Coll. Antropol. **35** (2011) 1: 143–146
Original scientific paper

Efficacy and Safety of Inferior Turbinate Coblation-Channeling in the Treatment of Nasal Obstructions

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A B S T R A C T

The aim of this study was to evaluate the safety and effectiveness of coblation-channeling in the treatment of inferior turbinate hypertrophy. The study was conducted in the Department of ENT, Head and Neck Surgery, Split University Hospital Center, Split, Croatia. Fifty-two patients with inferior turbinate hypertrophy who were refractory to medical therapy were evaluated for coblation. The procedures were performed under local anesthesia using an ArthroCare ReFlexUltra 45 wand; three submucosal channels were made per turbinate. Clinical examinations, a questionnaire on individual nasal symptoms (hyposmia, nasal drainage and post-nasal drip), a 10-cm visual analog scale (VAS) grading general nasal obstructions, and rhinomanometry before and 8 weeks after the treatment were administered to assess treatment outcomes. No adverse effects were encountered. Nasal breathing was significantly improved in all patients, decreasing the VAS from a median of 7 (range 2–9) to 1 (range 0–3) ($p<0.001$). Total nasal resistance decreased from 0.44 Pa±0.50 to 0.24 Pa±0.11 ($p=0.005$). Improvement was statistically significant for all three symptoms (hyposmia [$p=0.005$], nasal drainage [$p=0.003$] and post-nasal drip [$p<0.001$]). In this paper, we demonstrate that coblation-channeling of the hypertrophic inferior turbinate is an effective and safe way to reduce nasal obstruction symptoms.

Key words: *nasal obstruction, turbinates, surgery, rhinomanometry, treatment outcome*

Introduction

Nasal obstruction is one of the oldest and most common human complaints, and hypertrophy of the inferior turbinate is a common cause of chronic nasal obstruction[1].

Nasal obstruction is a considerable handicap for patients and drastically affects their quality of life. Inferior turbinate hypertrophy is usually observed with septal deviations (compensatory hypertrophy) and is associated with chronic rhinitis[2].

Epidemiologic investigations in various European countries have shown that up to 20% of the population has a chronic nasal obstruction caused by turbinate hypertrophy[2,3]. However, there is no agreement on how to treat this problem. Pharmacological therapy (using intranasal topical steroids, antihistamines or decongestants) is generally the treatment of choice[4]. Nasal breathing is often only slightly improved by conservative treatments, compelling patients to use local decongestants with a high risk of undesirable side effects[2]. In these cases, surgical reduction of the turbinate is an available option[2–4].

At least 13 different techniques have been introduced since the last quarter of the 19th century (e.g., total or partial turbinectomy, laser-assisted turbinoplasty, cryosurgery, electrocautery using monopolar and bipolar techniques, radio-frequency volumetric tissue reduction and microdebrider submucosal reduction)[1,2,4–6]. The variety of available surgical techniques indicates a lack of consensus on the optimal technique[2].

The majority of these techniques provide satisfactory results in terms of diminishing nasal obstruction, but adverse events are frequently observed. Bleeding, crusting, foul odor, pain, hyposmia, synechia, bone necrosis and infection are mainly caused by mucosal lesions that impair nasal mucociliary function[1,2,5,7].

Received for publication July 09, 2010

The ideal procedure for turbinate reduction should improve nasal breathing with minimal discomfort or adverse reactions and should preserve the physiological function of the turbinates[1,2,8]. Several studies have reported that the use of radio-frequency energy for submucosal tissue ablation of the inferior turbinate can meet these goals[1–3,6–15]. The tissue response, as well as the extent of volume reduction caused by radio frequencies, was studied by Powel et al. in the porcine tongue[16]. The safety and efficacy of radio frequencies in the human airway have been confirmed in soft palate and tonsillar tissue[17,18].

The procedure can be repeated without adverse effects to maintain the best possible results[19,20].

We performed a prospective study on the efficacy and safety of coblation for turbinate reduction. We used not only subjective symptoms but an objective test as well to assess the efficacy of coblation in treating nasal obstructions attributable to turbinate hypertrophy.

Subjects and Methods

Between June 2004 and June 2008, 52 patients with nasal obstructions due to inferior turbinate hypertrophy were enrolled in this prospective study. Exclusion criteria included septal deformation, nasal polyposis and recent nasal surgery. All patients had been previously treated with conventional medical management without improvement.

Before treatment, each patient underwent a medical history and clinical examination. Patients graded their nasal obstruction on a 10-cm visual analog scale (VAS). A score of 0 represented no obstruction, and a score of 10 indicated complete obstruction. The patients also completed a questionnaire measuring the severity of additional symptoms: hyposmia, nasal drainage and post-nasal drip, with scores ranging from 0 to 2 (0 – no symptoms, 1 – mild to moderate, 2 – severe). These scores served as the baseline measurements of nasal symptomatology.

Each patient underwent active anterior rhinomanometry (Rhinomanometer 300, ATMOS, Germany), which assesses trans-nasal resistance depending on the trans-nasal pressure difference, ΔP (Pa), between the nostrils and the choanae. The reference value of each measurement was defined as the resistance at a trans-nasal pressure of 150 kPa.

Operations were performed in an out-patient facility with patients under local anesthesia from an injection of 2 ccm of 2% lidocaine into each inferior turbinate. All surgical procedures were performed by the same surgeon (Z.R.) using an ArthroCare ReFlex Ultra 45 Wand (ArthroCare Corp., Sunnyvale, CA, USA) to make three submucosal channels *per* turbinate (power: 6 W for each channel).

Patients were discharged after two hours with instructions to perform a post-operative treatment of a saline lavage twice daily to prevent crusting and dryness and were advised to continue with their usual daily activities.

Follow-up visits were conducted at two and eight weeks after the operation to assess early adverse events. At the week-eight visit, patients completed the VAS and the nasal questionnaire again to help us determine their subjective response to the therapy. Rhinomanometry was also performed after eight weeks to determine the objective results of the coblation therapy.

This study was approved by the Split University Hospital Medical Ethics Committee.

Statistical analysis

The Statistica 7.1 software package (Stat Soft, Inc., Tulsa, USA) was used to statistically analyze the data. Differences between the total nasal resistance before and after the operation were statistically evaluated with *t*-tests for dependent samples. The Wilcoxon Signed-Rank test was used to evaluate the differences between nasal symptom scores before and after the operation. The Friedman test was used to analyze the VAS data. A P-value of less than 0.05 was considered statistically significant.

Results

Between June 2004 and June 2008, 52 patients (27 men and 25 women) with a mean age of 28.5 years (range: 11 to 71 years) were enrolled in this trial.

Patients tolerated the procedure well. None of them felt discomfort during coblation due to overheating of the tissue. No significant epistaxis occurred during or after the procedure. Mild crusting was noted in three (5.7%) patients at the week-two follow-up visit; in these cases, crusting was observed in the head of the inferior turbinate, corresponding to the areas that were punctured to introduce the wand. None of the patients experienced adverse events, including bleeding, crusting, dryness, infection, adhesion, or a worsening of obstruction, at the week-eight follow-up visit.

Nasal breathing was significantly improved in all patients: the median VAS decreased from 7 (range 2–9) to 1 (range 0–3) ($p<0.001$, Figure 1). Total nasal resistance decreased from 0.44 Pa±0.50 to 0.24 Pa±0.11 ($p=0.005$, Figure 2).

Patients reported improvement in each of the three scored symptoms after the procedure. The improvement

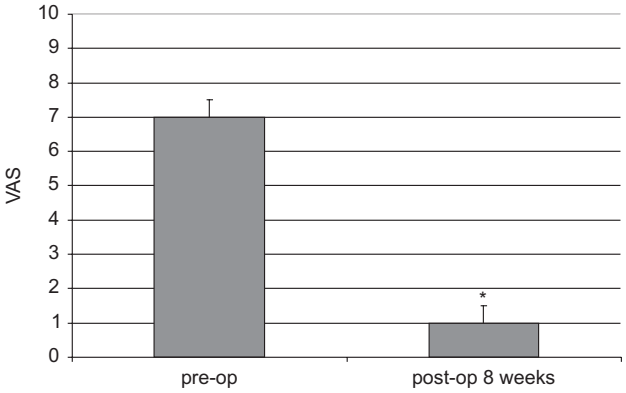

*Fig.1. Mean nasal obstruction (VAS) pre- and post-op (8 weeks). *Significant difference compared to pre-op ($p<0.001$).*

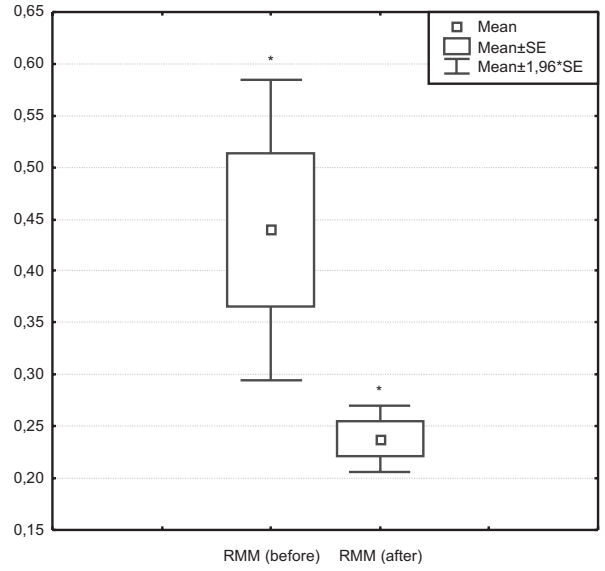

*Fig. 2. Rhinomanometry (nasal resistance) pre- and post-op (8 weeks). *Significant difference compared to pre-op (p=0.005).*

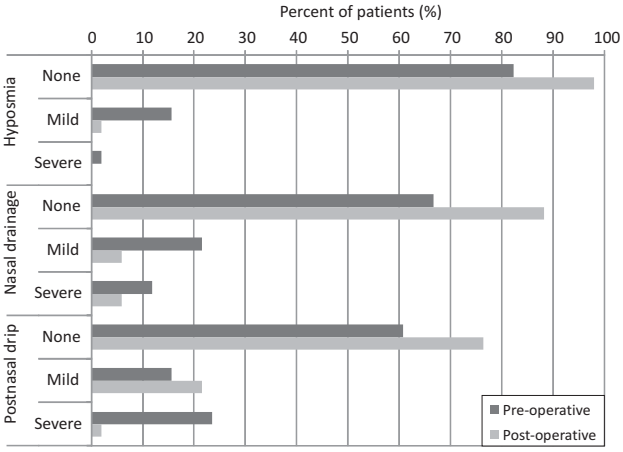

Fig. 3. Pre- and post-operative (8 weeks) symptoms.

in the symptoms was statistically significant for hyposmia (p=0.005), nasal drainage (p=0.003), and post-nasal drip (p<0.001, Figure 3).

Discussion

The ideal procedure for inferior turbinate reduction should be performed in an office setting under local anesthesia and should require minimal post-operative care, be clinically effective and preserve the mucosal and glandular architecture of the turbinate. The procedure should also be repeatable in case inferior turbinate hypertrophy were to recur[9,19].

Despite the existence of various techniques for the treatment of inferior turbinate enlargement, there is no consensus in the literature as to which technique is best[1,2,4,5]. However, there is a general consensus that submucosal techniques have advantages in terms of preserving the overall nasal physiology[4,5,10].

Coblation seems to meet all of the criteria for an ideal treatment of inferior turbinate hypertrophy[1,6,10–12,15].

In our study, treatment efficacy was confirmed by the patients' subjective assessment of their nasal symptoms (obstruction, hyposmia, nasal drainage and post-nasal drip) as well as by objective rhinomanometry. The median VAS decreased from 7 (range 2–9) to 1 (range 0–3) (p<0.001), which confirms previous reports about the efficacy of radio frequencies in the literature[6,15].

Utley et al.[8], Seeger et al.[3] and Rhee et al.[13] also reported excellent results using radio-frequency submucosal tissue reduction to treat inferior turbinate hypertrophy as assessed by subjective scores from patients. In a placebo-controlled study using radio frequencies, Nease et al. reported very similar results[9].

According to Atef et al., the radio-frequency procedure can be repeated without any additional adverse effects, thus allowing better long-term results to be maintained[20]. Porter et al. confirmed that good results were maintained for two years with this procedure[11].

In our study, a comparison of rhinomanometry performed before the surgery and eight weeks after the surgery showed a statistically significant difference in nasal resistance, from 0.44 Pa±0.50 to 0.24 Pa±0.11 (p=0.005), which is consistent with the acoustic rhinomanometry results obtained by Fischer et al.[14] and Rhee et al.[13] after radio-frequency procedures.

In our study, there were no adverse effects that demanded additional surgical treatment. Crusting was noted in three (5.7%) patients at the week-two follow-up visit and was located in the head of the inferior turbinate, corresponding to the puncture area where the wand was introduced. None of the patients reported adverse events at the week-eight follow-up visit, which confirms previous safety reports found in the literature[3,7,13,14].

Although the vast majority of proposed methods for the treatment of inferior turbinate enlargement meet the goal of providing better nasal patency[1,2,4,5,19,21], the main advantage of this technique is its preservation of the architecture and function of the mucosa[1,2].

Conclusions

Coblation channeling of the inferior turbinate is a safe, highly efficacious procedure for out-patient clinic-based inferior turbinate reduction. There are no side effects in either the early or late post-operative periods, and there is minimal patient discomfort during the procedure.

Thus, coblation tissue reduction of the inferior turbinate meets all of the criteria for an ideal method for the treatment of inferior turbinate hypertrophy.

Acknowledgements

The authors thank ArthroCare for technical support (free use of the bipolar devices during the study).

There were no finacial interest for authors or for ArthroCare in this study.

REFERENCES

1. SAPCI T, SAHIN B, KARAVUS A, AKBULUT UG, Laryngoscope, 113 (2003) 514. — 2. CAVALIERE M, MOTTOLA G, IEMMA M, Otolaryngol Head Neck Surg, 133 (2005) 972. — 3. SEEGER J, ZENEV E, GUNDLACH P, STEIN T, MUELLER G, Laryngoscope, 113 (2003) 130. — 4. HOL MK, HUIZING EH, Rhinology, 38 (2000) 157. — 5. PASSALI D, LAURIELLO M, ANSELMI M, BELLUSSI L, Ann Otol Rhinol Laryngol, 108 (1999) 569. — 6. KIZILKAYA Z, CEYLAN K, EMIR H, YAVANOGLU I, UNLU I, SAMIM E, AKAGUN M, Otolaryngol Head Neck Surg, 138 (2008) 176. — 7. LI KK, POWELL NB, RILEY RW, TROELL RJ, GUILLEMINAULT C, Otolaryngol Head Neck Surg, 119 (1998) 569. — 8. UTLEY DS, GOODE RL, HAKIM I, Laryngoscope, 109 (1999) 683. — 9. NEASE CJ, KREMPL GA, Otolaryngol Head Neck Surg, 130 (2004) 291. — 10. BHATTACHARYYA N, KEPNES LJ, Otolaryngol Head Neck Surg, 129 (2003) 365. — 11. PORTER MW, HALES NW, NEASE CJ, KREMPL GA, Laryngoscope, 116 (2006) 554. — 12. FRIEDMAN M, TANYERI H, LIM J, LANDSBERG R, CALDARELLI D, Laryngoscope, 109 (1999) 1834. — 13. RHEE CS, KIM DY, WON TB, LEE HJ, PARK SW, KWON TY, LEE CH, MIN YG, Laryngoscope, 111 (2001) 153. — 14. FISCHER Y, GOSEPATH J, AMEDEE RG, MANN WJ, Am J Rhinol, 14 (2000) 355. — 15. FARMER SE, QUINE SM, ECCLES R, J Laryngol Otol, 123 (2009) 309. — 16. POWELL NB, RILEY RW, TROELL RJ, BLUMEN MB, GUILLEMINAULT C, Chest, 111 (1997) 1348. — 17. POWELL NB, RILEY RW, TROELL RJ, BLUMEN MB, GUILLEMINAULT C, Chest, 113 (1998) 1163. — 18. ROJE Ž, RAČIĆ G, PEŠUTIĆ PISAC V, ĐOGAŠ Z, TIMMS M, Coll Antropol, 33 (2009) 293. — 19. FARMER SE, ECCLES R, J Laryngol Otol, 28 (2006) 1. — 20. ATEF A, MOSLEH M, EL BOSRATY H, ABD EL FATAH B, FAHTI A, Am J Rhinol, 20 (2006) 25. — 21. FARMER SE, ECCLES R, Rhinology, 44 (2006) 234.

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UČINKOVITOST I SIGURNOST KOBLACIJSKOG TUNELIRANJA DONJIH NOSNIH ŠKOLJKI U LIJEČENJU NOSNE OPSTRUKCIJE

SAŽETAK

Cilj ovog istraživanja bio je procijeniti učinkovitost i sigurnost koblacijskog tuneliranja hipertrofičnih donjih nosnih školjki u liječenju nosne opstrukcije. Studija je provedena u Klinici za bolesti uha, nosa i grla s kirurgijom glave i vrata KBC Split, Split, Hrvatska. Uključena su 52 pacijenta s hipertrofijom donjih nosnih školjki refrakternih na konzervativno liječenje. Operacije su rađene u lokalnoj anesteziji koristeći ArthoCare ReFlexUltra 45 wand; tri submukozna kanala po svakoj nosnoj školjki. U procjeni rezultata liječenja koristili smo: klinički pregled, upitnik o individualnim nosnim simptomima (hiposmija, curenje iz nosa, postnazalni drip), 10-cm vizualno-analognu skalu (VAS) za procjenu nosne opstrukcije i rinomanometriju prije operacije i 8 tjedana nakon operacije. Tijekom ispitivanja nije zabilježena nijedna nuspojava. Disanje kroz nos se značajno poboljšalo u svih pacijenata, smanjujući VAS od mediana 7 (raspon 2–9) na 1 (raspon 0–3) ($p<0,001$). Ukupni nosni otpor smanjio se od 0,44 Pa±0,50 na 0,24 Pa±0.11 ($p=0,005$). Poboljšanje je bilo statistički značajno za sva tri individualna simptoma (hiposmija [$p=0,005$], curenje iz nosa [$p=0,003$] i postnazalni drip [$p<0,001$]). U ovom istraživanju pokazali smo da je koblacijsko tuneliranje hipertrofičnih donjih nosnih školjki učinkovit i siguran način u smanjivanju simptoma nosne opstrukcije.