

THE EFFICACY OF TURBINOPLASTY WITH PARTIAL INFERIOR POSTERIOR TURBINECTOMY

APATINIŲ NOSIES KRIAUKLIŲ UŽPAKALINĖS DALINĖS KONCHOTOMIJOS IR KONCHOPLASTIKOS EFEKTYVUMAS

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ABSTRACT

Key words: partial inferior posterior turbinectomy, turbinoplasty, nasal obstruction, turbinates.

Objective. To assess the medium-term results and the incidence of complications after inferior turbinate surgery.

Methods. 107 patients, who undergone a turbinoplasty and partial posterior inferior turbinectomy with or without septoplasty during 12 months period (between January 1, 2005 and January 1, 2006) were included to study. The follow-up was 24–36 months after the surgery.

Results. From 107 patients who undergone the follow-up evaluation, turbinate surgery was performed to 23,4%, turbinate surgery and septoplasty to 76,6% patients. From those patients 60,7% reported good and excellent nasal breathing, 26,2% complained of mild nasal obstruction and 13,1% informed about severe nasal obstruction. Postoperative complications occurred in 29,2 % cases (mild nasal dryness – 24,3%, postnasal drip – 6,5%, nasal bleeding – 3,7%, sleep apnea – 0,9%, hyposmia – 0,9%, coughing – 0,9%, nose sensitiveness in a cold weather – 0,9%, troublesome nose blowing – 0,9%). In the study group, the complications prevalence was more prominent for women ($p < 0,019$) and for those patients, who had preoperative post-nasal drip ($p < 0,009$).

Conclusions. Minimally aggressive combination of turbinoplasty and partial posterior inferior turbinectomy stands as a method of choice for correction of turbinate hypertrophy with minimal intra-operative and post-operative complications and significant medium-term improvement.

SANTRAUKA

Reikšminiai žodžiai: dalinė užpakalinė konchotomija, konchoplastika, nosies obstrukcija, nosies kriauklės.

Darbo tikslas. Įvertinti pooperacinių komplikacijų dažnį ir rezultatus po apatinių kriauklių chirurgijos, atliekant konchoplastiką ir užpakalinę dalinę konchotomiją.

Tyrimo medžiaga ir metodai. Per 12 mėnesių (nuo 2005 m. sausio 1 d. iki 2006 m. sausio 1 d.) 107 ligoniams atliktos konchoplastika ir užpakalinė dalinė konchotomija. Pooperacinė būklė vertinta praėjus 24–36 mėnesiams po operacijos. Vertindami būklę po operacijos, pacientai užpildė klausimyną.

Rezultatai. Išanalizuoti 107 pacientų pooperacinio gydymo rezultatai (48,2 proc.). Labai geras kvėpavimas per nosį išliko 60,7 proc. pacientų, kitiems kvėpavimas išliko vidutinis (26,7 proc.) ir sunkus (13,1 proc.). Pooperacinės komplikacijos pastebėtos 29,2 proc. atvejų (lengvas nosies džiuvimas – 24,3 proc., užpakalinė rinorėja – 6,5 proc., kraujavimas iš nosies – 3,7 proc., miego apnėja – 0,9 proc., susilpnėjusi uoslė – 0,9 proc., kosulys – 0,9 proc., padidėjęs nosies jautrumas šaltyje – 0,9 proc., sunkus nosies išpūtimas – 0,9 proc.). Dažnesnės komplikacijos pastebėtos moterims ($p < 0,019$) ir pacientams, kurie prieš operaciją skundėsi užpakaline rinorėja ($p < 0,009$).

Išvados. Apatinių kriauklių hipertrofijos chirurginiam gydymui taikoma užpakalinės dalinės konchotomijos ir konchoplastikos kombinacija yra neagresyvi, sukelianti mažai pooperacinių komplikacijų ir efektyvi.

INTRODUCTION

Hypertrophy of inferior turbinates is a common cause of the nasal airway obstruction. When conservative treatment is not enough to offer good nasal permeability, surgical treatment should be indicated. While turbinate surgery

is commonly practised, there has been a long disagreement over its clinical effectiveness and long-term benefit [1]. A variety of surgical procedures are performed for treatment of hypertrophic inferior turbinates such as total, partial or submucous turbinectomies, turbinoplasties, besides other

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procedures, such as electrocautery, chemocautery, cryosurgery, laser surface surgery. The purpose of surgically reducing the inferior turbinates should be to diminish complaints while preserving function [2]. Any surgical procedures performed upon the nasal turbinates are certain to interfere with their physiological function. This interference and the possibility of postoperative complications are main reasons for the controversial attitudes toward this operation [3]. Each treatment is associated with variable symptomatic effectiveness and duration of results balanced against the risk of complication.

Radical turbinectomy techniques give stable results, but even with that aggressive technique there appears to be a significant recurrence of symptoms with a time [4]. Submucosal resection or turbinoplasty may be preferred because of moderate side effect, but those procedures not always give adequately stable symptomatic control [3].

The estimation of the optimal extent of procedure still remains an actual task of the surgery for mucosal hypertrophy reduction. The removal of the posterior tip of the inferior turbinate can be treated like a variation of turbinectomy and that led to think, that potentially it may distort the physiologic function of the nose. However, there is no consequent data about effectiveness of the procedure and incidence of complications in the literature.

The aim of this study was to assess the medium-term subjective results and the incidence of complications of combined turbinoplasty and partial posterior inferior turbinectomy technique.

MATERIAL AND METHODS

The study was carried out at the Center of Otorhinolaryngology of Vilnius University Hospital Santariskiu Clinics. 107 patients, who undergone a turbinoplasty and partial posterior inferior turbinectomy with or without septoplasty during 12 months period (between January 1, 2005 and January 1, 2006), were included to study.

The inclusion criteria for patients on the study were chronic mild or severe nasal obstruction without response to clinical treatment and inferior turbinate hypertrophy with or without septal deviation as causal agents. Causative factor of nasal obstruction was assessed using anterior rhinoscopy, rhinomanometry and rigid nasal endoscopy. Surgery was recommended to patients with significant mucosal and/or bony inferior turbinate hypertrophy and enlarged posterior tip of it. All patients were submitted to turbinoplasty and partial posterior inferior turbinectomy. In the case of clinically important septal deviation, at the same time patient was submitted to septoplasty. Surgery was carried out under general anesthesia. The turbinates were infiltrated with 1% lidocaine with adrenaline (1:100,000). A straight incision was made on the

anterior edge of the turbinate than mucosa was elevated off the bone as far back as possible and blunt destruction of submucosal tissue was performed. In the case of bone hypertrophy the excessive bone was removed with preservation of mucosa. The posterior tip of the inferior turbinate was removed with the nasal snare. Septoplasty was performed using the standard Cottle technique. Patient questionnaires were used for subjective assessment of nasal symptoms, history of allergy, the incidence of the upper respiratory tract infection and their quality of life before procedure.

Medium-term follow-up results were determined by patient's questionnaire. The patients were contacted by phone 24–36 months postoperatively in order to complete the questionnaire and evaluate subjective assessment of symptoms, need of further medical or surgical intervention, any adverse effects of surgery and the influence of symptoms after surgery on their quality of life.

Further analysis of results was prosecuted using patient's data which was made before and after operations. The reliability of data difference was statistically analyzed with application of Student's t-test. Differences between groups were analyzed using the χ^2 test. $p \leq 0,05$ was considered statistically significant.

RESULTS

The results were analyzed of 107 patients who undergone the follow-up evaluation (48,2% of all cases). Male to female distribution of respondents included 71 male (66,4%) and 36 female (33,6%) patients. The age of the patients varied from 14 to 63 years with an average of $29,6 \pm 11,4$ years. Turbinoplasty and partial posterior inferior turbinectomy were performed to 25 patients (23,4%), both procedures with septoplasty to 82 patients (76,6%).

The main symptoms before the operation were: nasal obstruction – 107 patients (100%), nasal secretion – 53 patients (49,5%), postnasal drip – 18 patients (16,8%). There were 62 patients (57,9%) who continuously used topical decongestants and 16 patients (15%) with history of allergy. Nasal obstruction less than 2 years reported 13 patients (12,1%) and more than 2 years – 94 patients (87,9%). 27 patients (25,2%) pointed up unilateral and 80 patients (74,8%) – bilateral nasal obstruction. There were no clinically important intraoperative complications.

24–36 months (mean follow-up period 29,5 months) after surgery 65 patients (60,7%) reported good or excellent nasal breathing, whereas 28 (26,2%) complained of mild nasal obstruction and 14 patients (13,1%) informed about severe nasal obstruction. 3 patients (2,8%) required reoperation in the follow-up period. 4 patients (3,7%) needed a constant use of drugs after the operation (topical decongestants). Results of interrelation of preoperative symptoms to results of surgery are

presented on Table 1. There was found interrelation between history of allergy and postoperative results ($p=0,037$).

There were 32 patients (29,2%) complained about the postoperative complications. In our study the postoperative complications were: mild nasal dryness – 26 patients (24,3%), post-nasal drip – 7 patients (6,5%) and nasal bleeding – 4 patients (3,7%). Other complications occurred as single cases: sleep apnea – 1 patient (0,9%), coughing – 1 patient (0,9%), hyposmia – 1 patient (0,9%), nose sensitiveness in a cold weather – 1 patient (0,9%) and

troublesome nose blowing – 1 patient (0,9%). Results of interrelation of preoperative symptoms and postoperatively complications rates are presented on Table 2.

DISCUSSION

The aim of turbinate surgery must be to reduce the size of turbinates in order to create sufficient space of which width can be regulated in the nasal cycle [5]. More than 10 surgical techniques have been used over decades to treat hypertrophy of the inferior turbinate, but there is

Table 1. The interrelation between the anamnestic data and the postoperative results

Variables	Number of patients	Results after the 24–36 months after the surgery		
		Severe nasal obstruction % of patients	<i>p</i> value (χ^2 test)	
Age	<18 y.o.	(n=16)	25,0%	0,538
	19-40 y.o.	(n=73)	9,6%	
	>40 y.o.	(n=18)	16,7%	
Gender	Male	(n=71)	9,9%	0,378
	Female	(n=36)	19,4%	
Duration of obstruction	≤ 2 years	(n=13)	7,70%	0,522
	> 2 years	(n=94)	13,8%	
Location of obstruction	unilateral	(n=27)	3,70%	0,205
	bilateral	(n=80)	16,2%	
Extent of surgery	Turbinates and septum	(n=82)	12,2%	0,592
	Turbinates	(n=25)	16,0%	
Nasal secretion preoperative	Yes	(n=53)	13,2%	0,623
	No	(n=54)	13,0%	
Post-nasal drip preoperative	Yes	(n=18)	27,8%	0,058
	No	(n=89)	10,1%	
Excessive topical decongestants preoperative	Yes	(n=62)	16,1%	0,056
	No	(n=45)	8,90%	
History of allergy	Yes	(n=16)	31,2%	0,037
	No	(n=91)	9,9%	

Table 2. The interrelation between the anamnestic data and the postoperative complications

Variables	Number of patients	Complications 24–36 months after the operation		
		Complications % of patients	<i>p</i> value (χ^2 test)	
Age	<18 y.o.	(n=16)	50,0%	0,149
	19-40 y.o.	(n=73)	27,4%	
	>40 y.o.	(n=18)	22,2%	
Gender	Male	(n=71)	22,5%	0,019
	Female	(n=36)	44,4%	
Duration of obstruction	≤ 2 years	(n=13)	30,8%	0,942
	> 2 years	(n=94)	29,8%	
Location of obstruction	unilateral	(n=27)	22,2%	0,313
	bilateral	(n=80)	32,5%	
Extent of surgery	Turbinates and septum	(n=82)	31,7%	0,461
	Turbinates	(n=25)	24,0%	
Nasal secretion preoperative	Yes	(n=53)	34,0%	0,364
	No	(n=54)	25,9%	
Post-nasal drip preoperative	Yes	(n=18)	55,6%	0,009
	No	(n=89)	24,7%	
Excessive topical decongestants preoperative	Yes	(n=62)	27,4%	0,510
	No	(n=45)	33,3%	
History of allergy	Yes	(n=16)	43,8%	0,190
	No	(n=91)	27,5%	

no completely effective therapy. The evidence supporting the efficacy of these procedures remains debatable. None of them are able to produce satisfactory long – term results in pathological turbinate hyperplasia for reasonable number of patients. In addition, the evaluation of the results is more difficult because of a lack of good evidence based on randomised controlled trials for inferior turbinate surgery detailing surgery with defined outcomes [1].

One of the main lacks of inferior turbinate surgery is a high rate of recurrence of symptoms with time. The comparison of the results is difficult due to difference in study methods, surgical techniques or follow-up. Most studies agree that total turbinate resection provides long-term effectiveness [4, 6, 7]. Even after 15 – years postoperatively success rates of over 80% [6]. The more aggressive technique is used, the more better results are reported [4, 6, 7], but even after aggressive turbinectomy a significant recurrence of symptoms increase in the intervening time period [8]. More aggressive technique associates with higher complications rates. Certain complications have been influential in guiding the course of turbinate surgical procedures, namely haemorrhage and atrophic rhinitis. To review the history of inferior turbinate surgery, many surgeons stopped using aggressive technique in addition of the risk of atrophic rhinitis and an opinion that „the turbinates were essentially „sacred bodies“ that were not to be touched“ was formed. This association dates from the 1930 years when total inferior turbinectomy was performed as part of drainage procedure for chronic maxillary sinusitis [9]. However, current literature suggests that some of these more feared complications may not be as prevalent as previously believed [6, 10]. Still this technique is not recommended as the method of choice due to potential side adverse effects and is considered carefully and critically. Total turbinectomy is indicated if all other treatment attempts do not succeed [3].

Other procedures were developed due to the negative experience with total turbinectomy. Long-term studies of partial resection of the inferior turbinates show very different results and ranges from 41% to 90% [11–17]. Performing safer procedures like submucosal turbinate resection or turbinoplasty also good results are reported [17–20]. Courtiss and Goldwyn (1983) provided long-term follow-up after partial inferior turbinectomy even after 16 years in two studies. With follow-up ranging from 6 to 9 years, 70 out of 76 patients believed their nasal breathing remained better, 6 believed it was the same, and none believed it was worse. With yet further long-term follow-up of 10 to 16 years authors noted that 18 out 25 patients felt they nasal breathing was better, whereas 5 felt it was the same compared with their preoperative state [13, 15]. Rohrich (1984) in a study conducted on 408 patients who underwent one of four turbinate procedures over a 6 year period reported

greater than 90% relief of nasal obstruction, and according to him, submucosal resection is the best method of turbinate reduction with the best long-term results and the least complications [19]. Riviere et al. (1989) reported subjective improvement in the nasal airway in 82% patients after submucous resection [20]. Passali et al. (2003) analyzed the long-term efficacy of turbinates surgical techniques after long-term follow-up and reported submucosal resection as the first-choice technique for inferior turbinate surgery [21]. Performing anterior turbinoplasty, some surgeons use submucosal turbinate resection which only resects the anterior parts of the turbinate bone and soft tissue [5]. Different authors achieved good results after anterior turbinoplasty and regard currently it as the method of choice [2, 22, 23, 24]. The definition of the anterior turbinoplasty as a gold – standart for future trials is proposed [24]. Mabry (1988) argues that submucous resection of inferior turbinate is not sufficient to alleviate the nasal obstruction associated with posterior tip enlargement and reported 25% return of nasal blockage at 39 to 63 months postoperatively after inferior turbinoplasty [17].

An alternative to resection procedures can be destructive procedures, including electrocautery, cryosurgery, or laser surgery. On looking through the literature of late 10 years a variety of new procedures used for turbinate reduction were invented by biomedical engineering and it seems that every new surgical procedure is tried out on the turbinates. There are many publications presenting good results of these procedures, but still there is no long-term follow-up results. The success rates for laser surgery fluctuate between 47% and 89% [5]. Nowadays, size reduction of the turbinates using a laser is gaining accelerated popularity because of its technically simple performing and applicability under local anaesthesia. However, as mention before, all destructive procedures have variable long-term success and significant risks, including necrosis of the conchal bone, synechiae formation and haemorrhage. The disadvantages as compared to the surgical procedures are the missing regeneration of epithelium and the delayed wound healing [5]. The effect of turbinate reduction and surface damage during coagulation remain difficult to regulate, even with modern procedures. Rakover and Rosen (1996) randomly divided 52 patients into two groups to receive either partial inferior turbinectomy or cryosurgery and found out good relief from nasal obstruction in 81% of patients who underwent partial turbinectomy at one year and in 77% at 2 to 5 years post-operatively. After cryosurgery, effectiveness dropped from 62% at 1 year to 35% at 2 to 5 years postoperatively [25]. Cryosurgery is no longer performed [2]. Jackson and Koch (1998), in their review of inferior turbinate surgery techniques, commented that turbinectomy techniques appeared to give more effective long-term results than mucos-

al hypertrophy reduction techniques, such as linear cautery, submucosal diathermy and cryotherapy [9].

There is limited number of studies, emphasizing procedures on posterior tip of inferior turbinate. The idea of our study was to verify efficacy and safety of minimally aggressive combination of turbinoplasty and partial posterior inferior turbinectomy. On the basis of our results, it gives significant medium-term improvement with minimal postoperative complications. Our investigation revealed that good or excellent improvement in nasal breathing 24–36 months after surgery was 86,9%. Compared with their preoperative state 60,7% of patients were very satisfied with postoperatively results. Another 26,2% had improved, but not imperfect nasal breathing. Reoperation of turbinates was performed for 2,8% of the cases and necessity for medication treatment was for 3,7% patients. In consideration of not aggressive technique, it seems that results are adequate. The only significant preoperative variable was found which may influence postoperative results was history of allergy ($p \leq 0,05$).

One of the points in our study was to evaluate patients' subjective symptoms and adverse effects after inferior turbinate surgery and to check out if specific unpleasant and uncomfortable symptoms did not occurred. Our investigation revealed no major complications associated with the surgery. The most common postoperative complain was nasal dryness (24,3%), but it was mild and did not cause a big discomfort. Postnasal drip occurred in 6,5% cases. Bleeding occurred for 3,7% of patients, but it did not require anterior nasal packing or operative cautery of bleeding vessels. More often complications occurred for women ($p < 0,019$) and for patients who had postnasal drip preoperatively ($p < 0,009$). No cases of crusting or atrophic rhinitis were observed. One specific complication noticed while performing the procedure was troublesome nose blowing after the procedure (0,9%). Those who's breathing improved, it was of good quality and did not cause discomfort.

CONCLUSIONS

Minimally aggressive combination of turbinoplasty and partial posterior inferior turbinectomy stands as a method of choice for correction of turbinate hypertrophy with minimal intra-operative and post-operative complications and significant medium-term improvement.

REFERENCES

- Clement WA, White PS. Trends in turbinate surgery literature: a 35-year review. *Clin. Otolaryngol.* 2001; 26: 124–128.
- Hol MK, Huizing EH. Treatment of inferior turbinate pathology: a review and critical evaluation of the different techniques. *Rhinology* 2000; 38(4): 157–66.
- Lippert BM, Werner JA. Treatment of the hypertrophied inferior turbinate. *HNO* 2000; 48 (3): 170–81.
- Wright RG, Jones AS, Beckingham E. Trimming of the inferior turbinates: a prospective long-term study. *Clin. Otolaryngol.* 1999;15: 347–350.
- Mlynski G. Restorative procedures in disturbed function of the upper airways – nasal breathing. *GMS Curr Top Otorhinolaryngol Head Neck Surg* 2005; 4.
- Ophir D, Schindel D, Halperin D, Marshak G. Long-term follow-up of the effectiveness and safety of inferior turbinectomy. *Plast. Reconstr. Surg.* 1992;90(6):980–4.
- Martinez SA, Nissen AJ, Stock CR, Tesmer T. Nasal turbinate resection for relief of nasal obstruction. *Laryngoscope* 1983; 93: 871.
- Carrie S, Wright RG, Jones AS. Long-term results of trimming of the inferior turbinates. *Clin. Otolaryngol.* 1996; 21: 139–141.
- Jackson LE, Koch RJ. Controversies in the management of inferior turbinate hypertrophy: a comprehensive review. *Plastic and Reconstructive Surgery* 1999; 300–312.
- Fry HJ. Long-term-follow-up of the effectiveness and safety of inferior turbinectomy. *Plast Reconstr. Surg.* 1992; 90: 985.
- Pollock RA, Rohrich RJ. Inferior turbinate surgery. *Plastic Reconstructive Surgery* 1984; 74: 227.
- Courtiss LF, Goldwyn RM. The effects of nasal surgery on airflow. *Plastic and Reconstructive Surgery* 1983; 72: 9.
- Courtiss LF, Goldwyn RM. Resection of obstructing inferior nasal turbinates: a 10-year follow-up. *Plastic Reconstructive Surgery* 1990; 86: 152.
- Fanous N. Anterior turbinectomy. A new surgical approach to turbinate hypertrophy: a review of 220 cases. *Arch. Otolaryngol. Head Neck Surgery* 1986; 112: 850.
- Courtiss LF, Goldwyn RM, O'Brien JJ. Resection of obstructing inferior nasal turbinates. *Plastic Reconstructive Surgery* 1978; 62: 249.
- Warwick-Brown NP, Marks NJ. Turbinate surgery: How effective is it? A long term assessment. *O.R.L.J. Otorhinolaryngol. Relat. Spec.* 1987; 49: 314.
- Mabry RL. Inferior turbinoplasty. *Laryngoscope* 1982; 92: 459.
- Egeli E, Erol M, Demirci L, Levent, Yazycy B, Burhan, Harputluoglu U, Ugur M. Evaluation of the inferior turbinate with deviated nasal septum by using computed tomography. *Laryngoscope* 2004; 114(1): 113–117.
- Rohrich RJ, Krueger JK, Adams WP, Marple BF. Rationale for submucous resection of hypertrophied inferior turbinates in rhinoplasty: an evolution. *Plastic and Reconstructive Surgery* 2001; 108(2): 535–544.
- Riviere F, Trotoux J, Aubert P, Geoffroy B, Kossman MJ, Lachiver X. Submucosal resection of the inferior turbinates. *Ann. Otolaryngol. Chir. Cervicofac.* 1989; 106: 297.
- Passali D, Passali FM, Damiani V, Passali GC, Bellussi L. Treatment of inferior turbinate hypertrophy: a randomized clinical trial. *Ann. Otol. Rhino. Laryngol.* 2003; 112(8): 683–8.
- Galetti G, Dallari S, Galetti R. Turbinoplasty: personal technique and long-term results. *ORL J Otorhinolaryngol Relat Spec.* 1991; 53(2): 111–5.
- Marks S. Endoscopic inferior turbinoplasty. *Am J Rhinology* 1997; 12: 405–407.
- Tasman AJ. The inferior turbinate: dysregulation and surgical reduction. *Laryngorhinootologie* 2002; 81(11): 822–33.
- Rakover Y, Rosen G. A comparison of partial inferior turbinectomy and cryosurgery for hypertrophic inferior turbinates. *J. Laryngol. Otol.* 1996; 110: 732.

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