

Evaluation of the effect of endoscopic partial middle-turbinectomy surgery on the quality of life of patients with chronic rhinosinusitis and nasal polyps*

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Abstract

Background: Chronic rhinosinusitis (CRS) is a common chronic inflammatory disease. Endoscopic sinus surgery is recommended as a standard method when medical treatment fails. The effectiveness of various complementary surgical methods such as endoscopic partial middle-turbinectomy is controversial in the improvement of CRS symptoms in these patients. This study aimed to investigate the effect of endoscopic partial middle-turbinectomy on the quality of life (QOL) of patients with chronic rhinosinusitis and nasal polyps (CRSwNP) in Iran.

Method: Ninety patients with CRSwNP of grades 3 and 4 were randomly assigned to either an intervention (45 patients) or control group (45 patients). In the control group, endoscopic sinus surgery without middle turbinectomy was performed and in the intervention group, endoscopic partial middle-turbinectomy was performed in addition to endoscopic sinus surgery. To evaluate the outcomes, the SNOT-22 QOL questionnaire was used, and the results were analyzed using SPSS version 24.

Results: Most of the patients were male and had a mean age of 39 years. The mean SNOT-22 QOL questionnaire scores were 49.13 ± 16.72 and 52.51 ± 16.95 before surgery in the control and intervention groups respectively, which did not show any significant difference. In contrast, after endoscopic surgery these scores changed to 28.46 ± 12.38 and 11.13 ± 5.55 in the control and intervention groups, respectively, and there was a significant difference between both groups. Although there was a significant improvement in both groups, the patients in the intervention group experienced more improvement than the control group ($41.4 (\pm 16.46)$ vs $30.7 (\pm 18.27)$, respectively).

Conclusion: According to this study, it appears that the use of endoscopic partial middle-turbinectomy in addition to endoscopic sinus surgery improves CRS symptoms and the QOL of patients compared with endoscopic sinus surgery alone.

Key words: chronic rhinosinusitis, nasal polyposis, middle turbinate, endoscopic surgery, quality of life

Introduction

Chronic rhinosinusitis (CRS) is a common chronic inflammatory disease of the nose and paranasal sinuses⁽¹⁾. The prevalence of this disease is estimated to be around 15% worldwide⁽²⁾ and is also associated with nasal polyps in 30% of patients⁽³⁾. Chronic rhinosinusitis with nasal polyps (CRSwNP) is a subtype of CRS that affects approximately 4% of the general population⁽⁴⁾.

About 20% of all patients referred to immunology and allergy clinics are diagnosed with CRSwNP⁽⁵⁾. Nasal congestion, rhinorrhea, insomnia, headache, and posterior nasal drip are the most common symptoms of CRSwNP that affect the daily activities of patients^(6,7). In addition, a high recurrence rate and multiple referrals to allergy clinics are consequences that not only place a financial burden on both the patient and society but also

disrupt a patient's social and individual functions^(8,9) and reduce their quality of life (QOL).

QOL is defined as an individual's mental evaluation of the positive and negative aspects of their life⁽¹⁰⁾. Health-related QOL is a QOL evaluation component that evaluates a patient's perception of their health status in different areas. CRS symptoms such as insomnia, fatigue and olfactory dysfunction may change a patient's functional, emotional and social states and lead to a decrease in their overall QOL⁽¹⁰⁾. Previous studies have determined a 74%–94% reduction in the QOL of CRS patients^(10,11). Although medical therapy is the initial treatment for rhinosinusitis, surgical treatment is considered in relapsing cases or in cases with resistance to primary medical therapy⁽¹²⁾. Recently, sinus surgery has begun to involve endoscopic procedures as standard because of the advances in this technique^(6,13). In addition to standard endoscopic sinus surgery, some studies have shown positive effects, such as decreasing the recurrence rate of polyps and fewer synechiae when combining endoscopic partial middle turbineotomy with endoscopic sinus surgery^(3,14,15). However, some controversial ideas still remain concerning the beneficial effect of keeping the middle turbinate as a landmark in modifying surgeries as well as preventing frontal sinusitis⁽¹⁶⁾. Evaluating the QOL in patients with CRSwNP is an important indicator to measure not only the severity of the disease but also the effectiveness of each type of treatment in these patients. Recently, assessment of the beneficial effects of therapeutic procedures in chronic diseases including CRSwNP has changed from patient-reported outcomes to the evaluation of objective mental symptoms using tools such as QOL index⁽⁶⁾. QOL can be used as a clinical assessment of health in chronic diseases⁽¹¹⁾. The effectiveness of endoscopic partial middle turbineotomy in CRSwNP patients on improving QOL was emphasized in previous studies^(10,17,18). However, evidence of its beneficial effects is conflicting and it seems essential to evaluate the QOL of patients in individual societies because different cultures, beliefs, and ethnicities have an impact on perceptions of QOL.

Materials and methods

Patients

This single-center, parallel-group, blinded, randomized clinical trial study was performed on 90 patients referred to Firoozgar hospital from 2017 to 2019 for CRSwNP. The inclusion criteria was a diagnosis of CRS based on Fokkens et al. criteria⁽¹⁹⁾, which consists of the presence of two or more symptoms that one of the symptoms must be one of these either nasal blockage, obstruction, congestion or nasal discharge, (\pm facial pain or pressure, \pm reduction or loss of smell) for ≥ 12 weeks. Additionally, the diagnosis of CRS was confirmed according to a nasal endoscopy and paranasal sinus CT scan. Moreover, patients with either grade 3 or 4 nasal polyps based on Meltzer et al. criteria⁽²⁰⁾ were included. Exclusion criteria were having a history of

previous endoscopic sinus surgery, secondary CRS due to fungal infections, vasculitis, mucocele, or anatomical deformities, or having a history of smoking, GERD, COPD, or immune suppression. Then, the patients were randomly divided into two 45 patient groups including an intervention group and a control group. Classic endoscopic sinus surgery was performed in both the control and intervention groups, and endoscopic partial middle turbineotomy was also performed in the intervention group. This project was granted ethical approval from Iran University of Medical Sciences ethics committee (IR.IUMS.FMD.REC No. 1396.9411369004). The informed consent letter was completed by all participants prior to the study.

Surgical technique

All patients underwent classical endoscopic sinus surgery as an uncinectomy, antrostomy, anterior and posterior ethmoidectomy, frontal sinusotomy and sphenoidotomy. Surgeons were blinded to the middle turbinate treatment method until the end of surgery when the treatment technique was revealed and performed. Endoscopic partial middle-turbineotomy was performed in 45 patients randomly assigned to the intervention group. Turbinate scissors were used to remove the anteroinferior part of the middle turbinate, while the upper part was left as a landmark. The posterior part of the middle turbinate, which is a landmark for sphenoidotomy was also protected. The rest of the patients were considered as a control group. A trans-septal 4-0 Vicryl suture was used to hold the turbinate in position in two patients in the control group due to its destabilization. At the end of the surgery, nasal packing was placed in each middle meatus cavity for 3 days and oral cephalixin (500 mg, QID) was administered for 7 days and normal saline irrigation was recommended.

At the 2-week follow-up, endoscopic sinonasal cavity debridement was performed and fluticasone nasal spray (50 mcg/ spray) therapy was prescribed twice daily for both groups.

Pre-operative and post-operative outcome evaluation

The Sino-Nasal Outcome Test version 22 (SNOT-22) questionnaire was completed preoperatively and 1 year after surgery⁽²¹⁾ to evaluate the QOL of patients. This questionnaire contains 22 questions about rhinosinusitis symptoms and is used as a specific QOL assessment for evaluating patients with CRSwNP. Each question is scored from zero (no problem) to five (the problem is as bad as possible) with final scores in the range of zero to 110. Higher scores mean a lower QOL. The validity and reliability of the Persian version of the questionnaire were assessed in a previous study⁽²²⁾. In addition, there was no significant difference between the two groups regarding adherence to medications during the follow-up period. Sinonasal endoscopy was performed as part of the routine post-operative care, and was carried out at each visit by a different blinded researcher after the SNOT-

Figure 1. Flow diagram of the progress through the phases of a parallel-randomized trial of two groups.

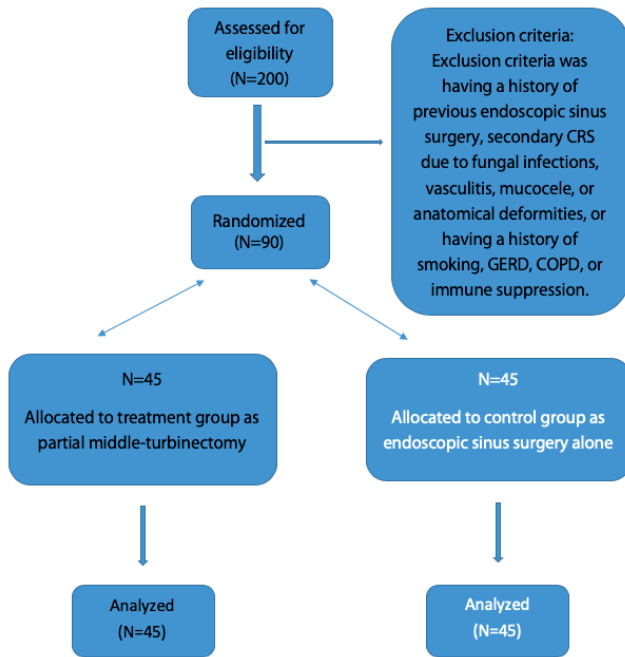


Table 1. Basic characteristic between both groups.

Variables	Intervention group (N=45)	Control group (N=45)	p-value
Age ^a	39.73±14.05	39.47±12.61	0.840
Sex (Female /Male) ^b	19/26	17/28	0.830
History of asthma ^b	6(13.3%)	5(11.1%)	1.000
Aspirin sensitivity ^b	8(17.8%)	7(15.6%)	1.000

^a according to Mann-Whitney test, ^b according to Fisher's exact test.

Table 2. Comparison SNOT-22 scores between both groups.

Outcomes	Group	Pre-operation	One-year post-operation	p-value ^a
QOL	control group	49.13±16.72	28.46±12.38	< 0.001
	intervention group	52.51±16.95	11.13±5.55	< 0.001
	P-value ^b	0.305	0.002	

^a according to Wilcoxon test, ^b according to Mann-Whitney exact test.

22 questionnaire was completed.

Statistical analysis

All statistical analyses were conducted using SPSS version 24 (IBM Corp. NY, USA). Statistical analysis of continuous variables with a normal distribution such as age and QOL evaluation were expressed as mean ± standard deviation, and categorical variables such as sex and history of asthma and aspirin sensitivity were defined as proportions or ratios. Baseline characteristics of the study participants were compared using independent t-test, Mann-Whitney, or chi square tests where appropriate. Wilcoxon and Mann-Whitney tests were also used to evaluate preoperative and postoperative quantitative data. P-values under 0.05 were considered statistically significant.

Results

Ninety patients with CRSwNP were randomly divided into 2 groups: the intervention group (45 patients) and the control group (45 patients) (Figure 1). Sixty per cent of the patients were male with a mean age of 39 years old. Past medical history of asthma and aspirin sensitivity was collected. As shown in Table 1, there was no significant difference between the two groups in aspirin sensitivity and having a history of asthma (p-values=1.000). The effectiveness of endoscopic partial middle turbinectomy between the two groups is also shown in Table 2. The preoperative mean QOL scores in the intervention group and control group were 49.13 ± 16.72 and 52.51 ± 16.95 respectively, which was not significantly different (p-value = 0.305). However,

1 year after surgery, the mean SNOT-22 index scores were different in the intervention group and control group: 11.13 ± 5.55 and 28.46 ± 12.38, respectively (p-value = 0.002). Comparing the mean QOL scores showed that there was a significant difference between the scores obtained before surgery and 1 year after surgery in the intervention (52.51±16.95 to 11.13±5.55, respectively, p-value < 0.001), and the control groups (49.13±16.72 to 28.46±12.38, respectively, p-value < 0.001). However, patients in the intervention group had a mean SNOT-22 score improvement of 41.4 (±16.46) compared with 30.7 (±18.27) in the control group. Despite significant improvement in both groups, the intervention group patients experienced more improvement than the control group (p-value = 0.004, independent t-test was performed).

Discussion

Surgery is one of the treatment methods for CRSwNP and is performed using different techniques ⁽⁴⁾. Choosing an appropriate therapeutic approach for a disease is related to how effective it is in controlling the outcomes of the disease. In regard to the costs of CRSwNP for society and patients, a reliable guide to determine the effectiveness of therapeutic interventions in chronic diseases is the QOL index which can help when choosing an effective treatment ⁽¹¹⁾. Therefore, we aimed to evaluate the effect of endoscopic partial middle-turbinectomy surgery in patients with CRSwNP compared with the effect of endoscopic sinus surgery without partial middle turbinectomy. Based on the SNOT-22 scores evaluated in the study, the difference in QOL

before and 1 year after surgery in patients with CRSwNP with or without endoscopic partial middle-turbineotomy showed that the treatment group had a better QOL improvement. A common problem in CRSwNP is nasal obstruction that leads to nasal congestion, rhinorrhea, anosmia, headache, respiratory problems and posterior nasal drip⁽²³⁾. Endoscopic partial middle-turbineotomy can remove this obstruction, and so it plays an important role in improving symptoms, which in turn improves the QOL of patients. A comprehensive review study on the effectiveness of endoscopic sinus surgery techniques showed that these methods not only improve treatment outcomes and patients' symptoms, but also reduce the recurrence of polyps, which leads to further improvement in a patient's condition⁽²⁴⁾. As with the results of our study, Marchioni et al. in 2008 showed that adding endoscopic partial middle-turbineotomy to endoscopic sinus surgery reduces CRS symptoms, which leads to a lower recurrence rate. A higher QOL index was also reported after 3 years of follow-up in the endoscopic partial middle-turbineotomy patients⁽²⁵⁾. Similarly, Hoodon and colleagues investigated the effectiveness of this surgical method in a two-group study by examining symptoms 1, 3, and 6 months after surgery. The results showed that even though the amount of crust in the turbineotomy group was greater than in the control group in the first month, at the postoperative 6-month follow-up visit, patients in the intervention group had a significant reduction in all symptoms⁽¹³⁾. Therefore, diminishing symptoms, reducing complications and improving QOL in patients with CRSwNP can justify the effectiveness of this surgical procedure. However, Soler and colleagues showed that in CRS patients treated surgically with and without partial middle-turbineotomy, there was no significant difference between the QOL score of patients before and after surgery based on the SF-36 QOL questionnaire⁽²⁶⁾. This disagreement can be related to the difference in the measurement tools and supports the use of a specific QOL tool based on the nature of the disease. General QOL measures such as the SF-36 are always used to compare the effects of different illnesses on health, while specific tools such as the SNOT-22 questionnaire are used to compare specific features of total health. Saedi et al evaluated the most optimal management of the middle turbinate in an epidemiological study on 90 patients with nasal polyps in 2014. They used three different surgical procedures: middle-turbineotomy by radiofrequency, partial resection of the middle turbinate, and medialization of the middle turbinate. Their results showed that all three treatment methods could

improve symptoms and there was no statistically significant difference in patients' QOL in the three groups⁽²⁷⁾. There are also studies that emphasize maintaining the turbinate structure. Some studies have reported complications such as atrophic rhinitis, iatrogenic frontal sinusitis, anosmia and empty nose syndrome, which are not consistent with the results of our study^(28, 29). However, the removal of the middle turbinate is still controversial based on some studies^(13, 30). The strength of this surgical procedure should be considered due to the decrease in the recurrence rate of polyps and its impact on improving the QOL of patients, as well as its effectiveness in reducing healthcare costs, which has been reported in numerous studies. Based on this, we believe that the present study could lead to further research in this field in Iran. There are some limitations in this study. First, we tried to consider some potential confounders as exclusion criteria, but it would be better for future studies to study the smoker population due to the higher risk of scarring and crusting in this population. Second, as any difference between these two grades of nasal polyps (type 3 and 4) between both groups (intervention and control groups) could lead to a study bias, it is better to analyze the percentage of each grade between two groups in the future studies. Although we subjectively assessed patients using a SNOT-22 questionnaire post-operatively, objective methods of outcome evaluation by endoscopy and/or imaging will be of more value.

Conclusion

Finally, the results of this study support the effectiveness of endoscopic partial middle-turbineotomy as a treatment for CRSwNP in improving patients' symptoms and QOL. Further clinical trials are necessary to determine the effectiveness of this surgical procedure.

Authorship contribution

MMD, SHR, HJ: Organizing and supervising the course of the article and taking the responsibility; MJ, MR, MDF: Taking responsibility in patient follow-up, data management and reporting; MMD, FDF, FM, MDF: Taking responsibility in the construction of the body of the manuscript; MMD, FDF, HJ, FM: Reviewing the article before submission not only for spelling and grammar but also for its intellectual content.

Conflict of interest

None.

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