Efficacy of radiofrequency ablation turbinate reduction (RFATR) among patients with rhinitis medicamentosa & withdrawal from decongestant topical spray abuse

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ABSTRACT

Objective:
Radiofrequency ablation turbinate reduction (RFATR) demonstrates high success rates for nasal obstruction relief and quality of life enhancement for patients with inferior turbinate hypertrophy (ITH). This research examines RFATR treatment for patients with rhinitis medicamentosa (RM) to determine its contribution to helping patients withdraw from topical decongestant sprays.

Methods:
A prospective single-arm interventional study evaluated RM patients who received RFATR treatment from March 2024 through March 2025. Assessment parameters before and after the procedure, included formal QoL assessment using the NOSE and SNOT-22 questionnaires. The main goal of the study was to evaluate symptom improvements along with successful decongestant spray withdrawal in patients with RM.

Results:
The research revealed that sino-nasal quality of life measurements significantly improved in the patients (N = 12) after RFATR treatment. RFATR enabled all RM patients to stop using decongestant sprays. Post-treatment analysis of RM patients' NOSE scores revealed significant improvements in nasal obstruction following RFATR ($P < 0.001$).

Conclusion:
RFATR proves successful for RM patients by allowing decongestant discontinuation and producing significant enhancements in nasal airflow. High QoL outcomes post-RFATR supports its role as a definitive treatment for this condition.

Keywords: Radiofrequency Ablation (RFA), Turbinate Hypertrophy, Rhinitis Medicamentosa (RM), Decongestant Spray Abuse, Nasal Obstruction, Quality of Life (QoL)
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Introduction

Rhinitis medicamentosa (RM) is defined as a condition where excessive or incorrect use of nasal decongestants leads to a rebound nasal congestion.(1) The basic pathophysiological process of RM involves the occurrence of paradoxical nasal congestion following prolonged and excessive use of decongestants, primarily attributed to the activation of alpha1A adrenoreceptors resulting in the down-regulation and desensitization of sympathetic (alpha-adrenergic) receptors, causing cytotoxic and ciliary-toxic effects.(1)(2). Consequently, these effects lead to a decreased duration of drug action, requiring higher doses and more frequent application, and causing damage to the nasal mucosa.(1) Histological findings seen in RM include damage to the nasociliary structure, squamous cell metaplasia, swelling of the epithelial tissue, loss of epithelial cells, excessive growth of goblet cells, heightened expression of the epidermal growth factor receptor, and infiltration of inflammatory cells.(3)

The available literature on the pathophysiology of RM and the effectiveness of treatment modalities is extremely limited.(4) The first line treatment in RM is stopping nasal decongestant.(1) Both a sudden cessation and a gradual tapering strategy can be

used.(1) The sudden discontinuation of a medication can result in rebound congestion and edema, leading to an exacerbation of symptoms, ultimately resulting in patients returning to the use of the drug.(4)

Although RM is a well-known illness in otolaryngology practice, there is currently no well recognized standard treatment protocol for it. Referring to a comprehensive systematic Review conducted by Zucker et al, the outcomes of the various treatments for RM reported in different publications exhibited significant variation and lacked standardized measures.(5) Topical nasal steroids ,topical hyaluronic acid and endonasal UV phototherapy, were the most often mentioned therapeutic options, although there was limited evidence supporting these treatment recommendation.(6)(7)

Radiofrequency ablation (RFA) is a well-established technology, that is widely used in otorhinolaryngology.(8) This technology relies on the targeted application of alternating heat to the submucosal tissue, while preserving the integrity of the surface layers.(2)Fibrosis is induced during the healing process resulting in a decrease in tissue volume.(2)Advantages of RFA include the simplicity of operation, noninvasive nature, and ability to target specific areas while preserving the surrounding healthy mucosa. Furthermore, RFA can be performed under local anesthesia.(2) RFA assisted turbinate reduction (RFATR) is indicated in current data to be beneficial in facilitating nasal breathing, leading to improved subjective Quality of Life (QoL) measures in patients with Inferior turbinate hypertrophy (ITH).(2) There is limited research available on the use of RFA in cases of RM. Therefore, in this study we aim to evaluate the efficacy of RFA in patients with RM using different validated questionnaires to evaluate the QoL in these patients before and after the surgery. Furthermore, we review the RM patients' ability to withdraw from decongestant drugs, and the potential for RFATR being a definitive treatment for this group .

Material and method

Study population & design:

Prospective single-arm interventional study That was conducted in Qatif central hospital (QCH) , in Patients who were diagnosed with RM and underwent RFA under local anesthesia at QCH Rhinology clinic between March 2024 to March 2025. Consenting patients were enrolled into a prospective single-arm interventional study that was approved by the institutional Review Board. All the procedures were performed by the senior author.

Inclusion criteria included: adults (age > 18 years old), Diagnosed with RM based on criteria of: History of prolonged nasal medication (at least once daily (≥1/day) for ≥4 consecutive weeks), Poor shrinkage of nasal mucous membranes on examination), Diagnosis of ITH resulting from RM. Ability to consent and understand the questionnaires. Exclusion criteria included: patients without sufficient follow up of 6 months after RFATR, Minors (age < 18 years old), pregnancy .

QoL assessment

Arabic validated Sino-Nasal Outcome Test-22 (SNOT-22) and Nasal Obstruction Symptom Evaluation (NOSE) (9,10) was filled by the participants before (i.e. baseline) and after RFA procedure (1 month and 6 months).

Surgical technique

The procedures were performed under local anesthesia by using a cotton pledget soaked with lidocaine 10% solution mixed with xylometazoline (1:1) in the middle and inferior meatus for 15–20 min. Then, under endoscopic view,Both turbinates were injected with 1 ml of 2% lidocaine.The turbinate reduction was carried out, using a bipolar radiofrequency electrode RaVoR™ by Sutter Medizintechnik GmbH . Three insertions superiorly and three insertions inferiorly were done using the bipolar, starting from posterior to anterior part of each inferior turbinate

Statistical analysis

Categorical variables were shown as numbers and percentages. Continuous variables were calculated and presented as mean, standard deviation, and median (min-max). A paired sample t-test was conducted to determine the differences in the score of NOSE and SNOT-22 before and after RFATR. All data analyses were carried out using the statistical package for social sciences, version 26 (SPSS, Armonk, NY: IBM Corp, USA)

RESULTS

Table (1) Description of the basic characteristics (n=12)

Gender	**Count**	**Percentage**
Male	7	58%
Female	5	42%
Age	**Count**	**Percentage**
20-29	2	17%

30-39	2	17%
40-49	4	33%
50-59	4	33%

Table1displays the distribution of 12 individuals across demographic categories. The gender distribution reveals that males account for 58% of the population (7 individuals) whereas females represent 42% (5 individuals). The age distributions show participants falling into four categories: 20-29 years (17%), 30-39 years (17%), 40-49 years (33%), and 50-59 years (33%). Data demonstrates that elderly participants make up the largest group since 66% of participants exceed the age of 40.

Table 2: Paired t-test of NOSE score Before and after 1 month and after 6 months of RFATR (n=12)

Variable	Pre Mean ± SD	Post (1 month) Mean ± SD.	Post (6 months)	P-value §
NOSE score	78.3 ± 22.6	13.3 ± 13.5	-	**<0.001 **
NOSE score	78.3 ± 22.6	-	3.00 ± 2.22	**<0.001 **
NOSE score		13.3 ± 13.5	3.00 ± 2.22	0.633

§ P-value has been calculated using paired sample t-test.
** Significant at p<0.05 level.

The results from Table 2 show a statistically significant reduction in nasal obstruction symptoms after patients underwent Radiofrequency Ablation Turbinate Reduction (RFATR) .The NOSE (Nasal Obstruction Symptom Evaluation) score exhibited a significant decrease from 78.3 ± 22.6 before RFATR to 13.3 ± 13.5 one month after the procedure, and to 3.00 ± 2.22 After 6 months . The p-value (<0.001) reveals a statistically significant decrease in nasal obstruction symptoms among patients with rhinitis medicamentosa who underwent RFATR treatment. It also shows that NOSE scores declined from 13.3 ± 13.5 at one month to 3.00 ± 2.22 at six months post-RFATR however these results did not reach statistical significance (p = 0.633).

Table 3: Paired t-test of SNOT-22 score total and domains Before and after 6 months of RFATR (n=12)

Variable	Pre Mean ± SD	Post (6 months) Mean ± SD	P-value §
SNOT-22 score	40.2 ± 9.97	6.83 ± 5.57	**<0.001 **
Nasal score	15.3 ± 5.93	3.00 ± 2.13	**<0.001 **
Ear/Facial score	3.92 ± 3.23	1.25 ± 1.82	**<0.001 **
Sleep score	13.2 ± 3.99	1.67 ± 2.90	**<0.001 **
Function score	6.25 ± 3.47	0.83 ± 1.34	**<0.001 **
Emotion score	1.50 ± 1.93	0.083 ± 0.29	**0.024 **

§ P-value has been calculated using paired sample t-test.
** Significant at p<0.05 level.

Table 3 showed that RFATR leads to significant improvements in sino-nasal quality of life measurements (see also Figure 1). After RFATR patients experienced a significant reduction in their SNOT-22 (Sino-Nasal Outcome Test-22) score from the initial value of 40.2 ± 9.97 to a post-procedure score of 6.83 ± 5.57. A p-value (<0.001) establishes the statistical significance of these positive changes. It also demonstrates a statistically significant improvement across all SNOT-22 domains following RFATR. Post-treatment analysis showed nasal symptom scores decreasing from 15.3 to 3.00 (p<0.001) indicating substantial relief from nasal obstruction. The study results indicated significant decreases in ear/facial symptoms and sleep disturbances and functional issues (p<0.001) which yielded improved overall quality of life. A significant decrease (p=0.024) in emotional domain scores implied patients experienced better mental health after receiving RFATR treatment.

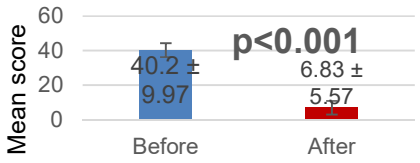

Figure 1: Comparison of mean SNOT-22 score Before and after RFATR

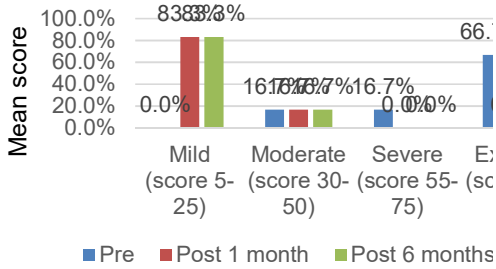

Figure 2: Severity of NOSE before and after RFATR

Figure 2 shows that extreme NOSE levels were higher pre-RFATR (66.7%), while mild levels were higher in both post-1-month (83.3%) and post-6 months (83.3%).

Table 4: Use of nasal decongestant (n=12)

Variable	N (%)
The frequency of using nasal decongestant during the day	
• Once Daily	01 (08.3%)
• Every 2 Hours	01 (08.3%)
• Every 4 Hours	02 (16.7%)
• Every 6 Hours	01 (08.3%)
• Every 8 Hours	04 (33.3%)
• Every 12 Hours	03 (25.0%)
Did you stop using nasal decongestant after surgery?	
• Stop	12 (100%)
• Continue	0 (0%)
How many years did you use nasal decongestant, median (min-max)	3.00 (1.00 – 20.0)

In Table 4, one-third of the patients (33.3%) were taking xylometazoline (Otrivin) every 8 hours. Patients who stopped using nasal decongestant post-surgery were 100%. The median years of Otrivin use was 3 years.

Discussion

Rhinitis medicamentosa (RM) occurs when excessive use of topical nasal decongestants triggers persistent nasal congestion. Nasal obstruction persists after inferior turbinate hypertrophy (ITH) develops and results in reduced quality of life. Radiofrequency ablation turbinate reduction (RFATR) stands as a promising therapeutic approach for RM that works by decreasing turbinate dimensions to address nasal blockage and support decongestant withdrawal. This study evaluated the effectiveness of Radiofrequency Ablation Turbinate Reduction (RFATR) for rhinitis medicamentosa (RM) patients and determined its potential to help patients wean from topical decongestant nasal sprays. The research data showed RFATR delivered improvements in nasal obstruction symptoms plus sinonasal-related quality of life outcomes and this result matched studies conducted previously.

In this study, post-RFATR patients experienced statistically significant improvement in nasal airflow as measured through NOSE (Nasal Obstruction Symptom Evaluation) scores. A significant reduction in NOSE scores was observed from 78.3 ± 22.6 before surgery to 13.3 ± 13.5 at one month post-procedure ($p < 0.001$). Research literature demonstrates that RFATR effectively reduces nasal congestion from turbinate hypertrophy [1,11] NOSE scores decreased to 3.00 ± 2.22 at six months but demonstrated no statistically significant difference versus one-month scores ($p = 0.633$). Most patients experience symptomatic relief between the first and sixth month which confirms previous research results about quick nasal obstruction symptom improvement following RFATR treatments [12].

In addition to nasal obstruction relief, patients reported significant improvements in their sinonasal-related quality of life, as reflected by the SNOT-22 (Sino-Nasal Outcome Test-22) scores. The mean preoperative score of 40.2 ± 9.97 significantly declined to 6.83 ± 5.57 post-procedure ($p < 0.001$), reinforcing the long-term effectiveness of RFATR in improving patient well-being. Our research supports previous studies showing RFATR leads to enduring improvements in both sinonasal health and patients' overall life quality [1, 13]

The research investigated RFATR effects on decongestant dependency between patients. Long-term use of nasal decongestant leads to RM through its development into rebound nasal congestion. Our study demonstrated that RFATR enabled 100% of participants to stop using nasal decongestant. Data revealed that 33.3% of patients needed decongestants every eight hours and another 25% needed it every twelve hours which demonstrated their dependency on the medication. The significant decrease in decongestant usage observed after RFATR agrees with previous research showing RFATR breaks RM cycles effectively [2, 14].

The research data supports earlier studies which examined RFATR effectiveness for nasal airway obstruction alongside RM therapy. Results from Sleurs et al. [16] agreed with our findings by showing substantial postoperative improvements in nasal airflow combined with reduced dependency on decongestants. RFATR has emerged as a minimally invasive procedure that offers excellent therapeutic outcomes for chronic nasal congestion and RM since recent review reports show both high patient satisfaction and minimal postoperative complications [14].

RFATR demonstrates excellent outcomes for both nasal airflow and decongestant dependency reduction therefore serving as a practical treatment option for RM patients who do not respond to other therapies. Furthermore, classical turbinate reduction surgery having high incidence of intraoperative and post operative bleeding due to the loss of sympathomimetic drive. There was no incidence of nasal bleeding during the procedure or during the follow up period among our patients [17]. The six-month observation period demonstrates long-term effect potential for RFATR but further studies must be conducted to validate its durability over longer periods of time. All of these advantages could make RFATR as a definitive treatment modality for RM patients. The limited assessment of our research effectiveness by a small number (N = 12) of participants could reduce the findings' general utility.

Conclusion

Radiofrequency ablation turbinate reduction (RFATR) enables minimally invasive treatment of rhinitis medicamentosa patients by reducing turbinate hypertrophy which results in better nasal airflow and reduced congestion while improving overall life quality. RFATR delivers long-term symptom relief alongside improved decongestant independence and lower incidence of reaction rebound. RFATR Could be a definitive treatment option for those struggling with decongestant dependency, with minimal discomfort and low complication rates. Future research should optimize treatment protocols while assessing the long-term treatment effectiveness. The integration of RFATR technology alongside patient education sessions and behavioral modification strategies shows potential to enhance therapy outcomes.

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No conflicts of interest to disclose

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