

Cryotherapy in the treatment of nasal obstruction: indications in adults

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Abstract

Cryotherapy is an established method of treating hypertrophic obstructive inferior turbinates. The long-term effectiveness of the technique is assessed in this study, using the need for alternative nasal surgery as an objective way of distinguishing success from failure. Over 50 per cent of patients with obstructive symptoms, including those with minor septal deviation or allergy derived lasting benefit from the technique. Cryotherapy is an effective means of treating nasal obstruction due to mucosal hypertrophy of the turbinates and may replace the need for more radical surgery.

Key words: Cryosurgery; Rhinitis; Turbinates

Introduction

Nasal obstruction is a common symptom for which hypertrophy of the inferior turbinate is frequently responsible. While the aetiology of this may be due to allergy or vasomotor instability, sinusoidal dilatation is the common finding during periodic turbinate engorgement (McCombe *et al.*, 1992). Treatment with topical steroids, antihistamines or decongestants is often utilized as a first-line therapy, failing which a number of surgical options are available. Surgical procedures include trimming of the inferior turbinates, laser therapy, linear cautery, submucosal diathermy and cryotherapy (Elwany and Harrison, 1990). While radical trimming and laser therapy are recognized as the most effective treatments for improving the nasal airway, they require the administration of a general anaesthetic and the former in particular may be associated with significant post-operative haemorrhage (Elwany and Harrison, 1990).

Cryotherapy, by contrast, is a procedure usually performed under a local anaesthetic and apart from a transient headache, is not usually associated with significant post-operative sequelae (Moore and Bicknell, 1980). Cryotherapy has been used in our centre for a number of years to treat hypertrophy of the inferior turbinates. It was the opinion of the authors that while the initial improvement from cryotherapy was not always maintained, in many patients the effect was long-lasting and avoided the need for an alternative procedure for nasal obstruction. A retrospective analysis of 98 patients was therefore undertaken to determine the long-term efficacy of cryotherapy in our unit. Treatment success rate was equated with resolution of the

nasal obstruction and subsequent discharge from our unit, while the need for surgical treatment was regarded as failure of the cryotherapy. At no time was an objective assessment of nasal resistance made, as treatment decisions in our department, as in many others, are made on clinical grounds alone (Mygind, 1980).

Patients and methods

One hundred and nine patients, underwent cryotherapy to their inferior turbinates during a 24-month period at Hope Hospital. Of these, 98 sets of notes with details of follow-up were available for a retrospective analysis. Of the remaining 11 sets of notes, six had no adequate follow-up recorded, and it was not possible to trace the other five. The patients studied comprised 48 men and 50 women with an age range of 16 to 84 years. All had undergone the procedure for nasal obstruction clinically due to turbinate enlargement. The presence or absence of an allergic element or septal deviation was similarly abstracted from the notes. The degree of septal deviation was in no case felt to be primarily responsible for the nasal obstruction and is therefore classified as minor. The study analyses were of a heterogeneous group of patients rather than those suffering from a single nasal disorder.

Each patient had cryotherapy performed on a single occasion using the Spembly medical 142 Cryo Unit (Spembly Ltd, Andover, Hants) (see Figure 1). The procedures were performed on an outpatient basis by trainee ENT surgeons of SHO or Registrar

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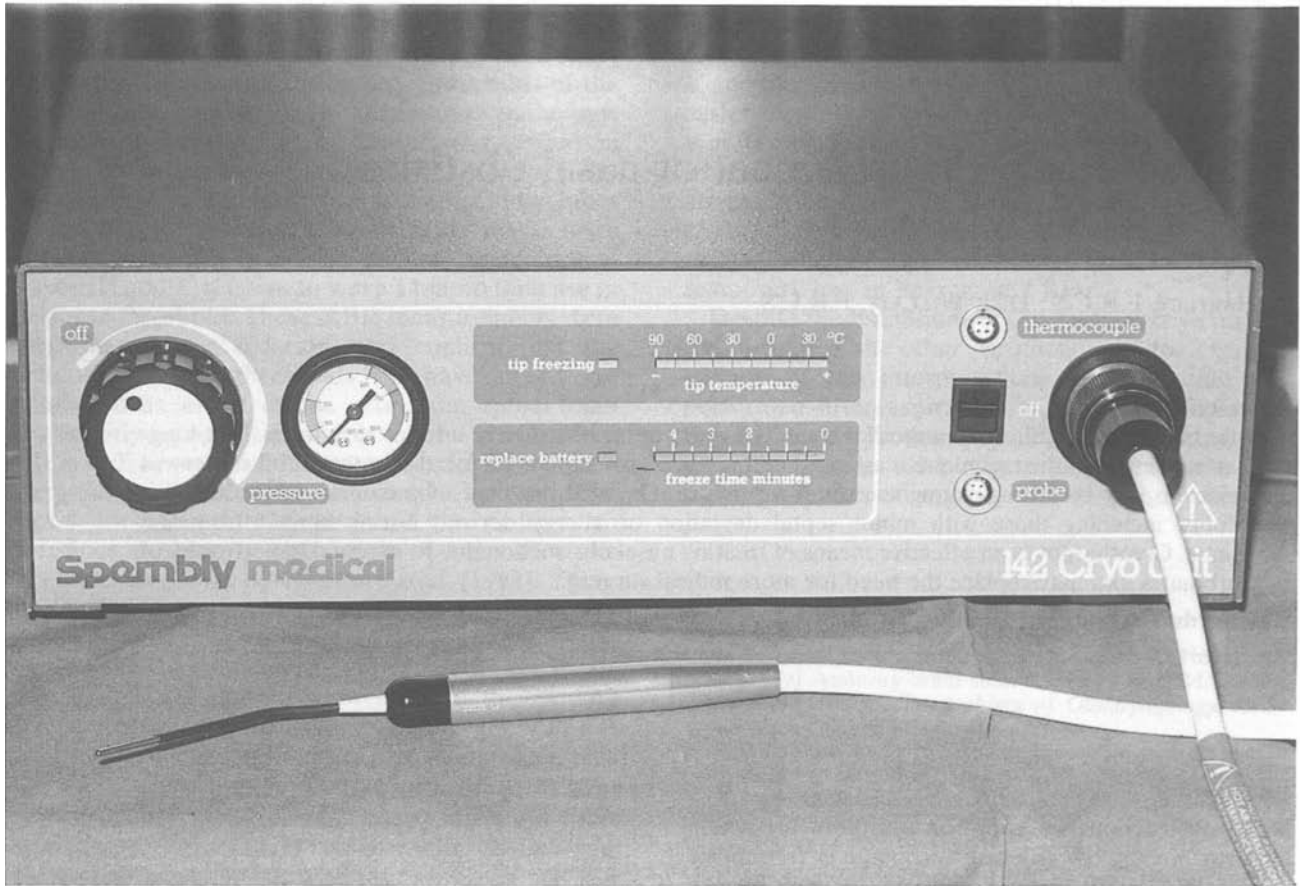


FIG. 1

Cryo Unit and cryoprobe used for treatment (Spembly Ltd. Andover, Hants).

status. Local anaesthesia was obtained using five per cent cocaine solution and/or 25 per cent cocaine paste following which the cryoprobe was applied to each inferior turbinate at two or three points, each application lasting 90–120 seconds. Standard initial review was at six weeks. Follow-up was continued until either the patient was discharged with an adequate nasal airway (successful outcome), or another surgical procedure was performed for symptoms of nasal obstruction (therapy failure). The duration of follow-up in the series was nine to 33 months (median = 22 months). Statistical analysis was performed using the chi-square test.

TABLE I
CRYOTHERAPY SUCCESS BY SEX, ALLERGIC STATUS AND SEPTAL CHARACTERISTICS

	Males		Females	
	Success	Failure	Success	Failure
No septal deviation or allergy	3	4	10	5
Septal deviation but no allergy	9	9	6	10
Allergy but no septal deviation	5	6	7	5
Septal deviation and allergy	7	5	6	1
Total	24	24	29	21

Females: chi-square = 5.43 (df = 3: ns).

Males: chi-square = 0.57 (df = 3: ns).

Total group: chi-square = 3.18 (df = 3: ns).

Results

Overall, cryotherapy was classified as having failed in 45 patients (46 per cent) (as determined by the need for an additional surgical procedure to relieve nasal obstruction) giving a success rate of 54 per cent. On the basis of positive radioimmunosorbent assay testing, 42 patients (43 per cent) were classified as having an allergic basis to their symptoms. Of these, 25 (59.5 per cent) were successfully treated by cryotherapy, compared to 28 (50 per cent) in whom allergy was not present (chi-square = 0.88 i.e. no significant difference).

Of 53 patients who had a coexistent minor nasal septal deviation and therapy 28 (53 per cent) had a favourable outcome as compared with 55.5 per cent where such a deflection was absent (chi-square = 0.07 i.e. no significant difference).

Amongst males, cryotherapy had a positive benefit in 50 per cent of cases, whilst for females the figure was 58 per cent (chi-square = 0.63 i.e. no significant difference). Table I gives a breakdown of cryotherapy outcome by sex, allergic tendency and the presence of septal deviation. Note that when the chi-square test is applied to males, females and the total group (irrespective of gender) it shows no significant differences according to the presenting group.

Discussion

Cryotherapy exerts its effects by the intracellular formation of ice crystals and subsequent cell membrane destruction (Chiossone *et al.*, 1990). The critical temperature for this process is -12°C (Fraser and Gill, 1967). Thrombosis of small vessels with subsequent ischaemia increases the tissue destruction and the effectiveness of cryotherapy (Chiossone *et al.*, 1990). The technique was first introduced as a treatment for chronic rhinitis in 1970 (Ozenberger, 1970), and its use has been widely reported since (Moore and Bicknell, 1980; Bumsted, 1984; Wengraf *et al.*, 1986). Direct comparison of different series is difficult, as patient selection and the method of cryotherapy vary significantly.

The highest reported success rate in the relief of nasal obstruction using cryotherapy in patients is 92 per cent. Selection in this series was limited to patients with pure mucosal disease of non-allergic aetiology. Those with an anatomical disorder such as septal deviation or turbinate bone hypertrophy were excluded from the study (Bumsted, 1984). Using similar exclusion criteria, Moore and Bicknell (1980) reported a 78 per cent success rate. It has been suggested that the effectiveness of cryotherapy is increased by a longer treatment duration, larger area of therapy, and repeated treatment sessions (Puhakka and Rantanen, 1977; Bumstead, 1984). In Bumstead's (1984) series, the cryoprobe was applied at four sites within each nare, compared with only two applications by Moore and Bicknell (1980). The variation in technique offers one explanation for the different success rates where patient selection appeared comparable.

In a more heterogeneous group of patients, including those with allergic rhinitis and septal deviations, relief from obstructive symptoms was achieved in 67 per cent (Chiossone *et al.*, 1990) and 83 per cent of patients (Puhakka and Rantanen, 1977). These two series had similar patient selection to our own. Thus at first glance the success rate of 54 per cent in our series may appear disappointing. However, in both these series cryotherapy was at times combined with septoplasty. The need for septal surgery in our study would have resulted in classification as a failed procedure. The criterion for success in the current series is therefore more stringent.

Many reports are based on limited length of follow-up, with review at two months or less (Moore and Bicknell, 1980; Wengraf *et al.*, 1986). It is well recognized that cryotherapy, in common with submucosal diathermy, partial turbinectomy and linear cautery is often effective in the short-term, but benefit is frequently not sustained (Warwick-Brown and Marks, 1987; Haight *et al.*, 1989). In our relatively unselected group of patients, 54 per cent obtained relief of their symptoms for between nine and 33 months (median = 22 months).

Many authors have drawn attention to the importance of adequate patient selection in order to maximize the effectiveness of cryotherapy (Principato, 1979; Bumsted, 1984). Cryotherapy will

not alleviate nasal obstruction secondary to turbinate bone hypertrophy or major septal deviation. However, our results suggest that cryotherapy can provide long-term benefit in patients with mucosal hypertrophy of the inferior turbinates when a minor anatomical abnormality is present. While our success was greater in patients with than without allergy and slightly worse when a minor septal deviation was present, these differences were not significant. Thus, unlike some authors (Moore and Bicknell, 1980; Bumsted, 1984), we will continue to use cryotherapy when there is an allergic component to the symptoms, or a minor septal deviation. Overall, adopting our less stringent criteria for cryotherapy treatment results in a greater total number of patients treated successfully when compared to its restriction to those with pure mucosal disease. In many cases septal or more radical turbinate surgery requiring an inpatient stay has been avoided consequently decreasing patient morbidity and increasing cost-effectiveness. Our future results may be enhanced by routinely identifying those patients with turbinate bone rather than mucosal hypertrophy by the use of sympathomimetics in the clinic environment. We may further improve our success rates by the repeated application of the cryoprobe at monthly intervals as described by Puhakka and Rantanen (1977).

The continued use of cryotherapy in nasal obstruction secondary to mucosal hypertrophy of the inferior turbinates is supported. Patients with an allergic basis to their symptoms or who have a minor septal deviation should not be denied this treatment.

References

- Bumstead, R. M. (1984) Cryotherapy for chronic vasomotor rhinitis: technique and patient selection for improved results. *Laryngoscope* **94**: 539–544.
- Chiossone, E., Gutierrez, J. R., Emmanuelli, J. L. (1990) Cryosurgery of the inferior nasal turbinates. *Auris, Nasus, Larynx* **17**: 87–93.
- Elwany, S., Harrison, R. (1990) Inferior turbinectomy: comparison of four techniques. *Journal of Laryngology and Otology* **104**: 206–209.
- Fraser, J., Gill, W. (1967) Observations on ultra-frozen tissue. *British Journal of Surgery* **54**: 770.
- Haight, J. S. J., Gardiner, G. W. (1989) Nasal cryosurgery and cautery: should the septum be treated and is a diagnosis relevant? *Journal of Otolaryngology* **18**(4): 144–150.
- McCombe, A. W., Cook, J., Jones, A. S. (1992) A comparison of laser cautery and sub-mucosal diathermy for rhinitis. *Clinical Otolaryngology* **17**: 297–299.
- Moore, J. R. M., Bicknell, P. G. (1980) A comparison of cryosurgery and submucosal diathermy in vasomotor rhinitis. *Journal of Laryngology and Otology* **94**: 1411–1413.
- Mygind, N. (1980) Measurement of nasal airway resistance – is it only for article writers? *Clinical Otolaryngology* **5**: 161–163.
- Ozenberger, J. M. (1970) Cryosurgery in chronic rhinitis. *Laryngoscope* **80**: 723–734.
- Principato, J. J. (1979) Chronic vasomotor rhinitis: cryogenic and other surgical modes of treatment. *Laryngoscope* **89**: 619–638.
- Puhakka, H., Rantanen, T. (1977) Cryotherapy as a method of treatment in allergic and vasomotor rhinitis. *Journal of Laryngology and Otology* **91**: 535–539.
- Warwick-Brown, N. P., Marks, N. J. (1987) Turbinate surgery:

how effective is it? *Journal of Otolaryngology, Rhinology and Laryngology* **49**: 314–320.

Wengraf, C. L., Gleeson, M. J., Siodlak, M. Z. (1986) The stuffy nose: a comparative study of two common methods of treatment. *Clinical Otolaryngology* **11**: 61–68.

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