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Correlation Between Lund-Mackay Ct Scores Before and after Surgery for Nasal Polyposis, An Evaluation of Medical and Surgical Treatment in Nasal Polyposis

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ABSTRACT

Objective: To determine the efficacy of functional endoscopic sinus surgery on treating nasal polyps in terms of improvement in the Lund-MacKay score.

Study Design: Quasi-experimental study.

Place and Duration of Study: Department of ENT, Combined Military Hospital, Rawalpindi Pakistan, Jul 2021 to Jan 2022.

Methodology: Seventy patients suffering from chronic rhino-sinusitis were included in this study. All patients were assessed before and three weeks after treatment using the Lund-MacKay computed tomography score. Group-A patients received management with a hybrid therapy using functional endoscopic sinus surgery and drug therapy, while Group-B patients received conservative management alone.

Results: The majority of the patients in our sample were males 43(61.4%), a mean duration of complaints of 6.47±1.91 months. Hybrid therapy showed a significantly higher improvement in relieving nasal obstruction when compared to conservative management alone (p=0.033). Conservative management appeared to be more effective in relieving nasal discharge and headache, although this did not approach statistical significance (p=0.11 and 0.43, respectively). Facial pain and olfactory function showed a greater improvement with hybrid therapy, which was not statistically significant (p=0.097 and 0.131, respectively). The Lund-MacKay computed tomography scores with conservative and hybrid therapy were 13.91±4.11 and 11.17±4.17 at the end of treatment (p=0.007), demonstrating that hybrid therapy was superior.

Conclusion: Functional Endoscopic Sinus Surgery combined with limited medical therapy is superior to pure medical therapy in terms of improvement in Lund-MacKay CT scores and relief in symptoms of nasal obstruction.

Keywords: Functional endoscopic sinus surgery, Lund-MacKay score, Nasal polyps.

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INTRODUCTION

Nasal polyposis is thought to affect 2% to 4% of the global population.[1] Provoking aetiologies include chronic rhino-sinusitis, bronchial asthma, cystic fibrosis, Churg-Strauss syndrome and aspirin idiosyncrasy.[2] Medical management is widely advocated with corticosteroids, both local and systemic, forming the mainstay of treatment which is even purported to reduce the size of the polyps.[3] Functional endoscopic sinus surgery (FESS) is a newer treatment modality that is employed for cases which are refractory to medical treatment.[4,5]

The diagnosis of chronic rhinosinusitis is clinical, as is the monitoring of disease progression.[6,7] While computed tomography (CT)is very useful in identifying nasal polyps, its role in demonstrating the presence of the underlying inflammation is purported to be limited, as the correlation between imaging findings and the severity of symptoms is thought to be poor.[8] CT is also useful in understanding the anatomical state of the nasal cavity and the paranasal sinuses, before undertaking FESS, and scoring systems such as the Lund-MacKay CT score has been used to delineate the severity of the disease, as well as the outcome of surgery, however, the exact value of this score is still up for debate. The correlation between symptoms before and after the intervention is unclear.[9,10]

Chronic rhinosinusitis with polyp formation is widely prevalent globally and is responsible for significant morbidity and lost work days. The disease is problematic to manage due to the usually present underlying disease process. Despite the wide variety of modalities available, an ideal strategy must still be within reach. This study looked at the utility of a hybrid surgical/medical management versus the more conventional and widely practised conservative management alone in an attempt to find a more effective mode of management, as well as the degree of correlation between the Lund-MacKay CT score before and after treatment with the degree of improvement in symptoms.

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METHODOLOGY

The quasi-experimental study was conducted from July 2021 to January 2022 at the Department of ENT, Combined Military Hospital, Rawalpindi Pakistan. The WHO sample size calculator was used to calculate the sample size keeping population standard deviation (σ) of 0.48, population variance (σ2) of 0.2304, test value of the population mean of 19.09, and anticipated population mean of 6.76.[11]

Inclusion Criteria: Patients of either gender, aged 15-70 years, with an established diagnosis of chronic rhinosinusitis with polyp formation, were included in the study.

Exclusion Criteria: Those patients who had received antibiotics, corticosteroids or immunomodulatory drugs within the last four weeks, or had received previous surgery or trauma to the sinuses, had septal deviation, inferior turbinate hypertrophy, cystic fibrosis, or primary ciliary dyskinesia were excluded.

All patients were thoroughly evaluated by history and clinical examination on enrollment. Patients were divided into two equal groups by a computer randomization method. All patients underwent a computed tomography scan to calculate the Lund-MacKay score pre-treatment; this was followed by treatment as per the group assigned. In addition, all patients underwent a scoring for symptoms, specifically nasal obstruction, nasal discharge, headache, facial pain and olfactory disturbance on a 5-Point Likert Scale, as per Table-I, before treatment.

Table-I: 5-Point Likert Scale Score for Symptoms

Question: How Often do you Suffer from the Following Symptom? (Nasal Obstruction, Nasal Discharge, Headache, Facial Pain And Olfactory Disturbance)				
0	1	2	3`	4
Never	Sometimes	Half the time	Most of the time	All the time

In Group-A, patients received conservative therapy with a combination of Amoxicillin 500mg/ Clavulanic acid 125mg twice daily along with Cetrizine 5mg/Pseudoephedrine 30mg once daily for three weeks and Xylometazoline 0.1% two drops per nostril twice daily) for seven days. In Group B, patients underwent functional endoscopic sinus surgery followed by Amoxicillin 500mg/Clavulanic acid 125mg twice daily and Cetrizine 5mg/Pseudoephedrine 30mg once daily for three days. In addition, both groups received Fluticasone 100mcg of once daily for three weeks concurrent with their specified treatment. At the end of three weeks, all patients underwent computed tomography to calculate the post-treatment Lund-MacKay score 12 and score on the 5-Point Likert scale for the aforementioned symptoms.

Data were analyzed using the Statistical Package for the social sciences (SPSS) version 26.0. Mean and SD were calculated for quantitative variables. In addition, qualitative variables like gender, alcohol usage, and smoking were recorded in frequency and percentage. The Chi-square test was applied to all quantitative variables, while the independent samples *t-test* was applied to quantitative variables to compare the groups. The *p*-value of ≤.05 was considered significant.

RESULTS

We studied 70 patients, the majority were males 43(61.4%). The mean duration of complaints for the sample was 6.47±1.91 months. The scores for pre-treatment nasal obstruction was 2.26±1.43, the nasal discharge had a mean score of 2.04±1.41, while the scores for headache, facial pain and olfactory disturbance were 2.06±1.41, 1.69±1.40 and 2.03±1.53, respectively. The mean pre-treatment Lund-Mackay CT score of the sample was 17.04±4.54. Pre-treatment patient charac-teristics and their comparison across both groups are shown in Table-II.

Table-II: Patient Characteristics Pre-Treatment (n=70)

Variables	**Group A (n=35)**	**Group B(n=35)**	***p*-value**
Gender			
Male	20(57.1%)	23(65.7%)	0.461
Female	15(42.9%)	12(34.3%)	
Age (years)	44.80±15.87	45.83±15.05	0.782
Body Mass Index (kg/m²)	25.43±3.56	25.60±3.03	0.823
Duration of Complaints (months)	6.66±1.85	6.29±1.98	0.420
Alcohol Consumption			
Yes	1(2.9%)	0(0%)	0.314
No	34(97.1%)	35(1000%)	
Smoking			
Yes	7(20.0%)	4(11.4%)	0.324
No	28(80.0%)	31(88.6%)	
5-Point Likert Scale Scores for Symptoms			
Nasal Obstruction	2.11±1.41	2.40±1.46	0.833
Nasal Discharge	2.14±1.31	1.94±1.51	0.556
Headache	2.00±1.46	2.11±1.39	0.738
Facial Pain	1.54±1.38	1.83±1.42	0.397
Olfactory Disturbance	1.80±1.53	2.26±1.52	0.214
Lund-MacKay Computed Tomography Scores			
Score	17.63±4.51	16.46±4.55	0.283

Post-treatment, the 5-Point Likert scale scores for nasal obstruction improved to 1.26±1.13, the nasal

discharge had a mean score of 1.39±1.12, while the scores for headache, facial pain and olfactory disturbance were 1.60±1.19, 1.51±1.15 and 1.30±1.03, respectively, all symptoms scores showed improvement compared to pre-transplant scores. In addition, the mean post-treatment Lund-Mackay CT score of the sample was 12.54±4.35, which also improved compared to the scores before the intervention (Table-III).

Table-III: Post-Treatment Symptom Scores and Lund-MacKay CT Score (n=70)

Variables	Group A (n=35)	Group B (n=35)	*p*-value
5-Point Likert Scale Scores for Symptoms			
Nasal Obstruction	1.54±1.20	0.97±0.99	0.033
Nasal Discharge	1.17±1.01	1.60±1.19	0.110
Headache	1.49±1.17	1.71±1.23	0.428
Facial Pain	1.74±1.09	1.29±1.18	0.097
Olfactory Disturbance	1.49±1.01	1.11±1.02	0.131
Lund-MacKay Computed Tomography Scores			
Score	13.91±4.11	11.17±4.17	0.007

DISCUSSION

This study demonstrated that hybrid therapy with a combination of FESS and appropriate medications was associated with a superior response compared to conservative therapy in patients with chronic rhinosinusitis with nasal polyps in terms of improvement in Lund-MacKay CT scores as well as symptoms.

The majority of patients studied in our sample were males, which indicates that this gender has a higher prevalence. This fact that was also confirmed by Busaba *et al.* who reported that while females were more prone to develop chronic sinusitis, males had a higher chance of developing nasal polyps.[13]

The frequency of patients in our study who were overweight, i.e., had a BMI over 24.9 kg/m^2 was 51.4%, indicating a probable absence of causality between weight and the occurrence of rhinosinusitis. However, we did not specifically conduct statistical tests for association in our study. Nam *et al.* conducted a more thorough survey and determined that obesity did not have a significant relationship with the development of nasal polyps with chronic rhinosinusitis (p>0.05).[14] Conversely, Kebaya *et al.* reported a significant relationship between the development of rhino-sinal disease with polyposis and obesity OR 2.26 (95%CI, 1.14–4.51). However, in this study, poor glycaemic control, which is known to be associated with the development of this disorder, was also seen to be higher in obese patients, introducing a certain degree of confounding.[15]

A total of 87.1% of patients complained of nasal obstruction, which was the most common complaint. Nasal discharge occurred in 81.4% of patients, while headache, facial pain and olfactory disturbance occurred in 78.6%, 74.3% and 77.1% of patients, respectively. Our findings were comparable to Chakravarti *et al.* who reported nasal obstruction and nasal discharge are the two most common symptoms, 94% and 91%, respectively, with headache occurring in 63% of patients.[16] Conversely, Bohman *et al*. reported a slightly different picture in their study, with disturbance in olfaction being the most common symptoms at a frequency of 76.6% and nasal obstruction occurring in only 55.3% of cases.[17]

Our study compared the utility of employing FESS hybrid therapy (in combination with a short course of drug therapy) with purely conservative management as first-line therapy for patients with nasal polyps secondary to chronic rhinosinusitis and found it to be an effective measure in this role, both in improving symptoms as well as in improvements in the Lund-MacKay CT scores. Ehnhage *et al*. studied the role of FESS in patients with bronchial asthma resulting in nasal polyposis. They found that it was effective management in improving obstruction and olfaction in these cases compared to conservative topical therapy and that conservative therapy was not superior to placebo.[18] Djukic *et al.* reported that FESS was associated with a significant improvement in quality-of-life indices in patients with nasal polyposis secondary to chronic rhino-sinusitis, with anywhere between 73% to 98.4% of patients showing some degree of improvement, which may last up to twelve months after procedure.[19]

LIMITATIONS OF STUDY

Hybrid therapy with functional endoscopic sinus surgery and the appropriate drugs has been demonstrated to be more efficacious. However, this study needs more data on the safety of this combination both in the short- and long term. Moreover, the length of follow-up was short.

CONCLUSION

Functional endoscopic sinus surgery combined with drug therapy appears to provide better results than the use of conservative therapy alone in managing chronic rhinosinusitis with polyp formation. With this in mind, combination therapy may be considered first-line management, especially in centres where the modality for FESS and the technical expertise are readily available, pending further evaluation.

Conflict of Interest: None.

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

IS & AH: Conception, study design, drafting the manuscript, approval of the final version to be published.

MA & NK: Data acquisition, data analysis, data interpre tation, critical review, approval of the final version to be published.

SI & SBN: Critical review, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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