

## ORIGINAL STUDY

# Quality of life in patients with chronic hypertrophic rhinitis after CO<sub>2</sub> laser turbinoplasty

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## ABSTRACT

**BACKGROUND.** Nasal obstruction due to chronic hypertrophic rhinitis is one of the most common problems encountered in rhinology. Even if it is not life-threatening, the disease has a major impact on patients' quality of life (QoL).

**OBJECTIVE.** The aim of this study was to evaluate the effectiveness of CO<sub>2</sub> LASER turbinoplasty in patients with chronic hypertrophic rhinitis in terms of QoL.

**MATERIAL AND METHODS.** The prospective study was performed on 174 patients with chronic hypertrophic rhinitis. All patients underwent CO<sub>2</sub> LASER turbinoplasty. The evaluation was performed before surgery and then 1 month, and 6 and 12 months after surgery, by using a visual analogue scale (VAS) assessing subjective symptoms like nasal obstruction, rhinorrhea, sneezing, smell disorders. 4-phase-rhinomanometry was used to assess the objective outcomes.

**RESULTS.** The results showed that the mean value of VAS for “nasal obstruction” parameter decreased from 7.86 before surgery to 4.4. one month after surgery and to 5.4, 12 months after surgery. Also, VAS scores showed significant statistic improvement ( $p < 0.05$ ) as far as concerns the other specific symptoms of the chronic rhinitis: rhinorrhea, sneezing, itching, smell disorders.

**CONCLUSION.** This study provides evidences that CO<sub>2</sub> LASER turbinoplasty is an effective treatment for chronic hypertrophic rhinitis and can positively influence patients' quality of life.

**KEYWORDS:** chronic hypertrophic rhinitis, CO<sub>2</sub> laser, turbinoplasty, QoL, nasal obstruction

## INTRODUCTION

Chronic hypertrophic rhinitis is one of the most common problems encountered in rhinology<sup>1,2</sup>. Even if it is not life-threatening, the disease has a major impact on patients' quality of life<sup>3,4</sup>. Rhinitis is an inflammatory disorder of nasal mucosa characterized by two or more of the following symptoms: nasal obstruction, anterior and /or posterior rhinorrhea, itching, sneezing<sup>5</sup>.

Due to intimate connections between the nose, the sinuses, the middle ear and the lungs, rhinitis has significant comorbid associations. These include asthma, sinusitis, pharyngitis, otitis media with effusion and sleep disorders<sup>6,7</sup>.

The elements of diagnosis for chronic rhinitis are: history, clinical ENT examination, endoscopic examination of the nose, rhinomanometry, imaging, allergy tests (skin prick or blood tests)<sup>8</sup>.

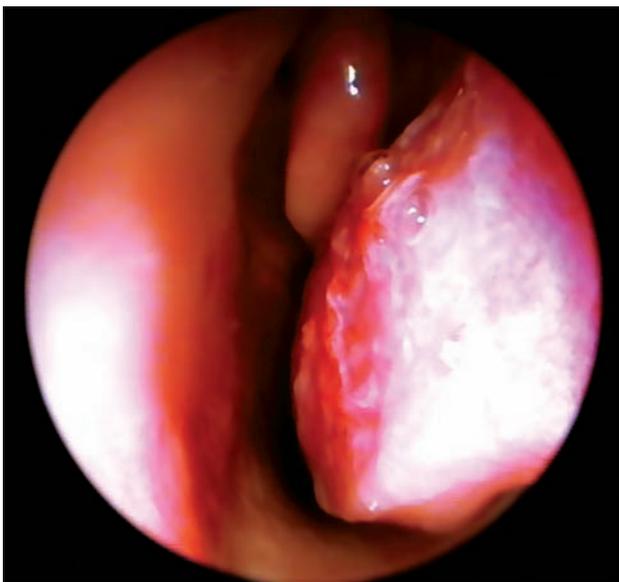
Management of chronic rhinitis is medical (nasal topic steroids, antihistamines, decongestants), according to etiology, and surgical if the conservative therapy has not had any subjective and objective success<sup>9</sup>. In order to reduce the hyperplastic inferior turbinates numerous surgical procedures have been described and different kinds of lasers were used<sup>10</sup>.

The aim of this study was to evaluate the effectiveness of CO<sub>2</sub> LASER turbinoplasty in patients with chronic hypertrophic rhinitis in terms of quality of life.

## MATERIAL AND METHODS

We performed a two years (2009-2011) prospective study on 174 adult patients (18-60 years old; mean age=34.2) with chronic hypertrophic rhinitis. Demographic data indicated 128 males and 46 females (male:female=2.78:1).

Study inclusion criteria: absence of prior turbinate surgery; conservative therapy for at least 3 months without any subjective and objective success; absence of other nasal pathology like



**Figure 1** Nasal endoscopic examination before surgery - hypertrophy of the inferior turbinate - left nasal fossa

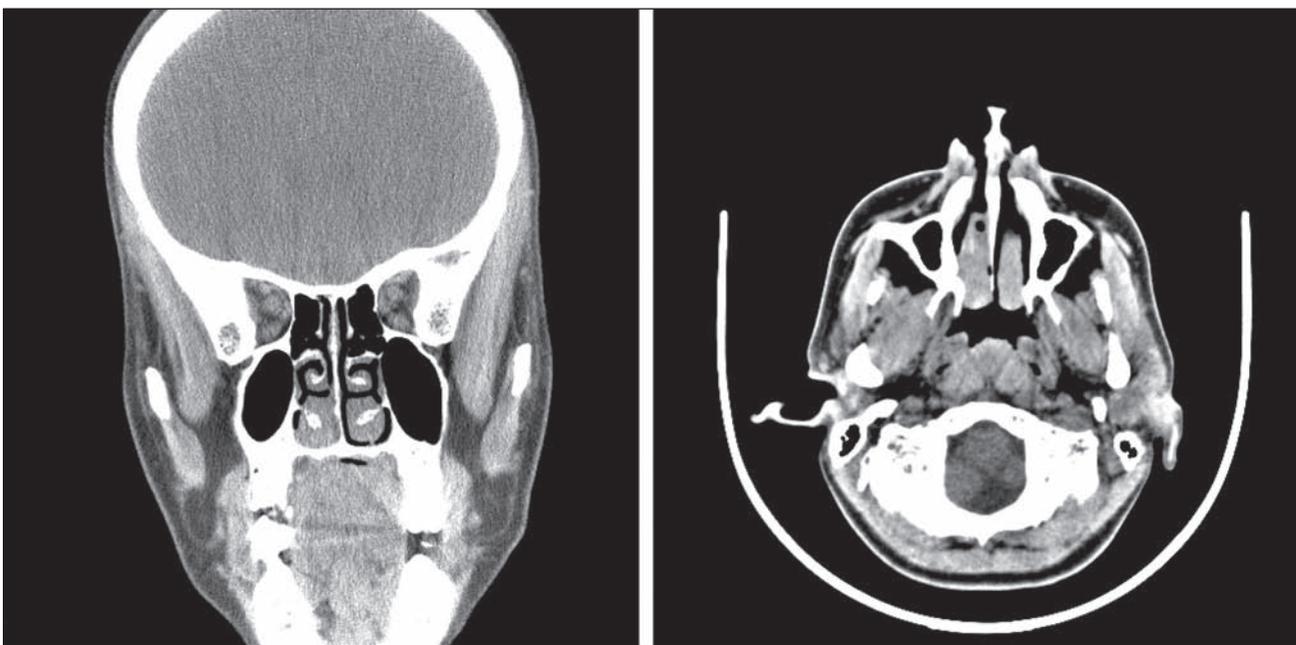
nasal septal deviation, nasal polyps or other nasal tumors, chronic rhinosinusitis; the written consent of the patients to be included in the study. The pregnant women and patients with poorly controlled hypertension or other cardiovascular diseases were excluded from the study.

The diagnostic of chronic hypertrophic rhinitis was made by clinical examination, nasal endoscopy (Figure 1), imaging (Figure 2), allergy tests. 4-phase-rhinomanometry was used to obtain objective data about nasal obstruction.

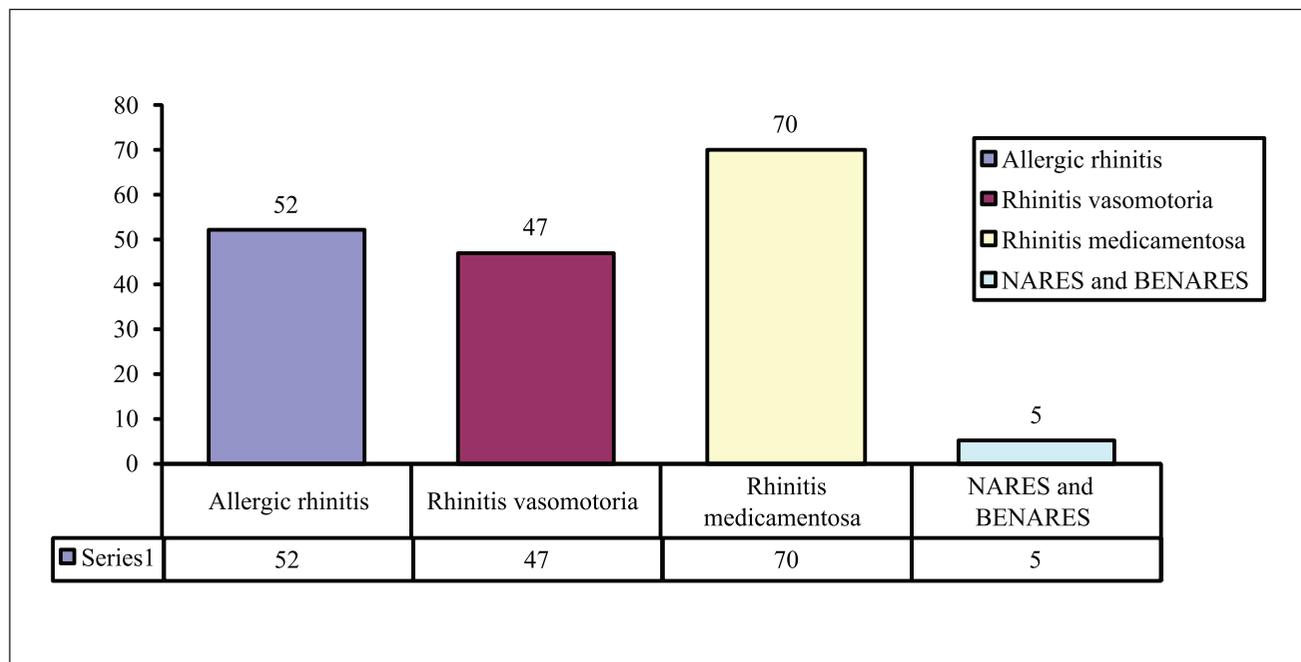
The types of chronic rhinitis were: rhinitis *medicamentosa* - 70 patients (40.23%), allergic rhinitis- 52 patients (29.89%), vasomotor rhinitis - 47 patients (27.01%) and other types of rhinitis (NARES, BENARES) - 5 patients (2.87%) (Chart 1).

The dominant symptom in patients with chronic rhinitis, regardless of its etiology, was chronic nasal obstruction - which was observed in all 174 patients (100%). Depending on the etiology of chronic rhinitis, nasal obstruction was accompanied by anterior and/or posterior rhinorrhea - 137 patients (78.73%), sneezing - 96 patients (55.17%), nasal itching - 78 patients (44.82%), hyposmia/anosmia - 117 patients (67.25%). The clinical profile was completed by headache, sleep disorders, fatigue, increased irritability.

Patients' subjective symptoms were evaluated using the Visual Analogue Scale that was completed before treatment and one, six and 12 months after the surgical procedure. We used a standard 0 to 10 visual analogue scale with 0 rep-



**Figure 2** Cranio-facial CT scan, coronal and axial slices - before treatment - hyperplastic inferior turbinates



**Chart 1** Types of chronic rhinitis

resenting no symptoms and 10 - the most severe symptoms.

The parameters assessed preoperatively and during follow-up visits included nasal obstruction, rhinorrhea, sneezing and smell disorders.

Turbinate reduction with the CO<sub>2</sub> LASER was done under local anesthesia and under direct vision. No nasal packing was necessary.

Follow-ups performed 1, 6 and 12 months after surgery were done using nasal endoscopy, 4-phase rhinomanometry and VAS. The 4-phase-rhinomanometry (4RHINO from RhinoLab) was used to evaluate the total nasal air-flow (ccm/s) and the total nasal airway resistance (NAR) (Pa/ccm/s), before and after decongestion for the right and the left nostril, at an air pressure of 150 Pa.

## RESULTS

The descriptive statistics for VAS results before surgery revealed an important impact of the symptoms on patients' QoL (Table 1).

After CO<sub>2</sub> LASER turbinoplasty, most of the patients reported significant improvement of their symptoms, in terms of decreased nasal obstruction, decreased nasal discharge, less sneezing and itching and a better smell. (Table 2).

One month after surgery, the mean value of VAS for the "nasal obstruction" parameter decreased from 7.86 to 4.4. The same great results were found also 12 months after surgery (Chart 2).

For the "smell disorders" parameter, we observed a significant improvement in VAS scores 1 and 6 months after surgery, but with a slight rebound after 12 months (Chart 3).

Regarding the rhinorrhea, the results showed a slight improvement in the first few months before surgery, with gradual recovery of the VAS values close to the preoperative values 12 months after surgery (VAS<sub>12</sub> = 6.6) (Chart 4).

In long term, there were no significant differences between the results of allergic and non-allergic patients.

The subjective data obtained with the Visual Analogue Scale were sustained by the results obtained with the 4-phase rhinomanometry (4RHINO). The rhinomanometry performed at the first evaluation revealed a high value of the total nasal airway resistance (NAR = 1.27) and a low nasal air-flow (mean value = 236Pa/ccm/s). Comparing the NAR mean value before surgery and the results obtained 1 month after treatment, we observed a significant improvement (NAR<sub>1</sub> = 0.85). The same results were also seen 12 months (NAR<sub>12</sub> = 0.83) after surgery (Chart 5) (Figure 3, Figure 4).

The objective evaluation revealed a statistically significant increase in the nasal air-flow one month after surgery (p<0.05).

No cases of major bleeding, atrophic rhinitis, synechiae, olfactory disturbance or any other complication were noted. The procedure was well tolerated by all patients.

**Table 1**  
The descriptive statistics for VAS results before surgery

Statistics Confidence interval (%): 95	Nasal obstruction	Rhinorrhea	Hyposmia Anosmia	Sneezing
Minimum	6	5	5	6
1 <sup>st</sup> quartile	7	6	6	6
Median	8	7	7	6
3 <sup>rd</sup> quartile	9	8	7	7
Maximum	10	8	9	9
Range	4	3	4	3
Mean (media)	<b>7.86</b>	<b>7.10</b>	<b>6.69</b>	<b>6.77</b>
CV (standard deviation/mean)	13%	13%	15%	15%
Sample variance	1.00	0.80	1.05	0.98
Estimated variance	1.01	0.81	1.05	0.99
Standard-error	0.05	0.05	0.07	0.10
Lower bound Mean CI	7.75	7.00	6.55	6.56
Upper bound Mean CI	7.97	7.21	6.82	6.98

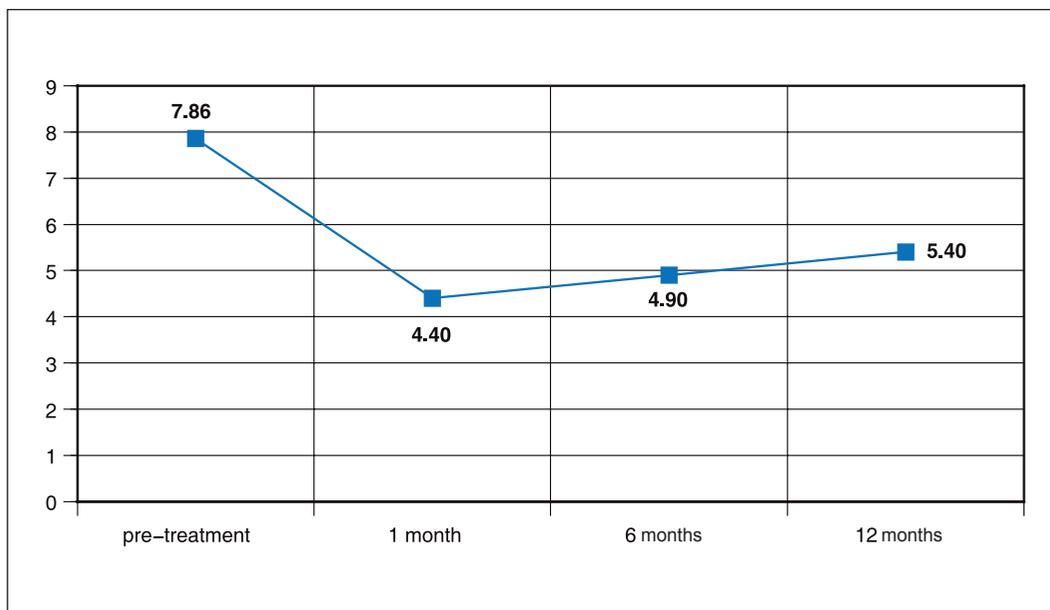
**Table 2**  
VAS results before surgery and 1, 6 and 12 months after surgery

Symptoms	Pretreatment	1 month	6 months	12 months	p value
Nasal obstruction	7.86	4.4	4.9	5.4	<0.05
Rhinorrhea	7.1	6.5	6.3	6.6	<0.05
Sneezing	6.77	5.2	5.7	6.3	<0.05
Hypo/anosmia	6.69	4.3	4.5	5.2	<0.05

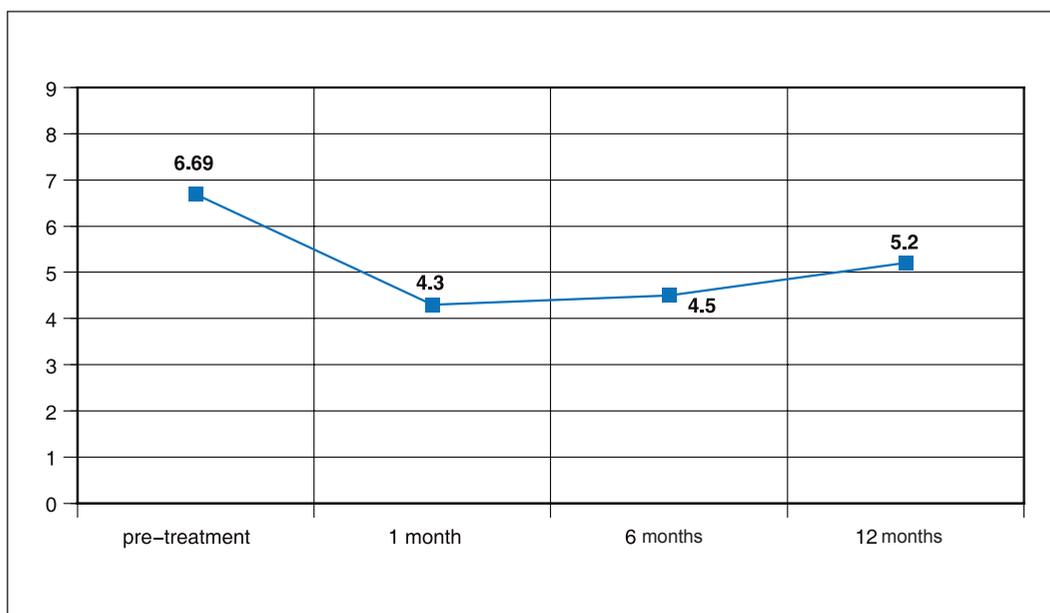
## DISCUSSIONS

Chronic hypertrophic rhinitis is an important public health problem, affecting between 10 and 25% of the population in different countries, with an increasing prevalence<sup>1,2</sup>.

Medical treatment is the first line of approach in nasal turbinates dysfunction. Except for the compensatory turbinate hyperplasia, a surgical reduction of the turbinate should only be indicated if a three months conservative therapy has not had any subjective and objective (active an-



**Chart 2** Evolution of VAS score for “nasal obstruction” parameter



**Chart 3** Evolution of VAS score for “smell disorders” parameter

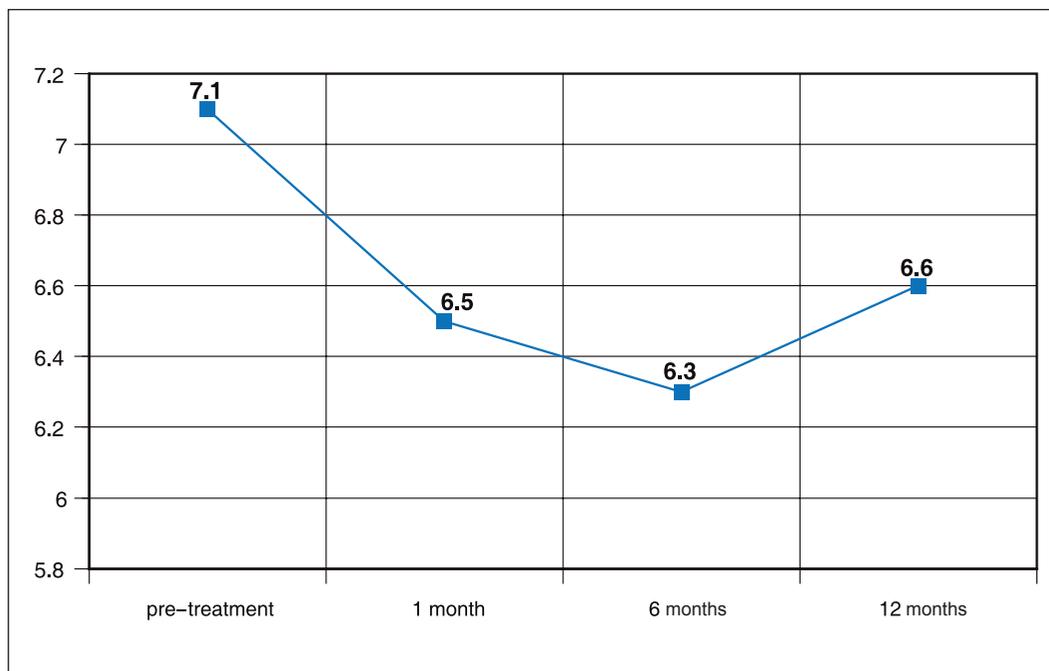
terior rhinomanometry, acoustic rhinometry) success<sup>11</sup>.

The purpose of inferior turbinate surgery is to restore nasal flow, to improve nasal breathing and coexisting symptoms, while preserving the normal physiologic function of the turbinate’s mucosa<sup>12</sup>.

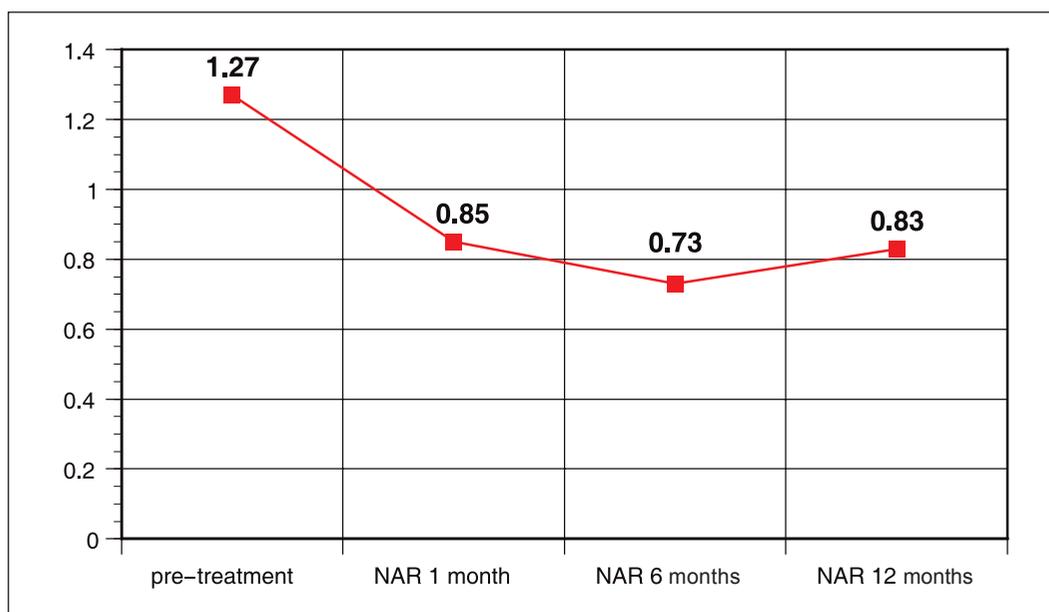
There are various surgical techniques described. Different types of lasers have been used, their advantages being less bleeding and tissue trauma, faster healing: CO<sub>2</sub> LASER (Mittelman in

1982, Simpson et al. in 1982, Fukutake et al. in 1986, Kawamura et al. in 1993, Kubota in 1995, Lippert and Werner in 1995, Lagerholm et al. in 1999, Katz et al. in 2000), Argon LASER (Lenz in 1977 and 1985), KTP LASER (Levine in 1990), Nd-Yag LASER (Lippert and Werner in 1996), Ho-Yag LASER (Oswal and Birmingham in 1992, Serano et al. in 1998), diode LASER (Min et al. in 1996)<sup>13-15</sup>.

LASER type depends on surgeon preference, experience and clinical context.



**Chart 4** Evolution of VAS score for "rhinorrhea" parameter



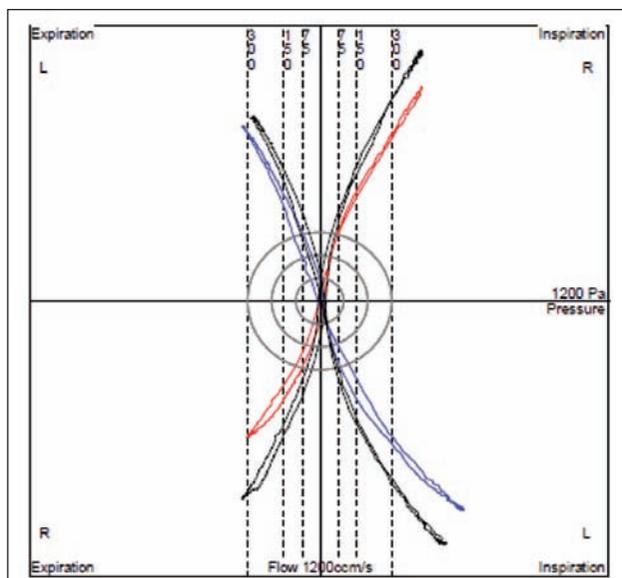
**Chart 5** Pre- and post-treatment value of nasal airway resistance (NAR)

The main aim of CO<sub>2</sub> LASER turbinate surgery is preservation of a well-functioning mucosa membrane, creating a sufficiently large air space, and maintenance of a physiological airway resistance.

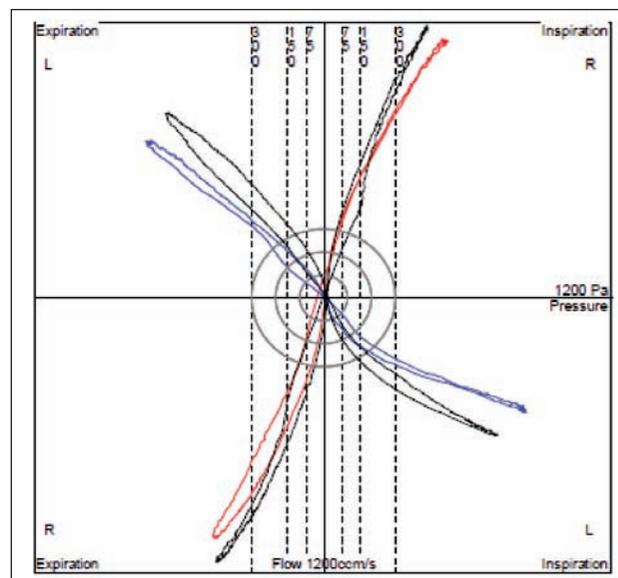
In the ENT literature, numerous studies have demonstrated the effectiveness of CO<sub>2</sub> LASER treatment in chronic rhinitis: Lippert and Werner in 1998<sup>16</sup>, Passali et al. in 1999<sup>17</sup>, Testa et al. in 2000 and 2006<sup>18,19</sup>, S. Katz et al. in 2000<sup>20</sup>, P Janda et al. in 2001<sup>21</sup>, Sadhu A.S. et al. in 2004<sup>22</sup>.

Lippert and Werner, in a study of 184 patients with allergic rhinitis and vasomotor rhinitis, reported a significant improvement of symptomatology in 87.5% of cases, 6 months after CO<sub>2</sub> LASER turbinate surgery. In their study, the decrease of symptoms was maintained in 82.1% of cases 1 year and 80.4% 2 years postoperatively. Also, a number of 84 patients (representing 61.3%) had no need for allergy medication<sup>23</sup>.

In another study, published in 2006, D. Testa and colleagues confirmed the effectiveness of CO<sub>2</sub>



**Figure 3** Rhinomanometry results 1 month after surgery - bilateral normal nasal patency, before and after decongestion



**Figure 4** Rhinomanometry 12 months after surgery: right nostril - normal patency; left nostril - mild nasal obstruction

LASER turbinoplasty in 308 patients diagnosed with chronic hypertrophic rhinitis and allergic rhinitis.

Patients were followed-up over a long period of time, with clinical and paraclinical evaluation at 2, 4.5 and 7.8 years<sup>19</sup>.

The data found in the ENT literature are similar to those revealed by our study: that this type of surgery seems to be very effective in reducing the turbinate hypertrophy, restoring nasal flow and improving symptoms.

## CONCLUSIONS

Rhinitis is a disease with a marked effect upon the quality of life and a significant economic impact.

CO<sub>2</sub> LASER turbinoplasty is a reliable surgical procedure, permitting an effective treatment for chronic hypertrophic rhinitis.

This form of treatment demonstrated a very good tolerability, with no postoperative complications. Therefore, we can say that CO<sub>2</sub> LASER turbinoplasty can positively influence patients' quality of life.

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