

Comparative Study between Electrical Submucosal Diathermy and Diode Laser in Treatment of Nasal Obstruction Due to Inferior Turbinate Hypertrophy

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Abstract

Nasal blockage is one of the common complaints that one of its causes is inferior turbinate hypertrophy, turbinate reduction surgeries aim to relieve this hypertrophy. We compared the short term results of a new technique (Laser assisted turbinoplasty) and an old one (submucosal diathermy of the inferior turbinate).

Aim: A prospective randomized comparative clinical study was designed to clarify the effect, outcome and prognosis between Diode laser assisted inferior turbinoplasty (DLT) and submucosal electrical diathermy (SMD) of the inferior turbinate.

Patients and methods: This study was conducted at department of otolaryngology in Al-Hilla Teaching General Hospital over a period of one year from December 2018 to August 2019. It included 31 patients having nasal obstruction due to inferior turbinate hypertrophy not responding to medical therapy randomly distributed to undergo either SMD or DLT. Comparisons were made between pre and postoperative symptoms scores and endoscopic scores of nasal patency.

Results: Both techniques were effective in reducing nasal blockage but the results of DLT were more predictable and controllable during surgery. The most commonly observed post-operative complication was crusting and dryness developed in 10/16 patients after DLT and in 15/15 patients after SMD.

Conclusion: Based on our study, DLT is a better substitution of the classic SMD.

Key words: Inferior turbinate hypertrophy, Diode laser assisted inferior turbinoplasty (DLT), and submucosal electrical diathermy (SMD)

Introduction

Turbinate hypertrophy (TH) is the enlargement of the turbinates. TH is very common, that it affects everyone at some point. Consequently, treatment of allergies and other nasal difficulties is highly advised before complications such as turbinate hypertrophy arise (1). Typically, the enlargement of inferior turbinate is temporary and the nasal obstruction resolves naturally. However, in some cases, the turbinates become chronically enlarged, and this condition is known as nasal turbinate hypertrophy (2). The surgical management of the enlarged inferior turbinates has been debated for more than 100 years. Since the late part of the 19th century, different medical and surgical treatments have been developed to treat the enlarged turbinates. However, no definition of an enlarged turbinate exists in terms of objective measurement, and diagnosis is by exclusion criteria when dealing with the sensation of nasal obstruction. In addition, diagnosis is often retrospective based on the effect of a given treatment (for example, reduction of the turbinate) on the impaired nasal patency (3). There are a wide variety of techniques available for the surgical reduction of inferior turbinate most of

these techniques provide satisfactory results for a variable period and they are associated with various adverse effects like post-operative bleeding, crusting, pain and synechiae formation. Optimal surgical technique for inferior turbinate reduction should strike a balance among effective turbinate volume reduction, preservation of nasal function and avoidance of complications. LTR (laser turbinate reduction) is an effective and simple method for treatment of ITH. The advantages of laser surgery are lack of bleeding, high precision and good healing of the wound (4). Diode LASER contributes to a more selective and less invasive surgery, minimizing the risk and post-operative period in hospital, it is indeed able to transmit to the fabric up to 60 W of LASER energy at a wavelength of 810 nm; this ensures a precise cutting/coagulation and excellent tissue vaporization. The possibility of using different sizes optical fibers (400, 600 and 1000 nm), both in “contact” and “non-contact” modality, allows a very effective use in endoscopy. (5)

Patients and methods

A prospective randomized comparative clinical study was performed on 31 patients who presented with nasal obstruction and hypertrophied inferior turbinate mucosa refractory to medical treatment (local and systemic steroids for several months with or without oral antihistamines and local decongestants xylometzolin HCL drops 0.01%), from December 2018 to August 2019 at Alhilla teaching hospital. All of these patients had symptoms and signs of nasal obstruction and blockage related to congested red color turbinate mucosa that did not respond well to medical treatment.

Selection of patients

Following routine physical ear-nose-throat examination, focusing on detailed nasal examination, every patient underwent endoscopic nasal evaluation. Patients with prominent mucosal hypertrophy were selected by means of a decongestion test and the patients who did not respond well to decongestant were selected. Nasal cavities were decongested by application of xylometazoline nasal spray and re-examined. Only patients with no evident shrinking of their inferior turbinates were included in this study.

Inclusion criteria: Adult patient with bilateral chronic nasal blockage due to bilateral inferior turbinate hypertrophy, not responding to adequate medical treatment for adequate duration.

Exclusion criteria :Patients with history of previous nasal surgery, and those with nasal obstruction due to causes other than turbinate hypertrophy were also excluded., presence of purulent secretions on nasendoscopy, evidence of chronic sinusitis on CT scan, septal deviation , nasal polyposis, previous nasal surgery, granulomatous and neoplastic diseases of the nose and paranasal sinuses, and post nasal space pathology. Sixteen patients (5 females, 11 males) were treated with (DLT) and 15 patients (7 females, 8 males) were treated with submucosal diathermy (SMD).

Informed consent signed by the patient, the surgeon and the ward's staff chief was obtained from all patients. Pre-operative evaluation included assessment of Fitness for G.A preparing ,hemoglobin level, full blood counts, prothrombin and partial thromboplastin times, fasting blood glucose, and blood urea.

Types of Interventions

1-Diode Laser Turbinoplasty

Patients in supine position with 30° head elevation wearing water soaked surgical towels. The procedure were performed under LA with endoscopic guide the laser delivered with the fiberoptic tip of 400 Mm in diameter with length of 9 mm to be inserted interstitially into the anterior end of the Inferior Turbinate connected tv monitor and recorder oxygen oximeter, ECG monitor supervised by Anasthiast fig(1 a,b)

The laser used in a continuous mode with a power of (3) W and exposure duration of (20 sec). The duration of operation for each IT was ranged from 10 to 20 minutes.



A

B

Fig(1) A- stainless applicater

B- diode laser (940nm)

The submucosal diathermy

General anesthesia with endotracheal intubation and pharyngeal packing toweleling the patient leaving both eyes exposed, in supine position with elevation of the head of the bed about 30 degrees. Using head light and Kilian's nasal speculum, three sites were cauterized using classic submucosal diathermy technique two medial and one inferior till obvious shrinkage of the turbinate size was observed.

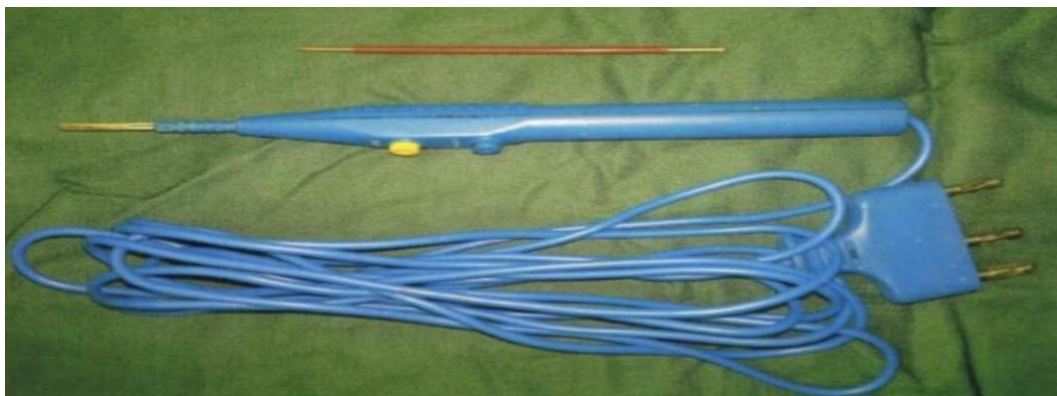


Fig (2) Momo poler submucosal diathermy needle and hand piece.

Results

From December 2018 to August 2019, out of 12922 patients presented to the ENT outpatient clinic at Al-Hilla teaching hospital, 31 underwent turbinate reduction surgery (0.21%). Out of 780 surgeries performed in the otolaryngology operation room at Al-Hilla teaching hospital in Babil, Thirty One (3.0%) were turbinate reduction surgery. Age and gender distribution Nineteen males (62%) and 12 females (38%) were included in our study, male to female ratio was 1.7:1

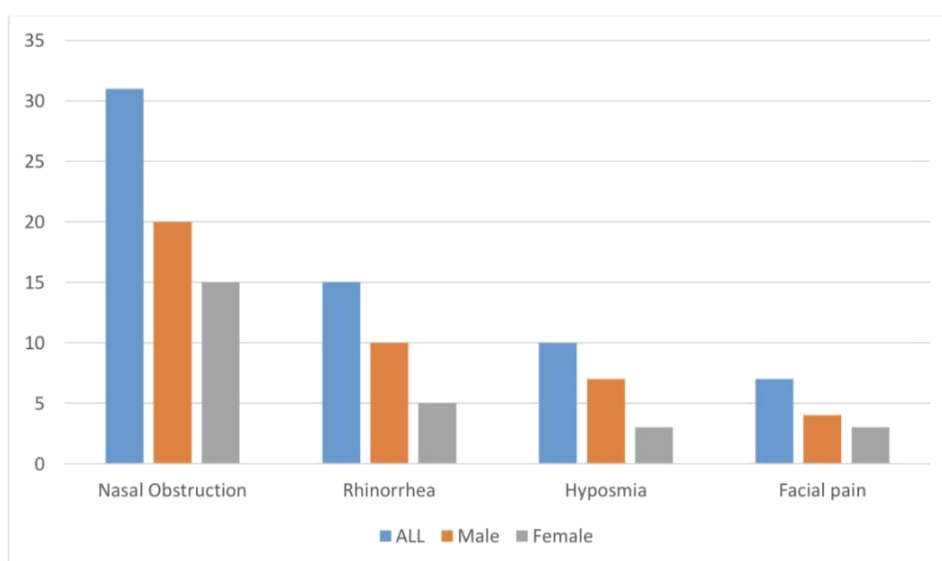


Fig (3) Gender distribution

The distribution of symptoms

At presentation, nasal obstruction (100%) was by far the most common symptom present in all patients followed by, rhinorrhea (48%), and to a lesser extent hyposmia (28%) and facial pain (24%)

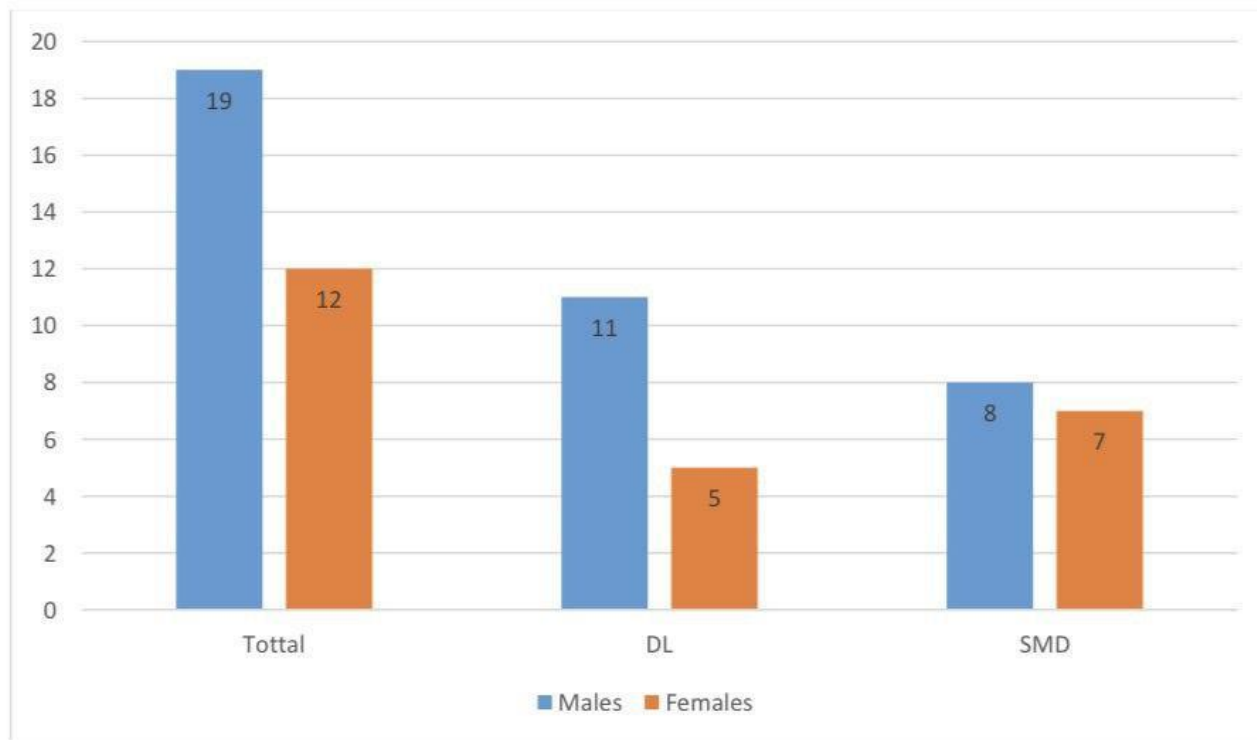


Fig (4)The pre-operative distribution of symptoms among males and females

Nasal obstruction

the number of patients complaining of nasal obstruction was reduced after DLT from 16 to 6 after one week and to zero after one month ($P=0.0002$), and from 15 to 10 after one week and to 3 after one month after SMD ($p=0.005$). At the three months visit all.

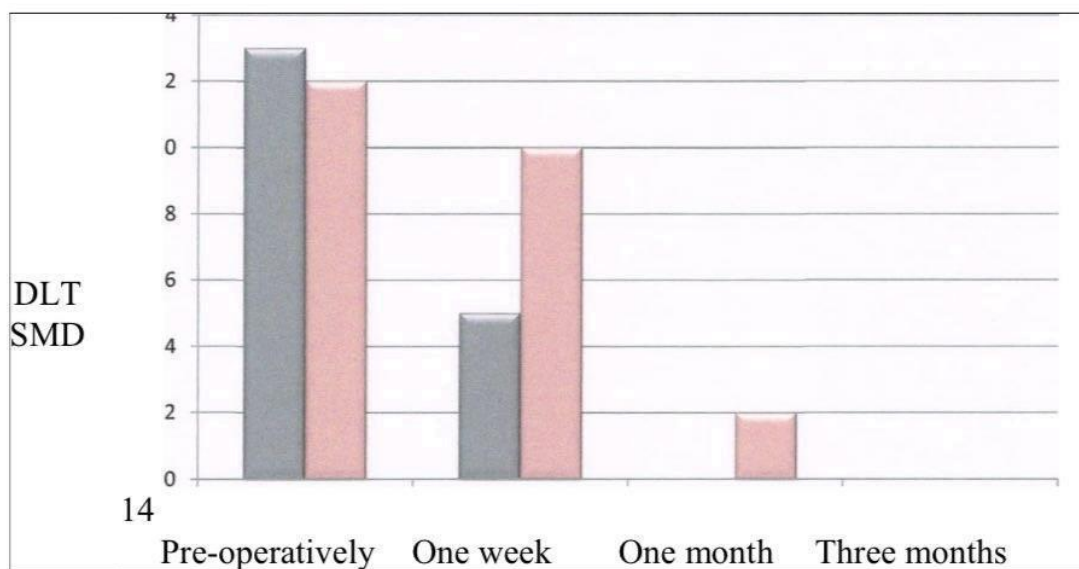


Fig (5) Nasal obstruction before and after surgery.

Post-operative complication

1-Crustation :

After DLT 10 patients developed crustation which was observed after one week and at the second post-operative visit after one month but gradually disappeared at the subsequent visit 3 months after surgery ($P=0.04$). After SMD 15 patients had crustation at the first visit one week after surgery, at the second visit 9 of them had complete resolution, and at the third visit 3 months after surgery all of them were free of crustation ($10=0.001$).

Table (1) Post-operative crustation.

	One week		One month		Three months	
	Prese nt	Abse nt	Prese nt	Abse nt	Prese nt	Abse nt
DL T	10	6	5	11	0	16
SM D	15	0	6	9	0	15
Tot al	31		31		31	

2- Synaechiae: Synaechiae developed one month after Two DLT surgery (7.7%) and 4SMD surgeries (25%), were treated by division of the adhesion points, no splint was needed, only one patient in SMD group had recurrent synaechiae lasting more than three months at the same site.

Table (2) Post-operative synaechiae.

	One week		One month		Three months	
	Prese nt	Abse nt	Prese nt	Abse nt	Prese nt	Abse nt
DL T	0	16	2	14	0	16
SM D	0	15	4	11	2	13
Tot al	31		31		31	

Discussion

Nasal obstruction caused by, hypertrophied inferior nasal turbinate (HIT) is one of the most common symptoms in otolaryngology .A variety of surgical procedures have been described for the reduction of hypertrophied inferior nasal turbinates. In the current study we used diode laser (940nm) with power of 3 W, Cw mode and interstitial technique.

According to time of procedure: The mean time was (15) minutes per turbinate while Pradipta Kumar Parida (6) (Diode Laser Turbinate Reduction in the Treatment of Symptomatic Inferior Turbinate Hypertrophy), The diode laser (Portable 980 nm wavelength Fox diode laser) was used in contact mode with fiber diameter of 600 Mm, power of 5 W in continuous wave mode for (100–140 s). Multiple applications were made along the inferior turbinate as required. Find that the mean time was (10.8) minutes.

Hamdi Cakli Cemal Cingi (7) (Diode laser treatment of hypertrophic inferior turbinates and evaluation of the results with acoustic rhinometry) evaluated the effectiveness and outcomes of using a diode laser ($\lambda = 980$ nm) in turbinate reduction. The study included 62 patients with symptoms of nasal obstruction due to hypertrophic inferior turbinates, by this study the mean duration of operation was (3) minutes. 34

Md. Rojibul Hoque¹, Asaduzzaman Rasel⁽⁸⁾ (Turbinoplasty of hypertrophied inferior turbinate by diode laser) A total of 45 patients suffering from nasal obstruction due to hypertrophied inferior turbinates were treated with a continuous diode laser (14 W- 940 nm) in “contact” mode and under local anesthesia. Thirty patients (16 with allergic rhinitis and 14 with vasomotor rhinitis) were included into this clinical trial with a follow-up of 6 months. Diode laser output power was 10–14 W in the continuous-wave mode) in this study the mean duration of operation was (8) minutes. Ronald Sroka PhD (9) (Comparison of long term results after Ho: YAG and diode laser treatment of hyperplastic inferior nasal turbinates). 113 patients (allergic rhinitis (52%) and vasomotor rhinitis (48%)) were treated by means of a continuous wave GaAlAs-diode laser emitting light at a wavelength of $\lambda = 940$ nm (power: 8–10 W) which are performed as an outpatient procedure under local anesthesia within a follow-up period of 6 month and after 3 years, mean duration of operation was (3-10) minutes per turbinate.

For nasal Patency: In the SMD and DLT all patients get improvment the first postoperative week shows the number of patients complaining of nasal obstruction was reduced after DL from 16 to 6 after one week and to zero after one month ($P=0.0002$), and from 15 to 10 after one week and to 3 after one month after SMD ($p=0.005$). At the three months visit all the patients both in DLT and SMD groups had no nasal blockage. Pradipta Kumar Parida(6) showed that there was significant improvement in nasal obstruction in all cases. In the initial 2–3 days following the surgery, nasal obstruction worsened in most of the patients. But by the end of the first week all patients showed statistically significant improvement in nasal obstruction and significant decrease in nasal airway resistance 6 months following the surgery. Adil H. Ibrahim(10) (Diode 1470nm laser turbinoplasty versus partial surgical inferior turbinoectomy for treatment of inferior turbinate hypertrophy) prosspective comparative study had been done at Al-Kafeel hospital from February to October 2016, fifty patient were included & equally divided into two groups of 25 patients for each . Female 30 (60%) Male 20 (40%) patient age ranged from 16-50 years with mean age(28.18 years & S.D was 7.27 yeas). No significant different in improvment of nosal obstruction both groups at 2 weeks assesmmnt after operation but after one month after operation shows a better improvment but after 3 months slightly better laser group. Ronald Sroka PhD (9). (Comparison of long term results after Ho: YAG and diode laser treatment of hyperplastic inferior nasal turbinates)Three years after laser treatment, a subjective improvement of nasal airflow had been described by the patients in (67.5%) after Ho: YAG- and in (74.4%) after diode laser treatment. Rhino manometry revealed a significant

improvement of the nasal airflow at both 6 months and 3 years after the laser treatment as compared to the preoperative data. After diode laser treatment, patients showed nasal obstruction due to postoperative edema and nasal crusting during the first 3–4 weeks, whereas patients from the Ho:YAG laser group described these symptoms only for a period of 1–2 weeks. Mohammed Radeef Dawood(11) (submucosal Diathermy versus partial inferior turbinectomy in the treatment of nasal obstruction) A prospective comparative study of 26 patient at ENT department Al-Yarmouk teaching hospital in Baghdad from January 2014 to January 2015. Regarding breathing improvement on first 2 months following 62% had excellent improvement (PIT)& 38% (S.M.D) .

Post-operative complication:

After DLT 10 patients developed crustation which was observed after one week and after one month appeared at the subsequent visit 3 months. After SMD 15 patients had crustation at the first visit one week after surgery, at the second visit 9 of them had complete resolution, and at the third visit 3 months after surgery all of them were free of crustation ($10=0.001$). Kumar Parida(6) found that Crusting over the inferior turbinate was present in 88.9 and 66.6% at 1 and 3 months of follow up. Ronald Sroka PhD (9) find that after diode laser treatment, patients showed nasal obstruction due to postoperative edema and nasal crusting during the first 3–4 weeks, whereas patients from the Ho:YAG laser group described these symptoms only for a period of 1–2 weeks. Hamdi Cakli Cemal Cingi (7) found that the pain was excellently accepted by the patients. Ronald Sroka PhD (9) find that side effects like nasal dryness and pain were rare (<5%) and occurred only during the first weeks after the intervention. Adil H. Ibrahim (10) find highly statistical significant lower pain in laser group (mild pain 40%) while moderate – severe pain 60% at partial turbinectomy & 5% at laser turbinoplasty. Mohammed Dawood (11) find at (SMD) submucosal diathermy the pain was found in 3 patient (23%) with mild pain form & 7 patient 53% had moderate pain were both managed by oral analgesia. Pedro Paulo Vivacqua(12) (Comparison of Turbinectomy techniques with CO2 laser and diode laser) realized that pain ranges during the procedure varied from moderate to severe being that CO2 laser presents moderate to severe range of pain, whereas in diode laser predominates mild pain. Md. Rojibul Hoque1, Asaduzzaman Rasel(8) 3 (10%) patients reported. About nasal dryness and 4 (13.33%) about pain after the operation. 37 Pedro Paulo Vivacqua(12) find that Laser diode presented lower bleeding rate, in both types, intraoperative bleeding was mild, but the CO2 group presented a larger number of patients with moderate and severe bleeding. Md. Rojibul Hoque1, Asaduzzaman Rasel(8) find that minor bleeding was observed in 2 of 30 (6.67%) of the patients but did not require nasal packing. Adil M.Ibrahim(10) find after 2 days assessment revealed that there was no bleeding at laser turbinoplasty groups were 56% patient with mild – moderate bleeding and 4% severe from suffered from severe bleeding in partial surgical inferior turbinectomy . Mohammed Radeef Dawood (11) find at (SMD) submucosal diathermy 23% of them had mild form of bleeding that stopped by gauze impregnated with vaseline nasal back for few hours and 8% had moderate bleeding .

Conclusion

Reduction of hypertrophied inferior turbinate by diode laser (940nm) is an effective, safe, minimally invasive procedure can be done with local anesthesia, in outpatient department, with a mild tolerable pain.

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