascular decompression	44.8	32.3	52.6–37

SD = Standard Deviation

Questionnaires were sent to patients, and included the Hospital Anxiety and Depression (HAD) scale (Zigmond & Snaith, 1983), and questions about the effect of continued pain and sensory loss on quality of life. The same group of cryotherapy patients were surveyed in both 1987 and 1988 to assess reproducibility of findings. Out of a total of 427 questionnaires distributed (48 patients were not sent questionnaires because they were known to have died, or to have moved abroad or because no follow-up addresses were available), 336 (79%) were returned, including 82% from the cryotherapy patients group. Twenty-four new patients were also given the HAD scale preoperatively to assess anxiety and depression states.

Patients in whom pain recurred were also assessed after repeated cryotherapy to see if median time to recurrence was similar to that after initial treatment. Only those patients who had had repeated cryotherapy performed on the same nerve were assessed and analysis was done at each time point using the log rank test.

RESULTS

Recurrence rates

All the recurrence rates were calculated using Kaplan-Meier plots and the results are presented in the Figure. These plots are a means of predicting the probability of recurrence at any given time. They enable all patient data to be used. Patients who have died, who have been lost to follow-up or are pain free can still be included as 'censored data', if the last date of contact is known. Each step indicates a recurrence of pain. The rate of curve-flattening reflects how soon after the operation relapses can be expected. If a plot intersects the horizontal axis all patients will eventually relapse. If the plot becomes flat some patients will have permanent pain relief.

Twenty-three radiofrequency thermocoagulation patients and one microvascular decompression patient had bilateral procedures performed. At 76 months, one cryotherapy patient was still pain free; at 73 months, 28 radiofrequency thermocoagulation patients were pain free; and at 50 months, 26 microvascular decompression patients were pain free.

Median time to recurrence is a more useful measure than mean time in studies such as these, because one or two patients with a very long period of pain relief distort mean values whereas they cannot affect median values. Total pain control time was used in the cryotherapy group as a whole, as opposed to the treated individual nerves. The reasons for this have been explained previously (Zakrzewska & Nally, 1988). The median time to recurrence of pain in the cryotherapy patients was 6 months, whereas mean time to recurrence as previously reported was 10 months, and in the radiofrequency thermocoagulation patients median time to recurrence was 24 months. Among the microvascular decompression patients, 62% were still totally pain free at 5 years.

Median time to recurrence of pain after repeat cryotherapy was similar to that after initial treatment. Assessment of individual nerves, however, showed that repeated cryotherapy of the infraorbital nerve resulted in the same pain free interval as after initial treatment, whereas repeated cryotherapy of the mental or long buccal nerve gave longer pain free periods than after initial treatment ($p>0.01$). These results are different from those previously reported (Zakrzewska & Nally, 1988).

There was no correlation between duration of pain relief and patient age or duration of pain prior to surgery.

Results of the questionnaire

At the time of the questionnaire, 51 of 102 (52%) cryotherapy patients reported that they had experienced trigeminal neuralgia after treatment compared to 29% of patients in the thermocoagulation group and 13% of patients in the decompression

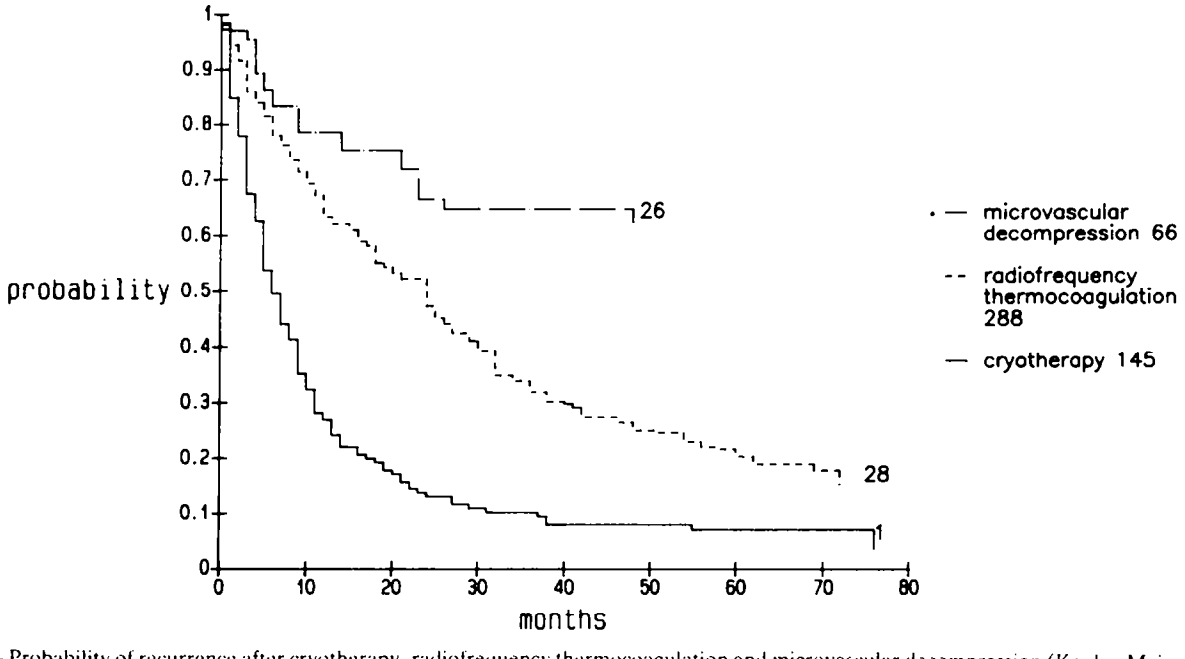

Fig – Probability of recurrence after cryotherapy, radiofrequency thermocoagulation and microvascular decompression (Kaplan Meier plot). The numbers at the end of each graph represent the numbers of patients still pain-free at that time point.

group. Eighty per cent of the cryotherapy group said the pain was in the same area as it had been previously. Thirty-six per cent of the cryotherapy patients also reported a quite different type of facial pain, which was classified as atypical facial pain. Among the radiofrequency thermocoagulation group, 29% of patients reported atypical facial pain, 8% described symptoms of *anaesthesia dolorosa* and 15% reported continuing eye problems.

At the time of the questionnaire, carbamazepine was being used by 71 (70%) of the cryotherapy patients compared to 25% and 4% in the thermocoagulation and decompression groups respectively. Cryotherapy patients noted that they had either complete numbness (28% of patients) or altered sensation (28% of patients) in the area supplied by the nerve, at least 3 months after treatment. Of those with sensory changes, 50% reported that it had adversely affected the quality of their lives to some extent.

No other complications were noted among the cryotherapy group. Seventy-four per cent of patient said that they would accept repeated cryotherapy if this was necessary. Seventy-four per cent of thermocoagulation and decompression patients also said that they would undergo the same treatment again if the pain recurred. There was no statistical differences between questionnaire replies in 1987 and 1988.

Results of the Hospital Anxiety and Depression Scale

Of the 24 patients who were assessed prior to cryotherapy, 39% were depressed and 42% were anxious. After therapy, only 15% were depressed and 30% were anxious.

DISCUSSION

Recurrence rates after peripheral procedures all appear to be similar, though Kaplan Meier plots have yet to be used to assess the success of treatment modalities other than cryotherapy and many studies have not included long term review. It is difficult to explain why repeated cryotherapy of mandibular nerves yielded better results than repeat cryotherapy of the infraorbital nerve. This study confirmed that morbidity after cryotherapy is low, whereas radiofrequency thermocoagulation results in more prolonged sensory loss (88%), *anaesthesia dolorosa* (8%) and eye problems (15%). Microvascular decompression has been shown to result in eighth nerve problems (in 11% of patients) and also has a 1% mortality risk (Burchiel, 1987). In this study, Kaplan-Meier plots (Fig.) for the cryotherapy patients became almost horizontal suggesting that there is little justification for further long-term follow up. Further long term follow-up is important, however, after microvascular decompression because late recurrence may occur (Burchiel *et al.*, 1988).

Many cryotherapy patients continued to take carbamazepine postoperatively in this investigation; some to control residual pain, some for prophylaxis and some for placebo effect. Cryotherapy may only act as adjuvant therapy in some cases and patients should be warned that drug therapy may need to be continued afterwards albeit at a lower dose. None of the cryotherapy patients developed *anaesthesia dolorosa* in this study, a condition characterised by continuous and incurable pain. Surprisingly, some patients complained of sensory changes beyond the first 3 months after cryotherapy. Prolonged sensory disturbances have rarely been reported by previous workers (Barnard *et al.*, 1981; Goss, 1984). In this study, however, it was not possible to confirm these subjective reports by clinical examination.

The apparently atypical facial pain that patients in all groups complained of after treatment may have been present preoperatively but had been masked by the severe pain of trigeminal neuralgia. The McGill pain questionnaire (Melzack, 1975) can be used to discriminate between these two conditions and should, perhaps, be a part of the assessment of all patients with chronic facial pain (Melzack *et al.*, 1986).

Of those patients who were treated with radiofrequency thermocoagulation, 75% continued to have complete sensory loss and 13% had altered sensation. Sensory loss appeared to affect patients' quality of life. In the cryotherapy patients the area of sensory loss was small whereas in the thermocoagulation patients it sometimes extended over all three divisions of the trigeminal nerve and 62% of these patients felt that it affected the quality of their lives to some extent.

Pain relief, by whichever technique, resulted in decreased depression and anxiety scores, suggesting that these psychological problems were caused by the patients' pain. It must, however, be emphasised that the patients assessed preoperatively were not the same as those analysed postoperatively and that this conclusion may be erroneous. Further long term psychometric studies are being carried out to assess patients pre-and postoperatively.

Interestingly, Arnott (1849, 1851), on the basis of only a few cases of trigeminal neuralgia treated with freezing solutions, came to the same conclusions as in this study: that the treatment provided immediate relief of pain, that it needed repeating and that some adjuvant therapy was often required. Cryotherapy continues to have a role in the surgical management of trigeminal neuralgia not least because recurrence rates are not the only criteria by which patients assess the success or failure of treatment. New patients should be given access to outcome data relating to the various forms of treatment which are available, so that they can make a more informed choice on their own treatment. This information can be made available in leaflet form.

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