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Impact of Diode Laser Assisted Inferior Turbinoplasty in Cases of Chronic Allergic Rhinitis

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Hyperplastic inferior nasal turbinate that has not responded to the medical treatment and required a surgical. However, most of these techniques are associated with a distinct risk of bleeding, pain, uncontrolled damage of the mucosa, and atrophic rhinitis. Thus, there is a need for a less traumatic treatment. This study intended to evaluate the inferior turbinates after diode laser turbinoplasty in resistant cases of inferior turbinate hypertrophy in patients of allergic rhinitis.A prospective study18 patients of allergic rhinitis having inferior turbinate hypertrophy that has not responded to the medical treatment. All the patients underwent for diode laser assisted inferior turbinoplasty under the general anesthesia in Oto-Rhino-Laryngology, Faculty of Medicine, Zagazig University. Mean age was 28.7 ± 6.7 years.Ten patients were females and eight patients were males. Three-month postoperatively, all of the patients had intact shrunken inferior turbinates. Sixteen patients (89%) had no nasal obstruction, 15 patients (83%) had moderate to good improvement of rhinorrhea, and 13 patients (72%) had moderate to good improvement of sneezing.Diode laser assisted inferior turbinoplasty is a safe and effective procedure resulting in an excellent coagulation of the soft tissue and a controllable performance.

Keywords: Allergic rhinitis, Diode laser, Hyperatrophy and Inferior turbinates

INTRODUCTION

Hypertrophy of the inferior turbinate is a significant factor in chronic nasal obstruction which is a common subjective complaint encountered in the practice of rhinology. Persistent allergic rhinitis, and compensatory hypertrophy resulting from a long-standing septal deviation are the most common noninfectious causes of mucosal swelling of the inferior turbinate which lead to turbinate enlargement (Farmer and Eccles,2006). Conservative treatment of inferior turbinate hypertrophy includes intranasal steroid sprays, antihistamines, systemic decongestants, mast cell stabilizers, and allergic desensitization (Saleh and Durham, 2007). When medical management fails, surgical reduction of the inferior turbinates is often used. Surgical procedures such as partial or total turbinectomy, cryotherapy, concho-antropexy, and submucosal diathermy are effective in relieving nasal obstruction in such patients. However, these procedures seem to be traumatic and too invasive and they may lead to different side effects such as crusting, bleeding, recurrent infections, nasal odor, pain, secondary atrophic rhinitis, and empty-nose syndrome (Rice et al., 2003). Therefore, there is a need for less traumatic but effective surgery. It is important to use the minimally invasive, safe, and effective method for volume reduction of hypertrophied inferior turbinate

(Sciamanna and Shore, 2015).

Diode laser is quite different from other kinds of lasers in both pumping mechanism and operating performance. They have the advantages of simplicity, efficiency, and compactness, and need a scanty of auxiliary equipment. Thus, they can be linked readily to optical fibers (Aldelaimi and Khalil, 2015). Diode laser has a flexible fiber delivery system is compatible with hollow instruments, allows for coaxial vision, and is ideally suited for intranasal, oral, and micro-laryngeal use. Diode laser is housed in a portable case and is light weighed. Therefore, it can be easily transported. Moreover, the length of set-up time is generally less than 5 minutes and no warm-up period are necessary (Fried and Irby, 2018). In nasal and sinus surgery, it has been applied for management of nasal polyps, turbinate hypertrophy, papilloma, cysts, mucocele, epistaxis, stenosis, synechia, and dacryocystorhinostomy (Pappas and Christodoulou, 2018).

Consequently, this study intended to evaluate the inferior turbinates after diode laser turbinoplasty in resistant cases of inferior turbinate hypertrophy in patients of allergic rhinitis.

MATERIALS AND METHODS

A prospective study included 18 of patients with allergic rhinitis complaining of nasal obstruction in Oto-Rhino-Laryngology department, Faculty of Medicine, Zagazig University.

Inclusion criteria: Allergic rhinitis with hypertrophied nasal obstruction and not responded to the medical treatment: avoidance of offending antigen, oral anti-histamines, intranasal steroid sprays, and systemic decongestants.

Exclusion criteria: patients who were not fit for surgery, pregnant patients, patients with septal deviation or polyposis, patients withchronicrhinosinusitis and patients with granulomas and tumors of paranasal sinuses.

A fully informative written consent was obtained from all the patients and approved by Zagazig University Institution Review Board (IRB). All patients underwent for the following diagnostic protocol:

1-full clinical history taking.

2-A five-point scale (0: absent, 1: mild, 2: moderate, 3: severe, and 4: very severe) was used to assess the patient symptom: The severity of nasal obstruction.

3-Complete ENT examination including rigid or flexible nasal endoscopy to confirm the presence of hypertrophy of the inferior turbinates and rule out other causes of nasal obstruction. The ITwere graded 1-4 based on the inferior turbinate classification system.

4-CT scan measurement which estimated the total amount of the airway space that the inferior turbinate

All patients underwent for diode laser assisted inferior turbinoplasty under the general anesthesia. laser applications were performed by inserting the laser flexible fiber tip into inferior turbinate. Patients were discharged on the same day andnasal pack was removed after 24 hours were given nasal decongestant, and analgesic for 7 days and saline nasal spray for irrigation for 1 month.

All patients were followed-up after 2 weeks, then every month and at every follow-up visit, rigid or flexible nasal endoscopic examination was performed to assess the nasal airway to detect crusts formation and any sequalae such as bleeding and synechiae. None of the patients was lost to follow-up.

Statistical analysis:

Data were analyzed using IBM SPSS 23.0 for windows (SPSS Inc., Chicago, IL, USA) and NCSS 11for windows (NCSS LCC., Kaysville, UT, USA). Quantitative data were expressed as mean± standard deviation (SD), Quantitative data were tested for normality using KolomogrovSmirnove test, assuming normality at $P>0.05$. Qualitative data were expressed as frequency and percentage.

RESULTS

This study included 18 patients who underwent for diode laser assisted inferior turbinoplasty for management of nasal obstruction due to refractory hypertrophy of the inferior turbinates secondary to allergic rhinitis. Their mean age was 28.7 ± 6.7 years. Ten patients were females and eight patients were males. All the patients responded to nasal decongestant with relief of nasal blockage ruling out bony hypertrophy of the inferior turbinates (Table 1).

Regarding to the nasal obstruction, preoperatively, 11 patients (61%) had very severe nasal obstruction (no nasal breathing), while 7 patients (39%) had severe nasal obstruction (predominant mouth breathing) (Table 2).Eight patients had grade 3 inferior turbinate hypertrophy, while 10 patients had grade 4 inferior turbinate hypertrophy (Table 3).

Table 1: Age and sex distribution of the studied group

Variable	The studied group(18) mean ± SD (Range) Median	
Age (years):	28.7± 6.7 (18-38) 29	
Variable	**No. (18)**	**%**
Sex		
Male	8	44.4%
Female	10	55.6%

Table 2: The severity of nasal obstruction preoperatively

The severity of nasal obstruction	No. (18)	%
Severe	7	39%
Very severe	11	61%

Tables3: Preoperative grading of inferior turbinate hypertrophy

Grading of inferior turbinate hypertrophy	No. (18)	%
Grade 3	8	44.4%
Grade 4	10	55.6%

Table 4: Preoperative associated nasal symptoms

Severity	Rhinorrhea		Sneezing	
	No. (18)	%	No. (18)	%
Mild	3	17%	4	22%
Moderate	4	22%	5	28%
Severe	11	61%	9	50%

Table 5: Postoperative improvement of nasal obstruction among the studied group

Improvement of nasal obstruction	No. (18)	%
No nasal obstruction	16	89%
Mild nasal obstruction (no mouth breathing)	2	11%

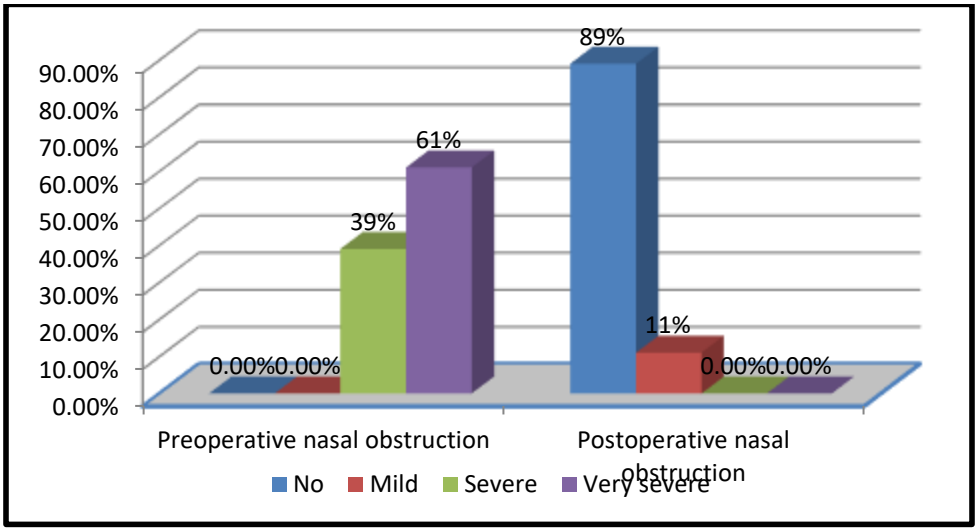

Figure1: Colon chart for preoperative and postoperative nasal obstruction

Table 6: Comparing preoperative and postoperative IgE among the studied group

Variable	Preoperative (18)	Postoperative (18)	Paired t-test	p-value
IgE mean ± SD (Range) median	606.7±137.2 (410-920) 490	133.3±46.7 (80-195) 110	7. 3	0.001**

** Statistically highly significant difference (P ≤ 0.001)

As regard to rhinorrhea and sneezing, 11 patients had severe rhinorrhea (61%), whereas 9 patients had severe sneezing (50%) (Table 4).

None of the patients had bleeding postoperatively. In all the patients, there were few isolated crusts on the inferior turbinates post diode laser inferior turbinate reduction and such crusts have resolved completely by the end of the 3rd month. At 2-week postoperatively, synechiae were noted in 3 patients (16.7%)) and release of these synechiae by forceps was done in the

outpatient clinic department under the local anesthesia. At 3-month postoperatively, all of the patients had intact shrunken inferior turbinate.16 patients (89%) had no nasal obstruction, while 2 patients (11%) had mild nasal obstruction (no mouth breathing) (Table 5and Figure 1).

Regards serum level of IgE, there was statistically significant decrease in total serum IgE level from 606.7±237 IU/ml preoperatively to 133.3±46.7 IU/ml 3-month postoperatively (P ≤ 0.001) (Table 6).

DISCUSSION

The goal of turbinate surgery is to obtain an improvement in nasal breathing, while preserving the physiologic function of the turbinate and minimizing discomfort and other adverse effects. No technique is perfect and the variety of surgical techniques available highlights the absence of unanimity regarding the optimal technique(Siedek et al., 2014). to evaluate the inferior turbinates after diode laser turbinoplasty in resistant cases of inferior turbinate hypertrophy in patients of allergic rhinitis.

Our results are in agreement with Parida et al. (2013) who revealed relief of nasal obstruction in 86.7% of the patients post diode laser turbinate reduction. Also, Ibrahim et al.(2017) who mentioned that diode laser turbinoplasty resulted in complete improvement of nasal obstruction in 92% of the patients.The improvement of rhinorrhea can be attributed to induction of fibrosis in the highly vascular submucosa, reduction of the seromucinous glands, and incision of branches of posterior nasal nerve which plays a crucial role in sneezing and hypersecretion. Whereas the relief of sneezing can be attributed to destruction of the branches of posterior nasal nerve.Consequently, the improvement of rhinorrhea and sneezing can be attributed to the change of the secretory reflex (Kim and Baraniuk, 2007; Parida et al. 2013).

In the present study, 3-monthpostoperativetotal serum IgE level decreased. Our results agree with that of Saleh et al. (2016) who studied the effect of diode laser turbinoplasty on the level of total serum IgE in allergic rhinitis patients. Our results are in agreement with Gupta et al. (2018) who concluded a significant improvement of nasal obstruction, rhinorrhea, and sneezing 3-month post diode laser turbinate reduction.

Diode laser was used in the contact mode and was applied in anterior to posterior stripe to the entire inferior turbinate. As the flexible fiber accurately delivers the beam, it produces in this way minimal damage to the nearby areas (Choi et al. 2018). By these results, laser assisted inferior tubinoplasty can be considered a vialable tool in treating resistant cases of nasal allergy. However, this needs more work-up in large number of patientswith longer follow-up.

CONCLUSION

Diode laser assisted inferior turbinoplasty is a safe and effective procedure resulting in an excellent coagulation of the soft tissue and a controllable performance.

CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

AUTHOR CONTRIBUTIONS

All author contributed in all parts of the paper

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