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Research Article

Efficacy of submucosal diathermy in allergic rhinitis

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Abstract

Background: Allergic rhinitis most commonly managed medically like nasal corticosteroid application, but with limited compliance, while, surgical techniques as submucosal diathermy may reduce both the duration and the need for long time in those conservative therapy.
Objective: To assess the results of submucosal diathermy in allergic rhinitis patients of perennial type.
Patients and method: A prospective observational study enrolled on 140 participants, whom diagnosed with medical refractory perennial allergic rhinitis based upon Allergic Rhinitis and its Impact on Asthma (ARIA) criteria, underwent to bilateral submucosal diathermy of inferior turbinate, the degree of symptoms severity was assessed using a Rhino-conjunctivitis Quality of Life Questionnaire (RQLQ) scoring system, and Nasal Obstruction Symptoms Evaluation (NOSE) scale, and nasal endoscopy gradings were analyzed and compared pre-and post-operatively to detect their improvement.
Results: Mean age 34.37± 1,47 SD, males (57%), females (43%), positive allergy family history (85%), Nasal obstruction was the main presenting symptom (86.24%), RQLQ improvement scoring of symptomologies at 6 months follow-up; nasal obstruction (88.5%), sneezing (77.1%), need to frequently blow nose (82.8%), sleep disturbance (62.8%), and watering of eyes (57.15%). NOSE scale score (78.34± 5.87 SD), pre-operatively to became (1.67 ± 1.35 SD), at 6 months post-operatively, and nasal endoscopic inferior turbinate grading; from (>50%) before surgery to (<25), at 6 months after. Overall success rate (96.42%), with statically significant results, as P values were <0.05.
Conclusion: Submucosal diathermy results in significant improvement in symptomology, excellent overall success rate, also, no complications were detected at 6 months follow-up.

1. Introduction

Allergic rhinitis (AR) incidence is elevating globally, as in adults over 18 years of age was 5.6% in the middle east, with an overall value of 23%, and it is a form of allergic disease showing symptoms of sneezing, nasal congestion, clear rhinorrhea, and nasal pruritic, it is IgE-mediated immune reaction versus inhaled antigens in the immediate phase, that's following leukotriene-mediated late phase [1].

The conventional categorization of allergic rhinitis into seasonal, and perennial up to the present time is utilized, and closely related to the type of antigen, like pollens "seasonal allergens", while if its likes house dust mites, molds, animal allergens "perennial allergens" [2].

Its medical therapy includes local and systemic corticosteroids application, local and systemic antihistamines usage, decongestants, and anticholinergics, also, leukotriene receptor antagonists, yet, these drugs are the pole of its treatment, but it has unfavorable effects, as nasal

corticosteroid application is a favored therapy, and regard as the best prophylaxis for long time, but still with confined acquiescence, as steroids lowers the hyper-responsiveness mucosal lining of nasal cavity, together with its anti-inflammatory effects, but the unwanted impacts as, headache, nasal/pharyngeal agitation and suppress local immunity in some of patients [3].

Also, antihistamines medical therapy is efficient in improving rhinorrhea and sneezing, but have minimum influence on nasal obstruction, yet they might lead to sedation, and learning deterioration, also on long-dated usage of decongestants results in rhinitis medicamentosa [3].

Surgical treatment of allergic rhinitis is confined to whom with refractory to medical treatment, these surgical procedures like, submucosal diathermy (SMD), laser resection, partial or/and total inferior turbinectomy, and radiofrequency ablation, although Inferior turbinectomy is the preferable surgical modality, yet, it might result in crustation, and atrophic rhinitis [3].

While, submucosal diathermy, aids in keeping the mucociliary epithelium action, and beside relieving the nasal obstruction, it improves other symptoms of allergic rhinitis, minimal complications, and treatment duration comparing to nasal corticosteroid application, in addition, its action mechanism is postulate to exert influence on destruction of nasal tissue with thrombosis of its vessel, and forming of scar tissue, that avoids congestion of the concha venous sinusoids [4].

The current study aims was to assess the submucosal inferior turbinate diathermy outcome in perennial allergic rhinitis.

2. Method

All steps were done in this study binding the human participants were in corresponding with the ethical standards of the institutional or/and national research committee and with the 1975 Helsinki declaration, as revised in 2003. Also, written consents from all participated patients were obtained, as well as, institutional Board Review (IBR) approval number 289 at 09/01/2025 was obtained.

A prospective observational study, conducted on 140 patients, whom attending otorhinolaryngology unit, and were diagnosed with perennial allergic rhinitis, depend upon Allergic Rhinitis and its Impact on Asthma (ARIA) criteria, as shown in Figure 1.

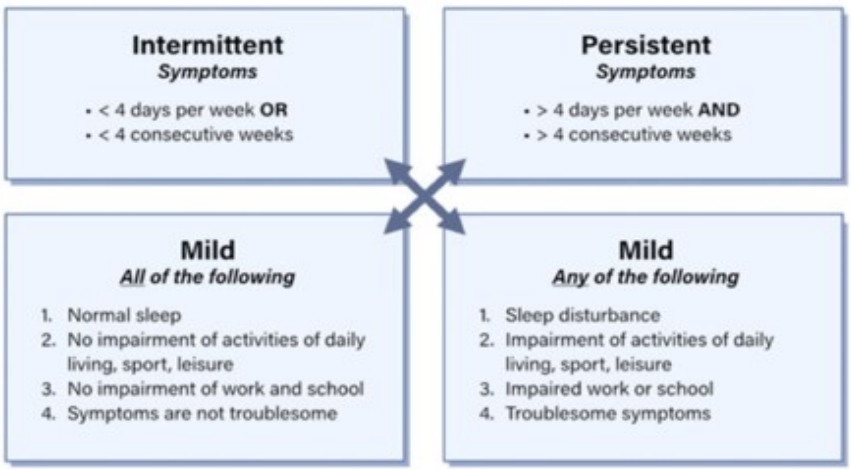

Figure 1: Total Mini Rhino-conjunctivitis Quality of Life Questionnaire (RQLQ) scores

Those patients had associated with bilateral hypertrophy of inferior turbinate, with failure of medical treatment, as (antihistamines and steroids) both local and systemically, a study period was for 1-year.

Nasal endoscopy was done to all patient, as well as, skin prick test for nose-allergy and blood investigations, while computed tomography (CT) was done accordingly, then when the diagnosis was determined, bilateral submucosal diathermy (SMD) was applied to all patients, which utilize nasal decongestant (ephedrine) spray, 1 puff 3 time daily in each nostril for 7-days pre-operatively for estimation the turbinate congestion degree, also, to predict efficiency of SMD (decongestant test). Then its effect washed out with nasal saline for 14-days before surgery.

2.1. Endoscopic turbinate grading

The nasal endoscopic examination: In addition to signs of allergic rhinitis, it reveals the inferior concha condition, which was guided by Camacho et al, grading system [5] via measuring size of inferior concha to the size of whole nasal cavity, as follows: Grade 1 (<25%). Grade 2 (between 26 to 50%). Grade 3 (between 51 to75%). Grade 4 (>75%). In the current study only, grades 3 and 4 were selected.

Excluding criteria: Children, symptomatic nasal septum deviation, chronic rhinosinusitis ± polyposis, other previous Sino-nasal procedures, or if it's in combination with submucosal diathermy.

A precise history concentrating on the family history of allergy, recognized allergen, and provoking factors, then full Ear, Nose, and Throat (ENT) examination, including anterior rhinoscopy, and diagnostic nasal endoscopy. The severity of allergic rhinitis was assessed using Rhino-conjunctivitis Quality of Life Questionnaire (RQLQ) scoring system.

The following up outcomes were assessed at 2 weeks, 1 month, 3 months, 6 months after the surgery, which were analyzed via nasal endoscopic grading guidance, and (RQLQ), and NOSE scoring systems.

2.2. Surgical Procedure

The nasal turbinate anesthetized using 2% lidocaine hydrochloride gel prior to the surgery, then introducing Abbey submucosal needles Figure 2 into the submucosal of lower anterior part tissue of the inferior turbinate longitudinally parallel, but not touching the turbinate bone.

Figure 2: Abbey SMD cautery needle

Care was taken to preserve the mucosal surface, avoid any mucosal trauma, a monopolar 22 watts electrical current was used until blanching of the nasal mucosa was visualized, at 3 linear horizontal lines, the cautery started from the posterior to anterior ends of the inferior concha, finally nasal passages were not packed ee Figure 3.

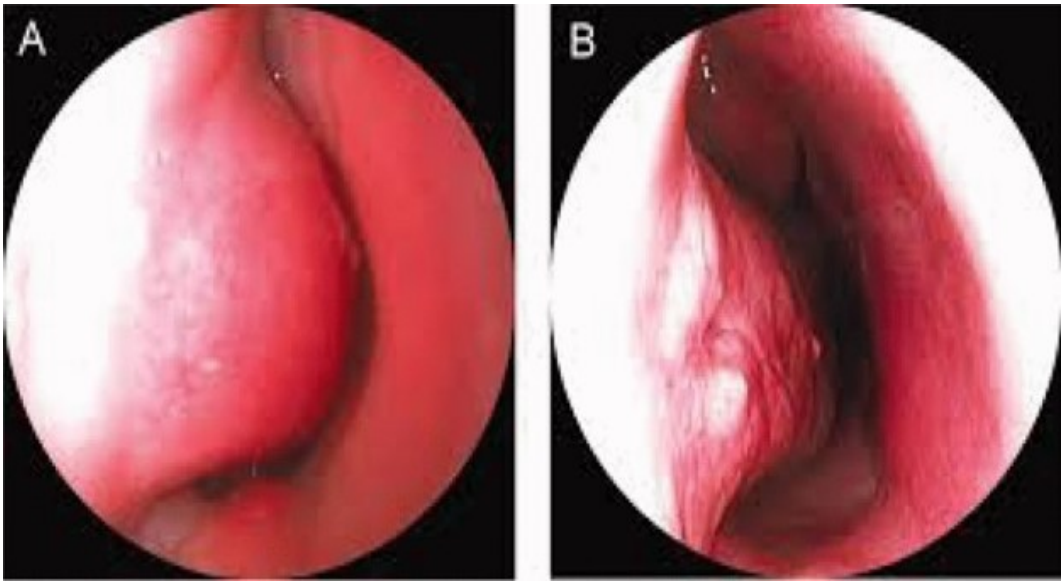

Figure 3: Pre- (A), and post-operative (B), endoscopic view of submucosal diathermy

NOSE score [6]; It's subjective and clinical validated questionnaire containing of 5 items: nasal obstruction (0–4), nasal breathing troubledness (0–4), difficult sleeping (0–4), not-possible to have adequate air in exertion (0–4). The final score was classified; as 0 (none problem), 1 (mild severity), 2 (moderate severity), 3 (bad), and 4 (very severe), then multiply total score x 5. So, the nasal obstruction severity categorization: (5-25), as mild forum, (30-50), as moderate forum, (55-75), as severe forum, (80-100), as extreme forum.

The patients were assessed on regular follow-up post-operatively, using Mini Rhino-conjunctivitis Quality of Life Questionnaire (RQLQ) scoring system, and Nasal Obstruction Symptoms Evaluation (NOSE) scale, and nasal endoscopy grading scores were analyzed and compared.

2.3. Statistical analysis

IBM Statistical Packages version 29 (Chicago, Illinois, United State). Data were present in; percentage, standard deviation (SD), mean, frequency, and values (minimum-maximum), chi 2 test used to analyze and compare preoperative to post-operative results. Statistical significance was noted to be significant, when P-value ≤ 0.05.

3. Results

Mean age was 34.37± 1,47 SD, there were 80 (57%) males, and 60 (43%) females. Allergic rhinitis family history was detected in 119 (85%) of patients. Figure 2, shows the total Mini RQLQ scores at 1 month, 3 and 6 months follow up.

In current study, nasal obstruction was the main presenting symptom, as it found in 121 patients (86.24%). As Table 1 shown the whole patient's symptoms.

Table 1: Whole patient's symptoms

Symptom	No. of patients	Percentage
Nasal obstruction	121	86.24%
Sneezing	119	85.00%
Nasal discharge	117	83.57%
Need to frequently blow nose	97	69.28%
Sleep disturbance	93	66.24%
Watery of eye	89	63.57%
Regular housework	87	62.14%
Itchy Eye	79	56.42%
Tiredness reduction	74	52.85%
Irritability	71	50.71%
Thirst	69	49.28%

3.1. RQLQ improvement of symptomology

The severity of whole patient's symptoms gradually faded at 3rd month, and becomes more decayed at 6 months of follow-up post-operatively, like in nasal obstruction was improved from (67.14%), at 3 months to become (88.5%), at 6 months of follow-up period, yet, 5 patients not detected an alleviation of their symptom's severity after surgery. The overall success rate was (96.42%), Table 2 shown the improvement of the severity of whole patient's symptoms at 3 and 4 months of follow-up.

Table 2: Improvement in severity of symptomology at 3- and 6-months follow-up

Symptom	3 months improvement	6 months improvement
Nasal obstruction	67.14%	88.5%
Sneezing	68.57%	82.8%
Nasal discharge	65.2%	77.1%
Need to frequently blow nose	61.4%	69.83%
Sleep disturbance	58.57%	63.69
Watery of eye	52.14%	57.18%
Regular housework	49.14%	53.72%
Itchy Eye	42.14%	51.68%
Tiredness reduction	35.71%	51.4%
Irritability	43.57%	48.82%
Thirst	39.57%	44.64%

A statically significant differences were detected, as the P values <0.05.

In addition, the NOSE scale score (78.34± 5.87 SD), pre-operatively to became (1.67 ± 1.35 SD), at 6 months of follow-up post-operatively.

The nasal endoscopic inferior turbinate grading; from (>50%) before surgery as grade 3 and 4 to (<25) as grade 1, at 6 months of follow-up after submucosal diathermy.

The related morbidities of submucosal diathermy surgery were minimal, on the follow-up period, at 1 month of follow-up: There were 12 patients (8.57%) had insomnia, 13 patients (9.28%) had dry noses, and 4 patients (2.85%) had nasal adhesion.

After submucosal diathermy; the nasal adhesion was seen in 4 patients, it removed under local anesthesia, also, in 3 patients whom had nasal crustation, as, they managed with local bicarbonate douching 1 week postoperatively, and instructed to continued saline nasal douching for another 2 weeks.

So, all those patients became free of symptoms (no recurrence), during whole study period.

4. Discussion

Achieving a complete cure for allergic rhinitis symptoms is challenging, and various management options are available, like medical and many surgical modalities, one of these surgical procedures was submucosal diathermy, which was confined to those with were refractory to medical treatment, as applied in the current study.

Allergic rhinitis often runs in families, as found in the current study (85%), also Wise SK, et al study [7] concluded that, it had a significant correlation between number of allergic first-degree relatives and presence of allergic disease.

In the current study, participants were aged between 18 - 58 years, with mean age of mid-thirties, with slight male predominance, also several literatures [3, 4] indicates that allergic rhinitis predominantly affects younger individuals, particularly males, and it was less common in the elderly people, due to nasal mucosa atrophy and reduced immunity.

The current study showed, that submucosal diathermy had a significant result in relieving the symptomology of allergic rhinitis, and overall improvement in Mini RQLQ, and NOSE scores, as well as, nasal endoscopic grading, via lowering in inferior concha size.

In addition, a study performed by Ashoor AA [8], concluded that, submucosal diathermy is an efficient surgical modality in reduction of inferior concha size, relieve nasal obstruction and enhance the subjective and objective symptoms with no-impact on mucosal function of the turbinate, and it is given rise to just slight inconvenience, but inconvenience this, it has a sensible long period of time favorable outcome.

In the current study, nasal obstruction was the main symptoms, and it decreased significantly post-operatively, this significant improvement in the symptoms severity, and its frequency, enhancing the quality of life for those patients, and it attributed to the reduction in erectile tissue with increased nasal cavity space, also, it lead to relief edema and obstruction of nasolacrimal duct, so it gets derange of nasolacrimal duct and reduction in nasal allergic process, as well the frequency of sneezing, soreness of eyes, the watering of eyes, and rubbing the eyes showed significant improvement post-operatively as it also reported in Greiner AN [9] study.

Also, in the current study, the postsurgical management showed a notable improvement of overall symptoms, as a study performed by [10], concluded that, most patients had significant relief, irritability symptoms, sleep disturbance, and substantial improvement, mainly due to reduced mechanical nasal obstruction, and allergic triggers.

García-Chabur MA [11] study, along with current study, showed that, the house working and daily activities became easier for the patients due to the relief of the allergic symptoms.

Fatigability and thirst symptoms had improved post operative in the current study, these findings go in line with Baab [12] study, which concluded that, it mainly because higher airway, as well as, an improvement in the sense of nasal obstruction, sleep disturbance, and snoring.

As in the current study results [13] study reported that, at1 month of post-operative follow-up period, some patients had anosmia, empty nose syndrome, and adhesion, but these issues were minimal and manageable.

The overall improvement in Mini RQLQ scores from presurgical to 6 months postsurgical shows that there was significant symptom relief and had better quality of life [14].

Submucous diathermy of the inferior turbinate was detected to be highly effective in relieving symptoms of nasal obstruction, and this finding was comparable to finding by [15] study.

So, allergic rhinitis patient with inferior turbinate hypertrophy, should consistently be designated the choice of submucosal diathermy of inferior turbinate, alignment with appropriate advisement concerning its usefulness in the management.

Limitations

Single-center study site, unavailability of objective tests of nasal patency as rhinomanometry, also a short follow-up period.

5. Conclusions

Submucosal diathermy appears to have a significant effect on the allergic rhinitis that led to improve in the patient‘s symptoms, and excellent overall success rate, as well as, no complications were detected after 6 months of follow-up.

Article Information

Author Contributions: Ahmed Mohammed Al-Alwan - Conceptualization; Zainab Sachit Hashim - Methodology; Ferial Shaker Taher - Data curation; Adnan Qahtan Khalaf - Formal analysis; Rasha Sabri Radef - Writing – original draft; Mohammed Radef Dawood - Writing – review & editing, Supervision.

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Ethical Approval: Mustansiriyah university institutional Board Review (IBR) approval number 289 at 09/01/2025.

Informed Consent: Written informed consent was obtained from all participants.

Data Availability Statement: Data available on reasonable request.

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