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The effectiveness and safety of radiofrequency in the management of nasal obstruction secondary to inferior turbinate hypertrophy

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Abstract

Nasal obstruction is a frequent complaint in ENT clinics and significantly affect the patient`s quality of life. Inferior turbinate hypertrophy is one of the common causes of nasal obstruction, surgical reduction of inferior turbinate is indicated in refractory cases not responding to conservative measures & the optimal surgical technique is controversial. The aim of our study was to evaluate the efficacy of radiofrequency in treating inferior turbinate hypertrophy, a prospective study was conducted & radiofrequency ablation was performed on 32 patients complaining of chronic nasal obstruction due to inferior turbinate hypertrophy & other causes of nasal obstruction were excluded , & results were assessed preoperatively & 1st week , 1st month & 3rd month postoperatively depending on subjective visual analogue scale for nasal obstruction, grade of inferior turbinate hypertrophy & complications. There was significant reduction in inferior turbinate size and improvement in nasal obstruction, no major complication was recorded, so we conclude that radiofrequency is an effective and safe in management of inferior turbinate hypertrophy.

Keywords: *Inferior turbinate hypertrophy, Radiofrequency, Nasal obstruction, Radiofrequency ablation*

Introduction

Nasal obstruction is a common complaint among patients presenting to otolaryngologists which significantly disturbs the patient's quality of life, resulting from anatomic abnormalities or mucosal sinonasal diseases.[1][2]

The inferior turbinate is the main regulator of nasal airflow and thus normal respiration[3]. So turbinate hypertrophy which may result from different conditions like allergic rhinitis, vasomotor rhinitis chronic hypertrophic rhinitis or rhinitis medicamentosa or compensatory due to septal deviation is one of the most common causes of chronic nasal obstruction[1][4].First line treatment for inferior turbinate hypertrophy (ITH) is mostly conservative & surgery only indicated in refractory cases[2] Although there are many options for turbinate reduction, there is no consensus on the best and most effective technique. [1]

However, despite the method used, most inferior turbinate procedures appear to be effective in treating symptoms of nasal obstruction not relieved by medical therapy.[1]

Recently, temperature-controlled radiofrequency tissue volume reduction (TCRFTVR) has been used for the treatment of the hypertrophied inferior turbinate.[5]

Patients and Methods

This prospective interventional study (non-controlled clinical trial) was conducted in the department of otorhinolaryngology,head and neck surgery during the period of January 2015 to January 2016, in AL-Sader medical city, AL-Najaf governorate, Iraq.

A total of 32 cases [23 males & 9 females, in age range 15-45 years] with bilateral inferior turbinate hypertrophy regardless the cause were included in this study, all of them complaining of chronic nasal obstruction not responding to at least 3 months of medical treatment. All other causes of nasal obstruction were excluded. All patients were subjected to detailed history taking, general and ENT examination & diagnostic nasal endoscopy. The preoperative parameters recording depends on subjective assessment of nasal obstruction and endoscopic grading of turbinate hypertrophy.

Nasal obstruction severity assessed individually & subjectively depending on Visual Analogue Scale (VAS) , in which each patient rates his/her symptom severity from a score 0-10 , where ;

- 0 → no obstruction
- 1-3 → mild obstruction
- 4-7 → moderate obstruction
- 8-10 → sever obstruction

By using 0 degree 4 mm Hopkins rigid endoscope, inferior turbinate was graded into 1, 2, and 3 on the basis of size of the inferior turbinate

Grade 1: inferior turbinate is occupying less than 25% of nasal cavity

Grade 2: Inferior turbinate is occupying 25 - 50% of nasal cavity.

Grade 3: Inferior turbinate is occupying more than 50% of nasal cavity

All the cases were operated on under local anesthesia (LA). The patient was placed in supine position with 15 degree head elevation. The nose was packed with cotton pledgets socked with 4% xylocain for about 15 minutes before shifting into the theatre , then local infiltration with 2-3 ml of xylocain plus adrenalin in the dilution of (1: 100,000) at the anterior end of inferior turbinate(IT) and surrounding area and wait for 5 minutes.

Under guidance of endoscope, the radiofrequency energy was delivered by a generator (SOMETECH) using a turbinate hand- piece comprising a bipolar long-needle electrode with an active part & insulated part. The active portion of the electrode was inserted into the submucosal plane & kept on coagulation mode, and the energy was delivered to three different points of each turbinate (anterior, middle, and posterior thirds of each turbinate) for about 30 seconds for each point, with great care not to injure the mucosa.

The patient was observed for about 1 hour for any bleeding, and no patient required postoperative packing. All the patients are discharged home on the following treatment if there is no contraindication & advised to follow his/her normal daily activities;

- Acetaminophen (panadol) 500mg on need
- Isotonic saline nasal irrigation 3 times daily for 2 weeks

All patients assessed postoperatively at 1st week, 1st month & 3rd months for:

- Severity of nasal obstruction according to VAS
- Size of IT hypertrophy according to endoscopic grading
- Post –operative complications like crustation, pain, bleeding, atrophic rhinitis& synechia.

Statistical analysis was done by using SPSS (statistical package for social sciences) version 20.

Results

We performed the surgery on 36 patients, 4 of them were excluded as they are did not completed the follow-up visits.

Table 1 Nasal obstruction preoperatively and postoperatively

variable		Preop.	1st week	1st month	3rd month	P value
Nasal Obstruction	No	0(0%)	1(3.1%)	1(3.1%)	27(84.5%)	<0.001
	Mild	1(3.1%)	1(3.1%)	12(37.5%)	2(6.2%)	
	Moderate	11(34.4%)	9(28.1%)	16(50%)	2(6.2%)	
	Sever	20(62.5%)	21(65.7%)	3(9.4%)	1(3.1%)	

Table 2 Grading of ITH preoperative and postoperative

		Time				P value
		Preoperative	1 week postoperative	1 month postoperative	3 months postop.	
Grade	1	0	0	15	27	<0.001
		0.00%	0.00%	46.90%	84.40%	
	2	15	18	16	5	
		46.90%	56.20%	50.00%	15.60%	
	3	17	14	1	0	
		53.10%	43.80%	3.10%	0.00%	
Total		32	32	32	32	
		100.00%	100.00%	100.00%	100.00%	

A total of 32 patients had been included in this study. The mean age of patients was 26.7±7.5 years (range 16-43). There were 23(71.88%) males and 9(28.13%) females as shown in figure (1).

Table 2 Complications during and after operation

variable		During operation	1st week	1st month	3rd month	P value
Pain	Yes	19(59.4%)	11(34.4%)	0(0%)	0(0%)	<0.001
Bleeding	Yes	9(28.1%)	4(12.5%)	0(0%)	0(0%)	<0.001
Crustation	Yes	-	27(84.3%)	7(21.8%)	-	<0.001

There was highly significant difference in degree of obstruction in different preoperative and postoperative periods.

There is significant association between different times before & after the operation and grade of inferior turbinate hypertrophy.

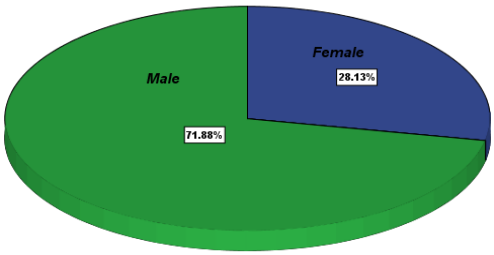

Fig.1 Gender distribution of patients

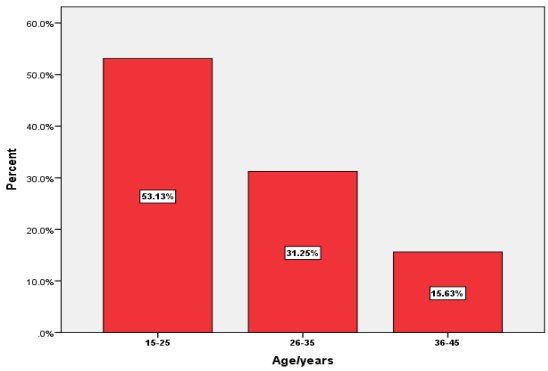

Fig.2 Age distribution of the patients

There was significant difference in incidence of complication during and after the procedure

Discussion

Inferior turbinate hypertrophy is regarded as a frequent cause of nasal airway

Obstruction which is one of the common patient complaints in ENT outpatient clinics

The management of chronic nasal obstruction caused by inferior turbinate hypertrophy of whatever cause is far challenging and the multitude of available approaches prove that no 'gold standard' method has been established and is still missing .[6]

The main purposes of turbinate surgery are to relief nasal blockage while preserve the mucosa & maintain the function.

Several studies report that treatment of inferior turbinate hypertrophy using bipolar RF offers an efficient alternative to other established methods. [5]

RFVTR technique cause submucosal tissue reduction using ablation by high energy current by means of specifically adapted electrode, this will cause thermal lesion & healing secondarily induce fibrosis & wound contracture & thus , volume reduction.[7]

In studies on radiofrequency ablation of the turbinate, improvement of severity and frequency of nasal obstruction were reported in 81–100% of cases. [5]

In present study, the improvement in nasal patency was studied in form of symptomatic relief depending on visual analogue scale (VAS) and improvement in endoscopic grading scores for inferior turbinate size

We focused in our study on relief of nasal blockage depending on VAS, as it was noted to be dependable & reliable in other studies. [5] [7]

Ciprandi *et al* [8], noted that a significant & strong correlation observed between VAS for allergic symptoms & nasal airway resistance by rhinomanometry, they concluded that VAS especially for nasal blockage regarded as a good & reliable predictor if objective nasal examinations are absent, their study supports the use of VAS in researches or clinical practice.

Demographic distribution

In our study, there were 23 (71.88%) males & 9 (28.13) females , this male predominance is comparable with other studies, Cury R *et al* [9] , their study showed tendency to male gender in inferior turbinate hypertrophy

The age of our patients was in range of (16 – 43) years, mean = 26.7±7.5 years & most of our cases were in (15 – 25) years age group, this figure was inconsistent with Cury R *et al* [9] , where most of their cases were in (10 – 40 years) age group & this is may be due to environmental & genetic causes as well as small sample size in our study in comparison to their larger sample size.

Nasal obstruction

In our study, all the 32 patients (100 %) had some degree of nasal obstruction preoperatively , it was severe in 20 (62.5 %) cases , moderate in 11 (34.4 %) cases & mild in 1 (3.1 %) cases.

In 1st week following the surgery , the degree of nasal obstruction worsened or persisted in most of patients as it became sever in 21 (65.7 %) , moderate in 9 (28.1 %) , mild in 1 (3.1 %) & no obstruction in 1 (3.1 %) .This worsening might be contributed to postoperative crustation, congestion & inflammatory edema Deenadayal D.S.*et al* [5], they noted persistent nasal obstruction in 188 of 200 cases few days after the surgery. Amarnath S.B. *et al* [10], reported that nasal obstruction was worsened in majority of cases in the first 2 – 3 days after the procedure ,And our finding were consistent with them ,in our study , after the 1st week, there was gradual & statistically significant (p value < 0.001) improvement in nasal obstruction started mostly at 1st month and persisted for 3 months , where in 1st month postoperative visit , only 3 patients (9.4 %) have severe obstruction & on the 3rd month post operative visit 27 patients (84.5 % n) had subjectively no nasal obstruction & only 1(3. 1 %) have persistent sever obstruction & this may be due to the persisten subjective nasal blockage.,Cavaliere *et al* [11], and cingi *et al* [12], mentioned that significant improvement in nasal obstruction occurred at one month after treatment which correlates with our present study. Pradipta K.P. *et al* [7], they reported that by the end of 1st week after the surgery all the patients had stastically significant improvement in nasal obstruction & continued up to 3 months following the procedure. Banhiran W *et al* [13], noted that at the 8th week after RF treatment, all symptoms revealed a significant improvement ($p < 0.05$). Particularly, the severity and frequency of nasal obstruction were reduced.

Mehmet A. *et al* [14], found that turbinate edema and nasal obstruction in the treated patients were recovered after one month of treatment ($p < 0.01$). Maximum improvement was determined at the end of third month ($p < 0.01$).

Endoscopic grading of ITH

There was no common, standardized & validated grading system for scoring turbinate hypertrophy & no classification system has been published. [5][15][16][17]

In our study, we used a 3 grades system & all the patients were in grade 2 & 3 preoperatively , grade 2 in 15 (46.9 %) & grade 3 in 17 (53.1)

There was significant improvement (P value < 0.001) in turbinate hypertrophy grades (inferior turbinate size) in different periods after the procedure where in the 3rd month most of patients (27 / 84.4 %) had grade 1 inferior turbinate hypertrophy , only (5 / 15.6 %) of patients had grade 2 & no patient had grade 3. In agreement with VAS of nasal obstruction

Assanasen P. *et al*([18], found that radio frequency turbinoplasty significantly decreases IT grading compared with its preoperative values.

Deenadayal D.S. *et al* [5], found that significant reduction in turbinate size started at 3 week postoperatively & reach its maximum at end of 8 week.

Ercan C. *et al* [8], found that Significant turbinate volume reduction was achieved with radiofrequency & submucosal resection.

Fischer Y *et al* [20], concluded that RF can safely reduce turbinate volume in a precise manner in patients with nasal obstruction due to hypertrophic inferior turbinates. So, our result was consistent & comparable to other studies.

Complications during and after the surgery

In our study, the surgery was well tolerated by most of patients with low rate of minor complications & no major or significant complications like sever epistaxis or atrophic rhinitis were reported during or after the operation & this was comparable to other studies, Eric J *et al* [21], noted that the incidence of minor complication was low & no complications of moderate or major severity. During the procedure, there was mild pain in 19 (59.4 %) of patients & generally the procedure was tolerable & mild bleeding observed in only 9 (28.1 %) patients & no one of them required nasal packing . This was consistent with other studies ,Pradipta *et al* [7], Deenadayal D.S. *et al* [5], noted that no significant complications intraoperatively & no packing required in all the cases

At 1st week following the surgery, we observed crustation which is mostly at site of probe insertion in 27 (84.3 %) & then gradually reduced with time where present in only 7 (21.8 %) at 1st postoperative month & no patient had crustation at 3 months following the procedure.

Garzaro *et al* [22], noted crusting at 1 week & settled completely by 3 months.

The postoperative pain reduced gradually with time where it was trivial & in only 11 (34.4 %) of cases after 1 week of the procedure & disappeared completely in all the cases at 1 month postoperatively

Kizilkaya *et al* [23], André C. *et al* [24] , Banhiran W *et al* [23] , all of them reported that gradual decrement in postoperative pain & no patient had pain at 1 & 3 months following the surgery &this was comparable to our study, we did not report sever bleeding during or after the surgery & the mild postoperative bleeding or blood stained discharge reported in only 4 (12.5 %) cases at the end of 1st week & significantly reduced with time to be completely disappeared at end of 1smonth & these were consistent with other studies Deenadayal D.S. *et al*[5] , Pradipta *et al*[7] .

Conclusion

Radiofrequency - assisted turbinoplasty is regarded as a promising technique as it is;

- Effective & reliable for short term improvement
- Relatively safe
- Well tolerated
- Easily applied

- Can be performed in an outpatient department under local anesthesia

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