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ORIGINAL ARTICLE

Medpor Microplasty For Surgical Treatment of Different Types of Atrophic Rhinitis

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Abstract

Background: Medpor microplasty is a surgical technique that involves the use of Medpor, a porous polyethylene implant, for craniofacial reconstruction and rhinoplasty surgery. This work aimed for evaluation of the usefulness of using Medpor implants for inferior turbinate reconstruction among patients with atrophic rhinitis.

Methods: We performed this prospective nonrandomized clinical trial on 12 patients with Atrophic Rhinitis resistant to medical treatment in Otorhinolaryngology Department, Zagazig University managed surgically by Medpor Implantation. Endoscopic Examination, Computerized tomography (CT) scan of the PNS (both coronal and axial), Mucociliary clearance test, SNOT-25Q and ENS6Q questionnaires were done for all patients pre-operative and (3,6 and 12 months) post operative.

Results: We found that 100% of patients had failure of perception before surgery while after surgery only 33.3% had failure of perception while 66.7% had success of perception with significant difference. The mean of mucociliary transient time was significantly lower in post-surgery than pre surgery(p=0.001). The median SNOT-25 pre-surgery was 25 and ranged from 18 to 40 while the median SNOT-25 post-surgery was 10 and ranged from 5 to 40 with statistically significant improvement (p=0.001). The median ENS6Q pre-surgery was 13 and ranged from 7 to 17 while the median ENS6Q post-surgery was 7 and ranged from 3 to 14 with statistically significant improvement (p=0.001).

Conclusions: A novel and potentially effective method for treating atrophic rhinitis is the use of Medpor for inferior turbinate reconstruction. Endonasal microplasty with Medpor implants overcomes the limitations of synthetic materials or cartilage by effectively relieving patients' symptoms. Medpor implants have an excellent contouring size, are available in prefabricated shapes, and promote the growth of innate vasculature, which increases mechanical stability, decreases the risk of implant migration, and prevents infection.

Keywords: Medpor, Microplasty, Surgical Treatment, Atrophic Rhinitis

INTRODUCTION

The chronic, progressive illness known as atrophic rhinitis causes the nasal mucosa and underlying bone to gradually atrophy, leading to the development of thick, dry crusts in an otherwise spacious nasal canal. A foul-smelling crust, nasal blockage, epistaxis, anosmia, and other symptoms may emerge from the main nasal disease and its consequences. Primary atrophic rhinitis and

subsequent secondary rhinitis are two ways to categorize this illness [1].

While the precise cause of primary atrophic rhinitis remains a mystery, researchers have identified bacteria including Klebsiella ozaenae, Proteus, and Escherichia coli in patient nasal secretions. To what extent viral factors, genetics, malnutrition, and estrogen insufficiency all play a role in the development of primary atrophic rhinitis remains a mystery [2].

Secondary atrophic rhinitis can develop due to various factors. It typically occurs as a late postoperative complication after excessive turbinate surgical removal, as well as from recurrent suppurative infections of the nose/paranasal sinuses (PNS), chronic granulomatous disorders of the nose (such as tuberculosis, lupus vulgaris, syphilis, leprosy, rhinoscleroma), and radiation-induced atrophic rhinitis has been extensively documented [3].

There is presently no medication that will fully alleviate the symptoms of Atrophic Rhinitis. For the most part, medical interventions have focused on alleviating patients' complaints and symptoms so that they can lead more normal lives. Nasal irrigation (sprays of salt water), nasal moisturizing ointment, and nasal plugs are examples of less aggressive but less effective conservative therapies. The goals of surgical procedures to reduce nasal cavity size, increase vascularity, and stimulate normal mucosal regeneration are typically unfulfilled [4]. Clinical data from patients undergoing submucosal implantation of Medpor for the treatment of Atrophic Rhinitis are presented in this study.

The biomaterial Medpor, which is made of porous high-density polyethylene (PHDPE), is a trusted implant that is extensively utilized in rhinoplasty and craniofacial reconstructive procedures. Due to its interconnected open holes larger than 100µm, the nonreactive substance known as Medpor permits the in-growth of both tissue and blood vessels [5]. These features are believed to increase the implant's stability and its ability to withstand infection [6].

Patients with Atrophic Rhinitis may be able to regain acceptable nasal sensations with the help of a well-vascularized graft implant, according to our hypothesis. Thus, the purpose of was evaluation of the usefulness of using Medpor implants for inferior turbinate reconstruction among patients with atrophic rhinitis.

METHODS

We performed this prospective nonrandomized clinical trial on 12 patients with Atrophic Rhinitis resistant to medical treatment and managed surgically by Medpor Implantation in the period from June 2023 to December 2023 in the Otorhinolaryngology Department, Zagazig University Hospitals. The approval for the study was obtained from the Institutional Review Board (#10434/7-2-2023) and the research was conducted in accordance with the Helsinki Declaration.

Inclusion criteria: We included patients from both sexes aged >18 years, with Atrophic Rhinitis Either Primary or Secondary types, and who underwent nasal surgery after clinical and radiological assessment.

Exclusion criteria: We excluded all cases who were younger than 18 years old and had any of the following conditions: Patients with malignant disease of nose and paranasal sinuses, Patients with well-known autoimmune primary atrophic Rhinitis, patients who had primary atrophic rhinitis, with Renal failure, HCV, HBV and AIDS patients, pregnant, lactating, or who were unable to tolerate surgery with general anesthesia or refused to be enrolled in the study.

Methods: Complete history taking including: Age, sex, History about two main complaints raising susceptibility of diagnosing Atrophic rhinitis (nasal obstruction and nasal offensive blackish/greenish crustations) and several symptoms involving the nose, including anosmia, epistaxis, sneezing, post-nasal drip, headache, itching in the nose, and facial pain. The patient was diagnosed with Atrophic Rhinitis if two or more nasal symptoms were positive (nasal obstruction, offensive crustations anterior and/or posterior nasal discharge, and/or abnormalities of smell).

Clinical evaluation: Local examination of nose

Laboratory investigations involved: (complete blood count, prothrombin time, and bleeding and coagulation time; biochemical tests for fasting and postprandial blood glucose, liver function tests, and renal function tests.

Saccharine test: One easy way to check the nasal mucociliary clearance was to put a small particle of saccharin particle about 1 cm beyond the front of the inferior turbinate. A sweet taste was detected when normal mucociliary activity swept the saccharin rearward to the nasopharynx. If the absence of sweetness was not noticed within 10–20 minutes, it indicated that the mucociliary clearance was delayed. Every step of the way, participants were told not to breathe in, out, chew, drink, talk, cough, scratch, or blow their nose. In such a case, the test was canceled, and the participants were rescheduled [8].

Endoscopic assessment to nasal cavity: For evaluation of turbinates' pathology and anatomical variations: gently inserted the endoscope into the nasal cavity, usually through the inferior meatus, navigated through the nasal passages, visualizing the structures along the way. Visualization was done for the nasal structures, turbinates, nasal airflow, and nasal mucosa.

Computerized tomography (CT) scan of the PNS (both coronal and axial): Using Phillips ICT BRILLIANCE 256 slices, 1 mm cuts, radiologists conducted computed tomographic (CT) scans for the purpose of radiological evaluation. Every patient underwent a standard procedure of a plain CT scan of the sinuses, axial and coronal slices, and a sagittal reconstructive bone window, all without contrast.

Mucociliary clearance test: A little saccharin particle was placed 1 centimeter behind the anterior end of the inferior turbinate. With proper mucociliary function, the sugar was sent to the nasopharynx, where it was detected as a sweet taste. The task was completed. Before and after the operation at15, and 30 days out.

SNOT-25Q: Disease specific questionnaire of 25 questions that evaluated the quality-of-life of the patients of atrophic rhinitis at preoperative and (3,6 and 12 months) post operative [7].

ENS6Q Questionnaire: Prior to surgery and at3,6, and 12 months after the procedure, participants rated the intensity and frequency of their nasal symptoms using the ENS6Q [7].

Operation:

Pre operative preparation: Pre surgery treatment consisted of Hypertonic Saline nasal wash for all cases and antibiotic if there was infection. General anesthesia with an endotracheal tube was the standard procedure for preparation for implantation. Surgeons would typically tape the endotracheal tube to the patient's left side of the mouth so they could be positioned on the right side of the patient throughout the procedure. Only the top lip, cheeks, eyes, and nose were left visible while the two surgical towels were used to surround the head. A transparent adhesive bandage was used to cover the eyes for protection. Medpor was ready, and the endoscopic tower and tools were set up.

The individual was positioned on their back in a reverse Trendelenburg position while lying down. In order to reduce venous return, the head end is raised to a 30 degree angle. A rigid endoscope with a 0-degree 4 mm objective and a high-definition camera is utilized. Administer fentanyl and dexmedetomidine intravenously according to body weight for pre-medication.

Operative procedure: Sinus surgeries using functional endoscopy have been performed on patients. Under general anesthesia, the operation was carried out. Injecting local anesthetic (1% lidocaine and 5 µg/mL epinephrine) into the sub-labial space between the canines was the first step in the treatment. Creating surgical pockets involves elevating the mucoperiosteum flap from the level of the pyriform aperture to that of the floor and lateral nasal wall. After the Medpor is fabricated and installed on the floor and lateral nasal wall, it will undergo endoscopic evaluation. Using an 0-4 vicryl continuous suture, the incision is closed sub-labially.

Postoperative care: After the operation, After their surgeries, those patients were sent to the recovery room to be closely monitored. They stayed for two to four hours until their vital signs stabilized, they were no longer sick to their stomach or vomiting, they could manage their pain, and no active bleeding was detected. They would be sent to their zones after leaving the recovery room if everything had gone smoothly. Sending patients home was the standard procedure if vital signs such as blood pressure, respiration rate, level of consciousness, and oxygen saturation were within normal ranges.

Checkups following surgery: Once a week for the first month, once a month for the first three, and then once at six and twelve months.

Statistical Analysis:

The information was analyzed using Stata (version 23.0), statistical software designed for the social sciences (SPSS Inc., Chicago, Illinois, USA). The chi-square test or Fischer's exact test was utilized for categorical variables with a frequency of less than 5, whereas the T test or Mann-Whitney test was utilized for normally distributed continuous variables. For paired categorical variables, the Mcnemar test was employed.

RESULTS

The mean age of the studied cases was 32.33 ± 11.20. The majority of cases were female (66.7%) with 66.7% had unilateral side affection and 33.3% had bilateral side affection (Table 1).

We found that 100% of patients had failure of perception before surgery while after surgery only 33.3% had failure of perception while 66.7% had success of perception with significant difference (p=0.001)(Table 2).

We found that 100% of patients had failure of perception before surgery while after surgery only 33.3% had failure of perception while 66.7% had

success of perception with significant difference. The mean of mucociliary transient time was significantly lower in post surgery than pre surgery (p=0.001) (Table 3).

The median SNOT-25 pre-surgery was 25 and ranged from 18 to 40 while the median SNOT-25 post-surgery was 10 and ranged from 5 to 40 with statistically significant improvement (p=0.001) (Table 4).

Pre ENS6Q of the studied group showed that the majority of patients before surgery had sever lack of air sensation through nasal cavity (41.7%), moderate and sever nasal crustation (33.3%), mild nose feels to open (58.3%), mild dryness (41.7%), mild nasal burning (58.3%) and only 41.7% had very mild suffocation, Post ENS6Q of the studied group showed that the majority of patients after surgery had mild lack of air sensation through nasal cavity (41.7%), very mild nasal crustation (50%), mild nose feels to open (50%), very mild dryness (41.7%), very mild nasal burning (75%) and only 8.3% had very mild suffocation while the majority had no problem, The median ENS6Q pre-surgery was 13 and ranged from 7 to 17 while the median ENS6Q post-surgery was 7 and ranged from 3 to 14 with statistical significant improvement (p=0.001) (Table 5).

Regarding CT measurements, the mean air space between inferior turbinate and septum in cases with unilateral atrophic rhinitis pre-surgery was 10.6 and ranged from 20 to 5.3 while the mean post-surgery was 4.4 and ranged from 10.2 to 2.2 with statistically significant improvement. The mean air space between inferior turbinate and septum in cases with right atrophic rhinitis pre-surgery was 7.7 and ranged from 10 to 5.1 while the mean post-surgery was 2.65 and ranged from 3 to 2.4 with statistically significant improvement. The mean air space between inferior turbinate and septum in cases with left atrophic rhinitis pre-surgery was 8.1 and ranged from 4.4 to 14.2 while the mean post-surgery was 3.7 and ranged from 12.1 to 2.1 with statistically significant improvement (Table 6).

A case of 44y female patient with bilateral secondary atrophic rhinitis managed by Bilateral Medpor Implant was shown (Figure 1).

Table (1): Demographic data of the studied group (n.12)

Variables		**Mean ± SD**	
Age		32.33 ± 11.20	
		Frequency	**Percent**
Sex	**Male**	4	33.3
	Female	8	66.7
Side of affection	**Unilateral**	8	66.7
	Bilateral	4	33.3

Table (2): Pre and post Muco-ciliary assessment test By Saccharin particles of the studied group

	Pre surgery muco-ciliary assessment test By Saccharin particles		**Post surgery muco-ciliary assessment test By Saccharin particles**		**P value**
	Frequency	**Percent**	**Frequency**	**Percent**	
Failure of perception	12	100	4	33.3	
Success of perception	0	0	8	66.7	**0.001**

Table (3): Pre and post mucociliary transient time of the studied group

	Pre surgery mucociliary transient time		**Post surgery mucociliary transient time**		**P value**
	Frequency	**Percent**	**Frequency**	**Percent**	
Failure of perception	12	100	4	33.3	
Success of perception	0	0	8	66.7	**0.001**
Mean ± SD	65.3±5.9		21.8±3.2		**0.001**

Table (4): Pre and post surgery SNOT-25 of the studied group

	Pre surgery SNOT-25	Post surgery SNOT-25	P value
Median	25	10	**0.001**
Range	18 – 40	5 – 40	

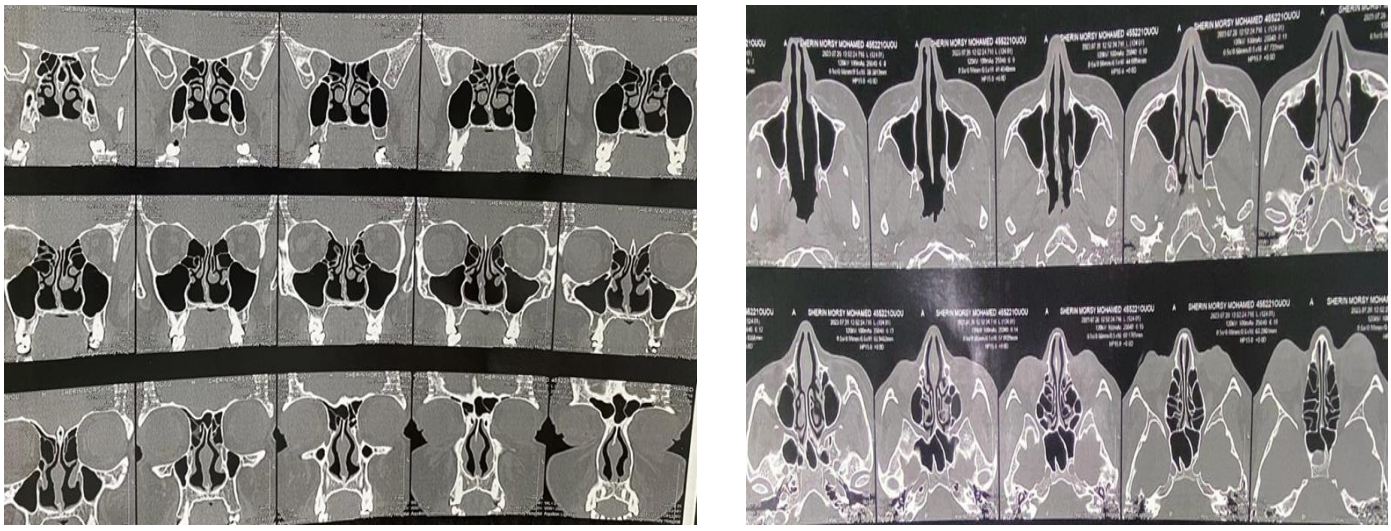
Table (5): Pre and Post ENS6Q of the studied group

Pre ENS6Q of the studied group						
	No problem N (%)	**Very mild N (%)**	**Mild N (%)**	**Moderate N (%)**	**Sever N (%)**	**Extremely sever N (%)**
Lack of air sensation through nasal cavity	1 (8.3%)	0 (0%)	2 (16.7%)	3 (25%)	5 (41.7%)	1 (8.3%)
Nasal crustation	0 (0%)	1 (8.3%)	1 (8.3%)	4 (33.3%)	4 (33.3%)	2 (16.7%)
Nose feels too open	0 (0%)	2 (16.7%)	7 (58.3%)	3 (25%)	0 (0%)	0 (0%)
Dryness	3 (25%)	2 (16.7%)	5 (41.7%)	1 (8.3%)	1 (8.3%)	0 (0%)
Nasal burning	0 (0%)	3 (25%)	7 (58.3%)	2 (16.7%)	0 (0%)	0 (0%)
Suffocation	7 (58.3%)	5 (41.7%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Post ENS6Q of the studied group						
	No problem N (%)	**Very mild N (%)**	**Mild N (%)**	**Moderate N (%)**	**Sever N (%)**	**Extremely sever N (%)**
Lack of air sensation through nasal cavity	1 (8.3%)	3 (25%)	5 (41.7%)	1 (8.3%)	2 (16.7%)	0 (0%)
Nasal crustation	2 (16.7%)	6 (50%)	2 (16.7%)	1 (8.3%)	1 (8.3%)	0 (0%)
Nose feels too open	2 (16.7%)	3 (25%)	6 (50%)	1 (8.3%)	0 (0%)	0 (0%)
Dryness	4 (33.3%)	5 (41.7%)	1 (8.3%)	2 (16.7%)	0 (0%)	0 (0%)
Nasal burning	1 (8.3%)	9 (75%)	1 (8.3%)	1 (8.3%)	0 (0%)	0 (0%)
Suffocation	11 (91.7%)	1 (8.3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

	Pre surgery ENS6Q	Post surgery ENS6Q	P value
Median	13	7	**0.001**

Table (6): Pre and post CT measurements of the air space between inferior turbinate and septum of the studied group

Measurements		Pre-operation	Post-operation	P value
Unilateral Mean ± SD. Range		10.6±4.9 (20-5.3)	4.4±2.1 (10.2-2.2)	**0.001**
Bilateral Mean ± SD. Range	**Rt**	7.7±2.6 (10-5.1)	2.65±0.3 (3-2.4)	**0.001**
	Lt	8.1±3.9 (4.4-14.2)	3.7±4.7 (12.1-2.1)	**0.001**



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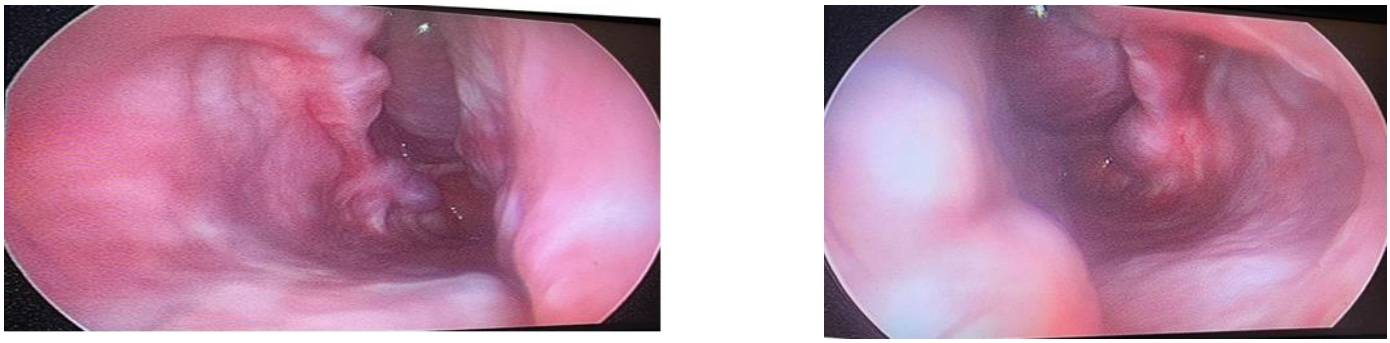

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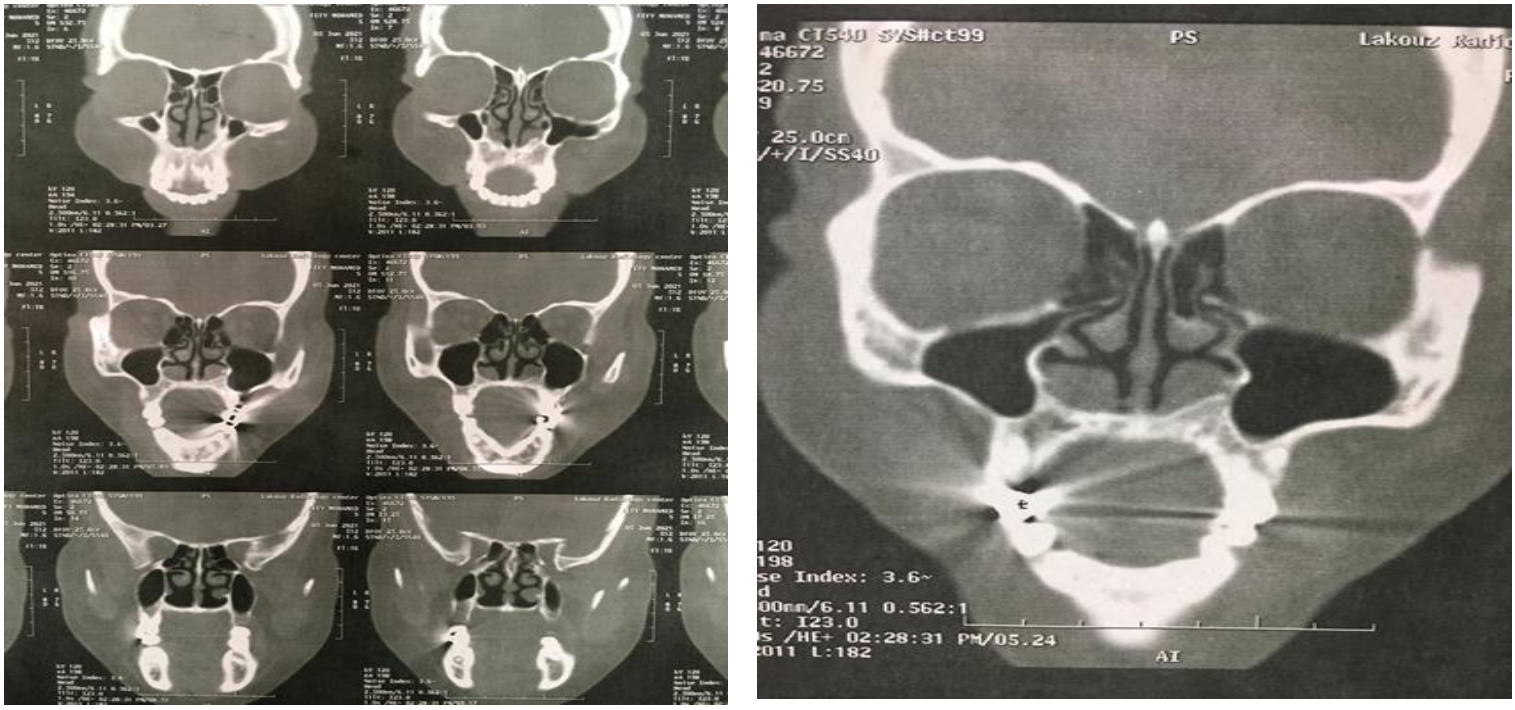

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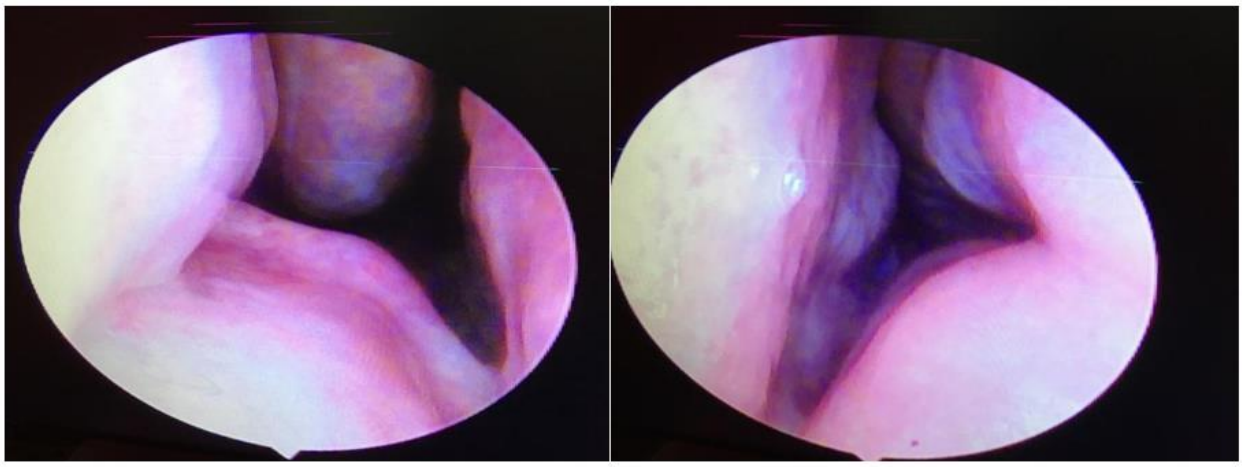

(D)

Figure 1: (A): Preoperative CT scan of PNS (Coronal cuts and Sagittal reconstruction) of the same patients showing Bilateral Atrophied Inferior turbinate, (B): Intraoperative zero-degree endoscopic exposure of Nasal cavity showing the Atrophied turbinate, (C): 3 months postoperative CT scan (coronal cuts) of the same patient showing Bilateral Medpor Implant, (D): 3 months post operative endoscopy of the same patient showing Bilateral Medpor Implant.

DISCUSSION

Medpor microplasty is a surgical technique that involves the use of Medpor, a porous polyethylene implant, for craniofacial reconstruction and rhinoplasty surgery. The porous nature of the Medpor implant allows for tissue ingrowth, which helps to anchor the implant and improve long-term stability. Additionally, Medpor is resistant to absorption, degradation, and fracture, providing long-lasting results. The material is also non-allergenic and generally well-tolerated by the body [6].

The aim of this study was evaluation of the usefulness of using Medpor implants for inferior turbinate reconstruction among patients with atrophic rhinitis.

In the current study we found that the mean age was 32.33 ± 11.20. The majority of cases were female (66.7%) with 66.7% had unilateral side affection and 33.3% had bilateral side affection.

In agreement with our findings, Sheth et al. [8] reported that the age range of 41–50 years had the highest prevalence. People in this study lived in places where there was less of a need to worry for people's fundamental health. They wait until it's advanced before seeking medical guidance since they don't take treatment when it's early on. Nearly two to one, more women than males were affected. Hormonal shifts may explain why women are more common. It is possible that an estrogen imbalance is the root cause.

In the present study regarding muco-ciliary assessment test by Saccharin particles we found that 100% of patients had failure of sweetness before surgery while after surgery only 33.3% had failure of sweetness while 66.7% had success of sweetness with significant difference. The mean of mucociliary transient time was significantly lower in post-surgery than pre surgery.

In this study the mean saccharine clearance times varied from 65.3 minutes preoperatively, to 21.8 minutes at 6 months follow-up. Mucociliary clearance assessments showed improvements of saccharine clearance times in group 6 months postoperatively, with statistical significance.

In contrast with our findings, Jiang et al. (2013) illustrated that the mean saccharine clearance times varied from 18.4 minutes preoperatively, to 17.9 minutes at 3 months follow-up, 12.5 minutes at 6 months follow-up. Mucociliary clearance assessments showed improvements of saccharine clearance times in group 3 and 6 months postoperatively, but without statistical significance.

It is worth conducting additional research into this matter since mucociliary transport is not a straightforward process; rather, it is dependent on interactions between the cilia (in terms of quantity, structure, and beating rhythm) and a two-layered mucus system that possesses certain viscoelastic properties.

The defense and maintenance of nasal health depend on nasal mucociliary clearance. When the nasal mucociliary clearance system is already compromised due to atrophic rhinitis, the crusts that form on the dry lining—a consequence of the lack of physiological humidification and heating—can make matters worse. Removing the inferior turbinate decreases total heat and water vapor flux in the nose by 16%, whereas removing the MT or both the IT and MT together decrease vaporization by 12% and 23%, respectively, according to computational and computerized models used by Elad et al. [10].

The current study findings regarding SNOT-25 clearly revealed that the median SNOT-25 pre-surgery was 25 and ranged from 18 to 40 while the median SNOT-25 post-surgery was 10 and ranged from 5 to 40 with statistically significant improvement.

In consistent with our results, Jiang et al. [11] employed the SNOT-25 as a 2-minute, all-encompassing evaluation instrument to help evaluate the impact of turbinate reconstruction surgery on ENS patients because it thoroughly covers these concerns. After Medpor implant surgery, all patients' SNOT-25 scores started to go down, which means they were steadily getting better. After three months, six months, and twelve months following surgery, the mean (SD) total SNOT-25 score was 30.69 (26.90), 68.31 (23.83), and 49.60 (29.80), respectively. At3,6, and 12 months post-op, patients' cumulative SNOT-25 scores differed considerably from their pre-op values.

These results were compatible with Tam et al. [12] who found that the summation score before the surgery was 39.25. After three months and one year following surgery, the summation score was 19.81 and 16.19, respectively. There are some distinctions in the symptoms of SNOT-22 when examined separately. Many symptoms, including the need to blow one's nose, post-nasal drip, thick nasal discharge, exhaustion, annoyance, restlessness, irritability, depression, and need to blow one's nose, significantly improve after surgery. Nevertheless, in terms of aural fullness, decreased productivity, embarrassment, altered sense of smell, or altered taste, there was no discernible improvement. A patient whose symptoms had been developing into atrophic rhinitis likewise showed a marked improvement, going from a SNOT-22 score of 22 to 6.

The current study findings were in concordance with those reported by Jiang et al. [9] who utilized the SNOT-20, a thorough evaluation method for nasal illnesses that takes into account general symptoms, both before and after the operation. According to the findings, patients' SNOT-20 ratings decreased after surgery, indicating a significant improvement in nasal symptoms, ear or facial symptoms, sleep, and mental functioning following Medpor repair of the inferior turbinate. Further, the SNOT-20 was upgraded to the SNOT-25 by include five Houser items: "dryness," "difficulty with nasal breathing,"

"suffocation," "nose is too open," and "nasal crusting." Based on the data, it appears that three items—"dryness," "nose is too open," and "difficulty with nasal breathing"—changed significantly after the operation. This suggests that a nasal implant could be helpful, as it redirects airflow toward more sensitive tissues, which reduces crusting due to a less dry air stream, and creates a normalized airflow pattern by establishing a pseudo-turbinate. As a result of reduced airflow during inspiration, the nasal mucosa experiences less drying, crusting, and injury, which is the rationale behind reducing the nasal lumen.

Saafan et al. [13] compared the safety and effectiveness of submucosal implants made of elastic sheets and acellular dermal grafts in a prospective randomized blind clinical trial for the treatment of AR. There was no statistical evidence of a significant difference between the groups, and both groups showed a considerable improvement following surgery according to the SNOT-25 scores.

In the current study we found that the majority of patients before surgery had sever lack of air sensation through nasal cavity (41.7%), moderate and sever nasal crustation (33.3%), mild nose feels to open (58.3%), mild dryness (41.7%), mild nasal burning (58.3%) and only 41.7% had very mild suffocation. The majority of patients after surgery had mild lack of air sensation through nasal cavity (41.7%), very mild nasal crustation (50%), mild nose feels to open (50%), very mild dryness (41.7%), very mild nasal burning (75%) and only 8.3% had very mild suffocation while the majority had no problem.

Similar findings were obtained by Jiang et al. [9] who demonstrated that before to implantation, patients most frequently experienced the following symptoms: "fatigue," "reduced concentration," "sadness," "dryness," and "nose is too open." Questions about "dryness" and "nose is too open" pertain specifically to ENS, whereas questions on "fatigue," "reduced concentration," and "sadness" pertain specifically to emotions. Due to the substantial impairment of normal breathing activities, individuals with ENS endure significant discomfort in their daily lives. Saafan et al. [13] noted that following implantation, the SNOT-25 values associated with depression (such as sorrow, irritation, decreased productivity, diminished focus, embarrassment and trouble sleeping) tended to exhibit an improvement. The current study findings regarding ENS6Q clearly revealed that the median ENS6Q pre-surgery was 13 and ranged from 7 to 17 while the median ENS6Q post-surgery was 7 and ranged from 3 to 14 with statistically significant improvement.

This was in accordance with Saafan et al. [13] those who hypothesized that, in comparison to the first visit, the average overall scores on the "fatigue," "reduced concentration," and "sadness" items were statistically lower at the3,6, and 12-month follow-up visits. They came to the conclusion that individuals with AR saw a considerable reduction in nose symptoms and psychological issues following inferior turbinate reconstruction surgery. Despite the lack of disease-specific symptoms in mental health issues, changes in these markers did indicate the onset and outcome of the condition to some extent. Support for the efficacy of implantation surgery is provided by the improvement in psychological disorders. The psychological healing process was positively influenced by implantation surgery.

Matching our findings, Kuo et al. [14] demonstrated that One subjective symptom measure that showed strong correlation with AR was the ENS6Q, which was used in this study. One disease-specific questionnaire that has recently been validated and is used extensively to distinguish between patients suspected of having AR is the ENS6Q. The survey is an excellent AR marker, and it only takes about two minutes to finish. Significant changes were observed in the total score as well as two items (nose feeling too open and nasal crusting) out of six on the ENS6Q between the pre- and post-operative periods.

Houser et al. [15] illustrated that Results showed that once acellular dermis was surgically implanted into a submucous layer, sub mucoperiosteal plane, or sub mucoperichondrial plane to replace lost turbinate tissue, the majority of patients saw a statistically significant reduction in SNOT-25 symptom scores. Thus, they proposed the use of a nasal implant, as it redirects airflow toward more sensitive tissues, reduces the dry air stream, and normalizes the airflow pattern (thanks to the creation of a pseudo turbinate). The theory behind constricting the nasal passages was that less airflow during inspiration would lead to less drying, crusting, and harm to the nasal mucosa.

The current study found that regarding CT measurements, the mean air space between inferior turbinate and septum in cases with unilateral atrophic rhinitis pre-surgery was 10.6 and ranged from 20 to 5.3 while the mean post-surgery was 4.4 and ranged from 10.2 to 2.2 with statistically significant improvement. The mean air space between inferior turbinate and septum in cases with right atrophic rhinitis pre-surgery was 7.7 and ranged from 10 to 5.1 while the mean post-surgery was 2.65 and ranged

from 3 to 2.4 with statistically significant improvement. The mean air space between inferior turbinate and septum in cases with left atrophic rhinitis pre-surgery was 8.1 and ranged from 4.4 to 14.2 while the mean post-surgery was 3.7 and ranged from 12.1 to 2.1 with statistically significant improvement.

Several limitations should be acknowledged in our study. Firstly, the relatively small sample size of 12 participants may limit the generalizability of our findings. A larger and more diverse clinical trials could provide a more comprehensive understanding of the clinical outcomes, and the safety of the usefulness of using Medpor implants for inferior turbinate reconstruction among patients with atrophic rhinitis. The absence of long-term follow-up data is another limitation, preventing us from assessing the enduring effects of inferior turbinate reconstruction with Medpor implants in patients with atrophic rhinitis and monitoring late-onset complications.

Conclusion

A novel and potentially effective method for treating atrophic rhinitis is the use of Medpor for inferior turbinate reconstruction. Endonasal microplasty with Medpor implants overcomes the limitations of synthetic materials or cartilage by effectively relieving patients' symptoms. Medpor implants have an excellent contouring size, are available in prefabricated shapes, and promote the growth of innate vasculature, which increases mechanical stability, decreases the risk of implant migration, and prevents infection.

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