

# Degloving of the inferior turbinates: pilot study to assess the effectiveness of a new technique in turbinate reduction

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## Abstract

A pilot study to assess the safety and efficacy of 'degloving' of the inferior turbinate is described. This prospective study reports on the effectiveness of the technique in 37 patients with nasal obstruction due to inferior turbinate hypertrophy. Both objective and subjective measurements of nasal patency were made pre-operatively, and repeated at six weeks, six months and two years post-operatively using nasal inspiratory peak flow rates, saccharin clearance time and an end referenced visual analogue scale to record nasal symptoms.

There was a significant improvement in the peak inspiratory flow at six weeks (96.4 to 151.2 l/min) and at six months (148.4 l/min), which was sustained at two years (117.1 l/min,  $p < 0.001$ ). There was an overall improvement in patient satisfaction with nasal symptoms (23.4 to 76.7, 76.8 and 66.8 at six weeks, six months and two years,  $p < 0.001$ ) and a decrease in the sensation of nasal obstruction (71.9 to 21.5, 32.9 and 29.8,  $p < 0.001$ ), which was also sustained. Rhinorrhoea was reduced, and sense of smell increased across the group, but the improvements did not reach statistical significance. The results for postnasal drip and saccharin clearance did not show a significant change over the period of the study. There were no haemorrhagic complications in the group studied.

This pilot study demonstrates a new surgical technique for reduction of the inferior turbinates, that yields significant improvement in nasal obstruction, an acceptably low complication rate and is well tolerated by patients. A randomized controlled trial is being planned.

**Key words:** Turbinates; Nasal Obstruction; Nasal Mucosa, surgery; Outcome Assessment (Health Care)

## Introduction

Chronic nasal obstruction due to inferior turbinate hypertrophy is a common symptom. Inflammatory nasal conditions including non-allergic and allergic rhinitis may cause turbinate hypertrophy as a result of collagen deposition and mucous gland hyperplasia.<sup>1</sup> Mucosal swelling of the inferior turbinates is the main factor contributing to obstruction both at the level of the nasal valve and the inferior part of the nose.<sup>2,3</sup> Nasal airway resistance studies have shown that selective decongestion of the inferior turbinate decreases airway resistance by up to two-thirds.<sup>3,4</sup>

Medical treatment in the form of topical nasal steroid sprays and systemic anti-histamines are usually the first line of treatment in these conditions. Surgery is offered when the inferior turbinates become hypertrophied and unresponsive to medical treatment or due to patient preference. Surgical approaches to reduce obstruction include linear cautery, submucosal diathermy, cryosurgery, lateral outfracture, antrochoanopexy, submucous turbinoplasty, laser turbinectomy, partial inferior

turbinectomy and total inferior turbinectomy. The variety of procedures reflects the lack of an effective technique with an acceptably low haemorrhage rate.

Clinical improvement with turbinectomy is sustained over the long term,<sup>5,6</sup> and fear of subsequent atrophic rhinitis and ozaenia has not been substantiated. Some surgeons however are reluctant to perform this procedure due to the significant risk of haemorrhage, reported in up to 10 per cent of patients.<sup>7</sup> Submucous diathermy is the most widely used technique, but is associated with a relapse rate of up to 50 per cent at two years.<sup>8</sup> Lateral outfracture is associated with minimal morbidity but results are temporary as the turbinate resumes its original position.<sup>7</sup>

This prospective study describes the technique of 'degloving' of the inferior turbinates and reports on the effectiveness of the technique by comparing objective and subjective measures both pre-operatively and post-operatively at six weeks, six months and a minimum of two years.

## Materials and methods

'Degloving' of the inferior turbinate is a partial but radical turbinectomy procedure, which offers the advantage of removing hypertrophied turbinate tissue along the whole length of the inferior turbinate while leaving the turbinate bone intact.

Under general anaesthesia the nose is prepared using Moffats solution to vasoconstrict the mucosal lining of the inferior turbinates. A number 15 blade is used to incise the anterior aspect of the turbinate, the incision passing down to the periosteum of the turbinate bone and extending along both the superior and inferior aspect of the turbinate to its posterior extremity (Figure 1). A Freer dissector is used to elevate the soft tissue of the turbinate leaving both the bone and the periosteum of the turbinate intact. Once the mucosal flap has been elevated the specimen is removed with Tilley's nasal forceps, together with the mulberry end of the inferior turbinate if this is present.

The nose is packed with Merocel nasal packs, which are removed the first morning after surgery. There is usually a short, brisk bleed on pack removal, which settles with conservative treatment. The patient is discharged on twice-daily Betnesol drops and alkaline nasal douches for six weeks post-operatively to reduce crusting. Co-amoxiclav is prescribed for 10 days to reduce the risk of infection.

A prospective study was performed to assess the efficacy of degloving comparing both objective and subjective measures of nasal patency pre-operatively (within one week of operation), and at six weeks, six months and two years. Thirty-seven consecutive patients (24 men and 13 women with a mean age of 34 years, range 17–73) placed on the waiting list for degloving of the inferior turbinate were entered in the study. Entry criteria were patients with chronic nasal obstruction due to inferior turbinate hypertrophy in the absence of any other nasal pathology e.g. deviated nasal septum, nasal polyps, and infection. Patients who had had previous surgery were excluded. All patients had suffered from nasal

symptoms (nasal obstruction, rhinorrhoea and sneezing) secondary to turbinate hypertrophy for a minimum of one year, had used nasal steroids for a minimum period of six months, and were still using them during the immediate pre-operative period.

Nasal patency was measured using the peak inspiratory airflow readings from a Youlton nasal peak flow meter. Five measurements were taken and the highest value obtained was recorded.<sup>9</sup> Mucociliary clearance was assessed by the saccharin clearance time.<sup>10</sup> Rhinological symptoms (nasal blockage, rhinorrhoea, postnasal drip, sense of smell and satisfaction with nasal symptoms) were scored using a 10 cm end referenced visual analogue scale.<sup>11</sup>

The same consultant surgeon performed all operations, and measurements were performed by one of four registrars.

Data sets were examined by repeated measures analysis of variance using SPSS. The mean values and standard error bars were displayed graphically.

## Results

Thirty-seven patients attended for surgery, 35 attended the six-week assessment (95 per cent follow up), but only 19 patients could be reviewed at six months and two years (51 per cent follow up), which is a common problem in nasal surgery studies. Of the non-responders at two years four patients refused to attend as they now lived considerable distances from the hospital, two failed to keep appointments on two occasions, and 12 could not be contacted. Telephone numbers were sought from directory enquiries, letters sent to recorded addresses and registered GP surgeries were contacted, but these patients could not be traced.

There was a significant improvement in peak nasal inspiratory flow at six weeks (96.4 l/min pre-op to 151.2 l/min), six months (148.4 l/min), and at two years (117.1 l/min,  $p < 0.001$ ). The result remained significant despite a slight progressive decline in effect (Figure 2).

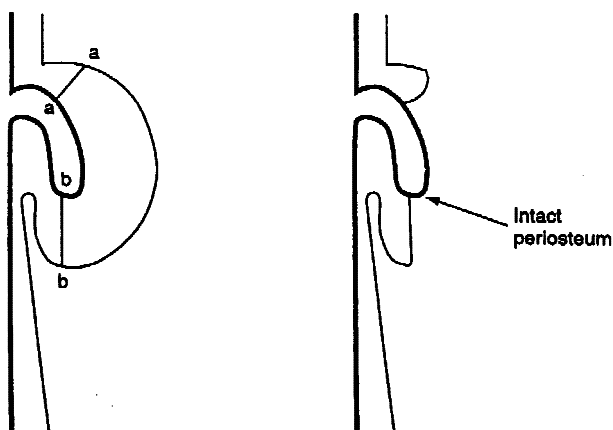


FIG. 1

Diagrammatic representation of surgical technique. a-a and b-b show line of surgical incision. The end result is demonstrated.

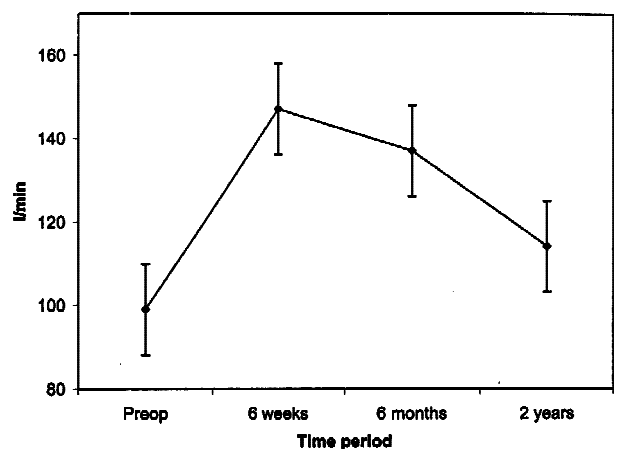


FIG. 2

Peak nasal inspiratory flow (l/min), with S.E. bars.  $p < 0.001$  at two years.

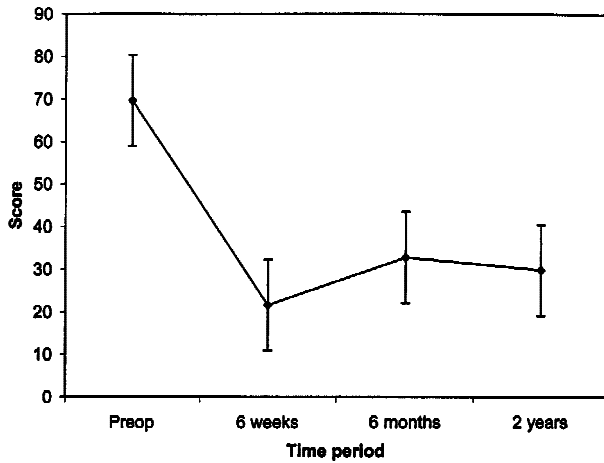


FIG. 3

Sensation of nasal obstruction: Subjective sensation of nasal obstruction as recorded on visual analogue scale (score out of 100), with S.E. bars shown.  $p < 0.001$  at two years.

There was a significant decrease in the sensation of nasal obstruction (71.9 to 21.5, 32.9 and 29.8 at six weeks, six months and two years respectively,  $p < 0.001$ ) (Figure 3), and there was an increase in satisfaction with patient assessment of their nasal symptoms (23.4 to 76.7, 76.8 and 66.8 at six weeks, six months and two years,  $p < 0.001$ , Figure 4). These were both maintained throughout the study period.

Olfaction increased (55.2 to 76.1, 67.9 and 82.9,  $p = 0.061$ ) and rhinorrhoea was reduced (41.2 to 33.0, 29.3 and 37.9,  $p = 0.261$ ) but the improvements failed to reach statistical significance across the study (Figures 5 and 6). The results for post-nasal drip (50.5 to 22.1, 28.5 and 41.3,  $p = 0.121$ ) and saccharin clearance were unchanged.

## Discussion

There are many published reports of various techniques for turbinate reduction in the literature,

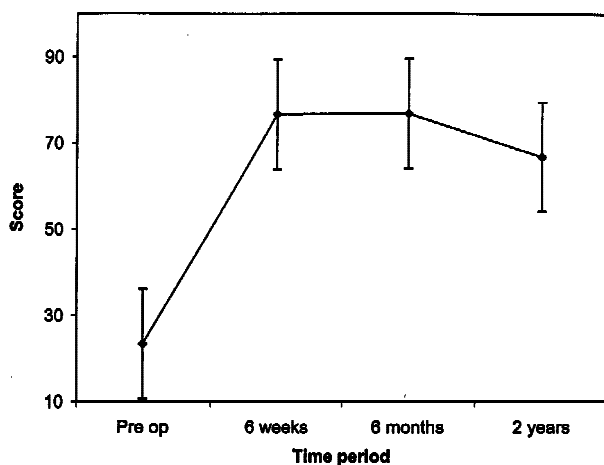


FIG. 4

Patient satisfaction: Subjective level of satisfaction with nasal symptoms as recorded on visual analogue scale (score out of 100), with S.E. bars shown.  $p < 0.001$  at two years.

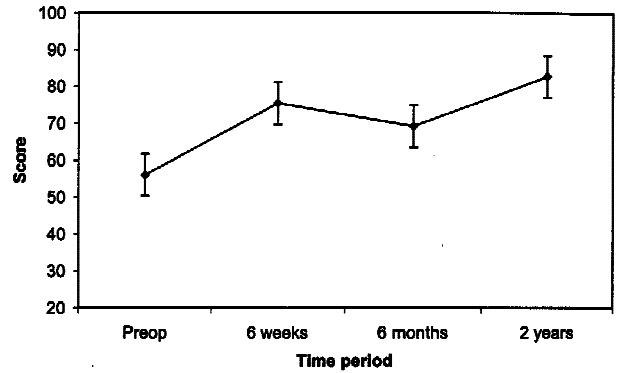


FIG. 5

Sense of smell: Subjective sense of smell as recorded on visual analogue scale (score out of 100), with S.E. bars shown.  $p = 0.061$  at two years.

but no randomized controlled trials, and the evidence supporting any technique remains debatable.<sup>12</sup> Most studies lack reproducible objective measurements of nasal function, and it is therefore difficult to compare results achieved with different techniques.

A study of over 300 patients treated with submucosal diathermy (SMD) or linear cautery demonstrated subjective improvement in 82 per cent of patients at one month, but falling to 54 per cent at one year.<sup>13</sup> Rhinomanometry studies confirm that while resistance is reduced two months post-operatively following SMD, there is no significant difference between before surgery and at 15 months post-treatment.<sup>14</sup> Several different types of lasers have been used for the reduction of turbinates. Surgery may be performed as a day-case procedure under local anaesthetic, with few haemorrhagic complications reported in the literature. Cook *et al.* claim that the reduction in subjective nasal airway obstruction achieved with laser cautery to the inferior turbinates is maintained one year after

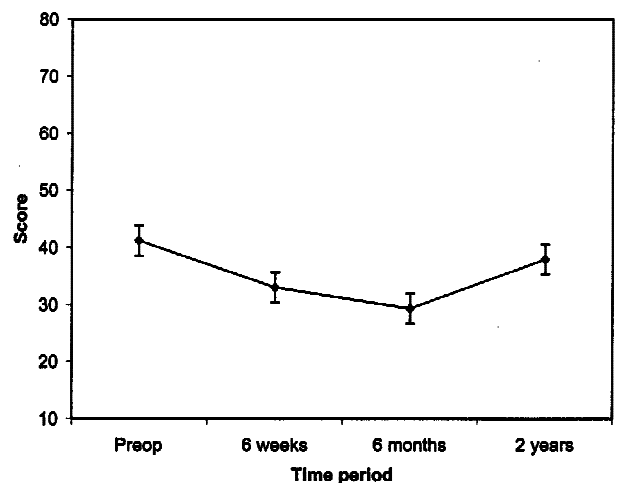


FIG. 6

Rhinorrhoea: Subjective assessment of rhinorrhoea as recorded on visual analogue scale (score out of 100), with S.E. bars shown.  $p = 0.261$ .

surgery,<sup>15</sup> despite there being no measurable improvement in peak nasal inspiratory flow. However, a review of the literature regarding laser turbinectomy notes that although in published studies this procedure achieves comparable or better results than most conventional techniques, it appears to be less effective in the long term.<sup>16</sup>

Total inferior turbinectomy achieves significant reduction in subjective nasal obstruction, and is maintained in 80 per cent of patients at two years.<sup>17</sup> Total resection is associated with significantly more post-operative pain and haemorrhage than other techniques, and long-term crusting and dryness in some patients. There appears to be no benefit from anterior trimming in terms of subjective improvement in airway obstruction.<sup>2</sup> Antro-conchopexy,<sup>18</sup> and out-fracture of the turbinates<sup>19</sup> have both been shown to reduce obstruction short-term but there are no long-term studies comparing their efficacy.

'Degloving' of the inferior turbinate is a partial but radical turbinectomy procedure, which offers the advantage of removing hypertrophied turbinate tissue along the whole length of the inferior turbinate while leaving the turbinate bone intact. Our study demonstrates subjective improvement in 97.1 per cent of patients six weeks after surgery, falling to 89.5 per cent in those followed up at two years, which compares favourably with published results for other techniques. There was improvement in nasal peak flow rates at two years post-surgery in 63.2 per cent of patients. The denuded bone re-epithelializes, thus reducing the risk of atrophic rhinitis and crusting.

The technique was developed in an attempt to find a radical surgical approach to the turbinates associated with a less than average haemorrhage rate. Degloving avoids disruption of the descending branch of the sphenopalatine artery, which enters the inferior turbinate bone posteriorly and subperiosteally before branching,<sup>20</sup> and is therefore at risk in turbinectomy procedures. No haemorrhages occurred in this small series of 37 patients, and although no firm conclusions can be reached about the haemorrhage rate the procedure appears to be safe.

The study showed significant improvement in peak nasal inspiratory flow as well as a decreased subjective sensation of nasal blockage and improved overall patient satisfaction. As with other studies, subjective and objective measures did not correlate completely. Early improvement may be attributed to use of Betnesol in the post-operative period, however, as the results are maintained at two years they could be ascribed to the surgical intervention. This differs from results of laser turbinectomy, where despite maintained subjective improvement there is no long-term objective improvement in nasal patency.<sup>15</sup>

There are of course criticisms of a non-randomized, uncontrolled trial, but this is meant as a pilot study to assess the technique, and a randomized, controlled trial is planned to compare 'degloving' with submucous diathermy. In addition, peak nasal

inspiratory flow is a poorly reproducible measure of patency, and rhinomanometry may be a better assessment tool.

- **This paper describes a pilot study to assess the safety and efficacy of 'degloving' of the inferior turbinate in 37 patients with nasal obstruction due to inferior turbinate hypertrophy**
- **Objective and subjective measurements of nasal patency were made pre-operatively and repeated at six weeks, six months and two years post-operatively by nasal inspiratory peak flow rates, saccharin clearance time and an end referenced visual analogue scale to record nasal symptoms**
- **There was a statistically significant sustained improvement in peak inspiratory flow, overall improvement in patient satisfaction and a decrease in the sensation of nasal obstruction at all the above time intervals**
- **Rhinorrhoea was reduced and the sense of smell increased. There was no significant change in post-nasal drip and saccharin clearance**
- **A randomized controlled trial is being planned**

However, this study demonstrates a new surgical technique for reduction of the inferior turbinates, which gives significant improvements in nasal obstruction, a potentially lower complication rate than classical turbinectomy, and is well tolerated by the patients.

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Ms E. Chevretton takes responsibility for the integrity of the content of the paper.  
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