

Original article

The Efficacy of Radiofrequency Turbinate Reduction in Hypertrophied Inferior Turbinate

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Email: Omkaltom.ali@gmail.com**Abstract**

Inferior turbinate hypertrophy (ITH) is a predominant etiology of chronic nasal obstruction, often refractory to medical management with corticosteroids and antihistamines. When medical therapy fails, surgical intervention is indicated to reduce turbinate volume and restore nasal patency. Radiofrequency turbinate reduction (RFTR) has emerged as a minimally invasive technique that utilizes submucosal thermal energy to induce controlled volumetric tissue reduction with minimal morbidity. This study was conducted to evaluate the subjective efficacy and temporal profile of RFTR in the management of bilateral ITH refractory to medical therapy. A retrospective study, this investigation included 50 patients with persistent nasal obstruction due to bilateral ITH. All participants underwent a single session of bilateral RFTR. Subjective symptom severity was assessed using a Visual Analog Scale (VAS) for nasal obstruction preoperatively and at postoperative intervals of 1 week, 1 month, 3 months, and 6 months. Statistical analysis was performed to compare the pre- and postoperative scores. Forty-seven patients completed the follow-up protocol. A statistically significant reduction in VAS scores for nasal obstruction was observed at all postoperative time points compared to preoperative baselines ($p < 0.05$). Symptomatic improvement commenced at the first postoperative week and was sustained through the 3-month assessment. While a minor recrudescence in symptoms was noted at the 6-month follow-up, the mean VAS score remained significantly improved over the preoperative value ($p < 0.05$). Overall, 89.4% of patients reported satisfactory symptomatic improvement over the 6-month study period. Radiofrequency turbinate reduction is an effective and safe intervention for providing significant and sustained subjective relief of nasal obstruction in patients with medically refractory inferior turbinate hypertrophy.

Keywords: Nasal Obstruction, Radiofrequency Ablation, Turbinate Hypertrophy, Treatment Outcome.

Introduction

Chronic nasal obstruction is a prevalent clinical complaint, most frequently caused by mucosal hypertrophy of the inferior turbinate, often accompanied by structural deformities such as septal deviation [1]. The management of nasal obstruction secondary to inferior turbinate hypertrophy (ITH) encompasses a spectrum of interventions. These range from medical therapies, including intranasal corticosteroids, antihistamines, and immunotherapy, to various surgical modalities aimed at reducing turbinate volume [2]. The principal goals of any surgical intervention for ITH are to achieve a significant reduction in nasal obstruction while preserving mucosal function and minimizing complications. Despite the array of available techniques, which include turbinate outfracture, microdebrider-assisted turbinoplasty, submucous resection, and electrocautery, no single procedure has emerged as a universally accepted gold standard [2]. Radiofrequency turbinate reduction (RFTR) represents a minimally invasive surgical option that utilizes low-power radiofrequency energy to create submucosal lesions, leading to controlled volumetric tissue reduction with relative precision and minimal damage to the surrounding mucosa [2,3]. The technique is noted for being well-tolerated and effective in the short term [4]. However, its comparative efficacy against other modern techniques remains a subject of investigation. For instance, while some studies show comparable outcomes between RFTR and microdebrider-assisted inferior turbinoplasty (MAIT) at six months, others suggest that MAIT may offer superior long-term maintenance of symptom relief and greater reduction in nasal volume [5, 6]. Furthermore, some investigations have raised questions about potential effects on nasal physiology, such as altered mucociliary clearance, though the clinical significance of these findings requires further validation with longer follow-up periods [7-9]. This study was conducted to evaluate the subjective efficacy and temporal profile of RFTR in the management of bilateral ITH refractory to medical therapy.

Methods

Study Design and Patient Selection

A retrospective analysis was conducted involving 50 patients diagnosed with bilateral inferior turbinate hypertrophy (ITH) refractory to medical therapy. Participants were recruited from the ENT Department of Misrata Medical Center, Libya, between November 2016 and January 2017. The study comprised 23 males and 27 females, with a mean age of 30.86 years and a mean nasal obstruction duration of 5–6 years (range: 2–13 years). All patients had previously undergone a minimum of 12 weeks of medical treatment, including antihistamines and steroid nasal sprays, with 90% and 60% having received such therapy for at least 6 months and one year, respectively. Exclusion criteria included smoking history, prior nasal surgery or trauma, significant septal deviation, nasal polyposis, sinonasal malignancy, epilepsy, cardiac pacemakers, and pregnancy.

Preoperative Evaluation

A comprehensive assessment was performed for all enrolled patients. Symptom profiles, including nasal obstruction, rhinorrhea, sneezing, snoring, and mouth breathing, were documented. Subjective symptom severity was evaluated using a 10-cm Visual Analogue Scale (VAS), where 0 indicated no obstruction and 10 represented complete obstruction. Inclusion required a baseline VAS score of ≥ 6 , consistent with established thresholds for surgical intervention [3, 4]. The Nasal Obstruction Symptom Evaluation (NOSE) scale, a validated quality-of-life instrument, was administered to quantify obstruction-related distress. Clinical examination included anterior and posterior rhinoscopy, while diagnostic nasal endoscopy graded turbinate hypertrophy using the Camacho classification [13]. Only patients with Grade 3 (51–75% airway obstruction) or Grade 4 (76–100% obstruction) were included. Computed tomography of the paranasal sinuses was performed to exclude concurrent sinus pathology.

Surgical Procedure

Radiofrequency turbinate reduction (RFTR) was performed under local anesthesia with endoscopic guidance. Topical anesthesia involved xylocaine-soaked cotton pledges applied for 10 minutes, followed by submucosal infiltration of 2% xylocaine along each inferior turbinate. Using an Ellman Surgitron FFPF EMC device (Ellman International, USA) set at 350 J, 5 W, and 80 V, a 15-mm active tip electrode was inserted submucosally at three sites per turbinate (anterior, middle, and posterior thirds). Each application delivered energy for 30–50 seconds. No nasal packing was required postoperatively.

Postoperative Protocol and Follow-up

Patients received paracetamol for analgesia as needed. Scheduled follow-ups occurred at 1 week, 1 month, 3 months, and 6 months postoperatively. Each visit included VAS reassessment, documentation of morbidity (pain, bleeding, crusting), and nasal endoscopic evaluation.

Statistical Analysis

Data were analyzed using SPSS version 18.0 (SPSS Inc., Chicago, IL, USA). Preoperative and postoperative VAS scores were compared using the Wilcoxon matched-pairs test and paired t-test, with statistical significance set at $p < 0.05$.

Results

Patient Demographics and Study Completion

A total of 50 patients were initially enrolled in the study. Three patients were lost to follow-up, resulting in a final cohort of 47 patients who completed the entire 6-month study period. The study population consisted of 24 females (51.1%) and 23 males (48.9%), with all participants falling within the 20–45 year age range. The majority of patients ($n=34$, 72.3%) were between 20 and 35 years of age.

Preoperative Symptom Profile

All 47 patients (100%) presented with nasal obstruction as their primary complaint, with a mean preoperative VAS score of 8.98 ± 1.01 . Additional prevalent symptoms included rhinorrhea (95.7%, $n=45$; mean VAS 6.72 ± 2.14) and sneezing (95.7%, $n=45$; mean VAS 6.40 ± 2.02). Hyposmia (31.9%, $n=15$) and snoring (42.6%, $n=20$) were less frequently reported (Table 1).

Table 1. Preoperative Symptom Prevalence and Severity (N=47)

Symptom	Patients (n)	Prevalence (%)	Mean VAS Score $\pm$ SD
Nasal Obstruction	47	100.0	8.98 ± 1.01
Rhinorrhea	45	95.7	6.72 ± 2.14
Sneezing	45	95.7	6.40 ± 2.02
Hyposmia	15	31.9	2.14 ± 3.37
Snoring	20	42.6	3.28 ± 3.90

Surgical Outcomes and Symptom Improvement

The mean duration of the RFTR procedure was 14.7 minutes ($SD \pm 4.92$). A statistically significant reduction in VAS scores for nasal obstruction, rhinorrhea, and sneezing was observed at all postoperative intervals (1 week, 1 month, 3 months, and 6 months) when compared to preoperative values ($p < 0.05$ for all comparisons) (Table 2).

Symptomatic improvement for nasal obstruction commenced at the 1-week follow-up and was maintained through the 3-month assessment. Although a minor increase in VAS scores was noted at the 6-month follow-up compared to the 3-month evaluation, the scores remained significantly improved from baseline. At the 6-month endpoint, 42 out of 47 patients (89.4%) reported satisfactory relief from nasal obstruction (Table 3). Nasal endoscopic examination confirmed reduced turbinate size in all patients, with intact mucosa observed at the 3-month follow-up.

Table 2: Statistical Analysis of VAS Score Improvement for Primary Symptoms

Comparison Period	Nasal Obstruction (Mean VAS $\pm$ SD)	Rhinorrhea (Mean VAS $\pm$ SD)	Sneezing (Mean VAS $\pm$ SD)
Preoperative	8.98 $\pm$ 1.01	6.72 $\pm$ 2.14	6.40 $\pm$ 2.02
1 Week Postop	0.43 $\pm$ 0.83*	1.50 $\pm$ 2.79*	2.49 $\pm$ 1.80*
1 Month Postop	4.72 $\pm$ 1.64*	3.02 $\pm$ 2.39*	3.43 $\pm$ 1.92*
3 Months Postop	5.36 $\pm$ 1.53*	3.28 $\pm$ 2.22*	3.43 $\pm$ 1.92*
6 Months Postop	5.06 $\pm$ 1.81*	3.06 $\pm$ 2.35*	3.43 $\pm$ 2.01*

*Statistically significant difference from preoperative value ($p < 0.05$)**Table 3: Symptomatic Relief at 6-Month Follow-up**

Outcome Measure	Nasal Obstruction
Patients Relieved	42/47 (89.4%)
Patients Not Relieved	5/47 (10.6%)

Postoperative Morbidity

No major complications were recorded. Transient side effects were common in the immediate postoperative period, including mucosal edema (66.0%, $n=31$) and bloody nasal discharge (53.2%, $n=25$). Crusting (17.0%, $n=8$) and pain (23.4%, $n=11$) were also reported. These sequelae resolved progressively, with only minimal crusting (2.1%, $n=1$) and bloody discharge (10.6%, $n=5$) persisting at the 1-month follow-up. By the 3- and 6-month visits, no complications were documented (Table 4).

Table 4: Postoperative Complication Profile Over Time

Complication	Immediate (n=47)	1 Week (n=47)	1 Month (n=47)	3 & 6 Months (n=47)
Mucosal Edema	31 (66.0%)	0 (0%)	0 (0%)	0 (0%)
Crusting	8 (17.0%)	7 (14.9%)	1 (2.1%)	0 (0%)
Pain	11 (23.4%)	2 (4.3%)	0 (0%)	0 (0%)
Bloody Discharge	25 (53.2%)	20 (42.5%)	5 (10.6%)	0 (0%)

Discussion

Nasal obstruction resulting from inferior turbinate hypertrophy (ITH) represents a significant clinical concern that adversely affects patient quality of life. The persistence of various surgical techniques for turbinate reduction underscores the ongoing search for an optimal procedure that effectively reduces turbinate volume while preserving mucosal function and minimizing patient morbidity [12]. Radiofrequency turbinate reduction (RFTR) addresses this need by utilizing high-frequency current to create controlled submucosal thermal lesions. The subsequent healing process, characterized by fibrosis and tissue contraction, leads to a reduction in turbinate volume while theoretically preserving the superficial mucosa and its essential functions in humidification, temperature regulation, and mucociliary clearance [12].

The present study employed the Visual Analog Scale (VAS) to quantify subjective symptomatic improvement, a tool validated in prior rhinologic research for its sensitivity and reliability in assessing nasal obstruction, particularly in the absence of objective measures [12]. Our findings demonstrate a significant reduction in VAS scores for nasal obstruction, rhinorrhea, and sneezing at all postoperative intervals, corroborating the efficacy of RFTR established in other studies [12]. While an initial worsening of obstruction was noted in the immediate postoperative period, attributable to edema and crusting, a statistically significant improvement was evident by the one-week mark and maintained throughout the three-month follow-up. This rapid onset of relief aligns with some literature, though other studies report a more delayed significant improvement [12]. At the six-month postoperative assessment, 89.4% of patients continued to report satisfactory relief from nasal obstruction. This medium-term outcome is consistent with the sustained symptomatic improvement documented in other series that have evaluated RFTR, with several studies reporting persistent benefits for periods extending up to several years [12]. The long-term durability of the procedure's effect is a key attribute highlighted in the literature [12].

Regarding safety, our experience with RFTR revealed a favorable complication profile, characterized by the absence of major adverse events. Transient side effects, such as mucosal edema, minor bloody discharge, crusting, and pain, were common in the immediate postoperative period but resolved spontaneously within weeks. These findings are consistent with the broader body of evidence, which typically reports such issues as self-limiting [12]. The incidence of crusting in our cohort was lower than that reported in some studies, which have noted rates as high as 68% [12]. Importantly, more serious complications such as significant hemorrhage, synechiae formation, or rhinitis sicca were not observed, reinforcing the procedure's safety as documented by others [12].

Conclusion

The study concludes that the radiofrequency turbinate reduction is a safe, effective, and minimally invasive intervention that provides significant and sustained relief from nasal obstruction caused by inferior turbinate hypertrophy.

Conflict of interest. Nil

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