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The Effect of Endoscopic Sinus Surgery on Quality of Life: A Prospective Clinical Study

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ABSTRACT

Objective. Chronic rhinosinusitis has a negative effect on the quality of life of millions of involved patients. The aim of this study was to assess the effect of endoscopic sinus surgery on the quality of life in patients with chronic rhinosinusitis. *Materials and Methods.* Twenty-five cases with chronic rhinosinusitis, which were resistant to 12 weeks of medical treatment, underwent Endoscopic Sinus Surgery. Two kinds of health related quality of life (HRQoL) surveys (the Chronic Sinusitis Survey and the Rhinosinusitis Disability Index) were applied to all cases before and at least 6 months after the operation. The Lund-Kennedy endoscopic scoring system was used as an objective evaluation. All analysis was performed using SPSS statistical software. Results. Statistically significant improvements were computed for cases before and after surgery for the Chronic Sinusitis Survey symptom scores ($p<0.05$). Also, statistically significant improvements were found for cases using the Rhinosinusitis Disability Index. However, mean changes in endoscopic scores did not statistically correlate with changes in quality of life ($p>0.05$). *Conclusions.* Our results showed that endoscopic sinus surgery improves the quality of life in cases with chronic rhinosinusitis. But this improvement did not correlate with the endoscopic scores of the paranasal sinuses.

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Keywords: Chronic rhinosinusitis; endoscopic sinus surgery; chronic sinusitis survey, rhinosinusitis disability index, quality of life

Introduction

Rhinosinusitis is one of the most common health problems around the world. The prevalence and incidence of this disease have recently been increasing. Statistical data show that rhinosinusitis is more common than diabetes mellitus, arthritis, heart disease and headache. It brings significant economic burden in both treatment costs and loss of labor [1].

Rhinosinusitis is defined as inflammation of the nose and paranasal sinuses characterized by two or

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more of the following symptoms, one of which should be nasal obstruction (blockage, congestion) or nasal discharge (anterior/posterior), along with either facial pressure/pain or reduction or loss of smell. Sinus-nasal mucosal inflammation should be confirmed via either endoscopic inspection or imaging. Chronicity is arbitrarily defined as the persistence of symptoms beyond 12 weeks. Currently, chronic rhinosinusitis (CRS) is sub-classified into two distinct subtypes, termed CRS without nasal polyps (CRSsNP) and CRS with nasal polyps (CRSwNP) [2].

Sinusitis has a negative impact on the quality of life that can be compared with diabetes mellitus and congestive heart failure. Besides its physical symptoms, CRS may also cause functional and emotional disorders [3]. Especially CRSwNP has a more negative impact on the quality of life and economic cost than CRSsNP [4]. Endoscopic sinus surgery (ESS) was defined for the treatment of CRS and nasal polyposis by Messenklinger and Wigand in the 1960s. This technique was popularized by Stammberger in Europe and by Kennedy in North America in the 1970s [5]. In many studies, the success rate of ESS has been reported to be between 73-97.5 %. But in those studies, patients were only questioned whether or not they were cured [6]. On the other hand, the final goal in the treatment process of a benign disease like sinusitis should be an increase in the quality of life. There are limited numbers of papers about the impact of ESS on quality of life in the literature. It is important to use disease specific health related quality of life (HRQoL) surveys when determining the success of ESS [7]. The reliability of this survey must be proven.

The aim of this study was to investigate the impact of ESS on the Chronic Sinusitis Survey (CSS) symptoms and quality of life. The second purpose of this study was to investigate the relationship between change in endoscopy score and change in HRQoL following ESS in cases with CRS.

Materials and Methods

The study included 25 patients (15 males, 10 females; age range 18-65 years) who had undergone ESS with CRS diagnosis between January 2009- December 2010 and who were followed for at least 6 months after surgery.

The institutional review board of our (blind) hospital provided approval for consent/authorization forms and all research protocols. The diagnosis of CRS was based on clinical symptoms and diagnostic criteria as suggested by the American Academy of Otolaryngology and the Head and Neck Surgery Task Force on Rhinosinusitis [8]. All patients were informed about the study protocol and written informed consent was obtained before their enrollment. After 12 weeks of medical treatment, the patients who still had CRS symptoms underwent ESS. Exclusion criteria were the presence of positive allergy tests, acetylsalicylic intolerance, asthma and history of previous sinus surgery. Cases having nasal pathologies such as septal deviation and concha bullosa accompanying CRSsNP and CRSwNP were not excluded from the study.

Postoperatively, all cases were prescribed antibiotic (amoxicillin+clavulanic acid) and nasal saline irrigation for one week. Nasal steroids were initiated one week after the operation and continued for two months only in the CRSwNP group. All cases in this study were discharged from the hospital within 3 days postoperatively after the removal of nasal packages.

Preoperatively, bilateral assessment of the sinuses was performed by reviewing paranasal computerized tomography (CT) scans in the coronal plane and conducting sinonasal endoscopy with the use of 0o, 2.7mm or 4.0mm diameter rigid endoscopes. Endoscopy procedures were repeated at the 6 month postoperative appointments. CT scans and endoscopic findings were quantified using the Lund-Mackay (score range: 0–24) and Lund-Kennedy (score range: 0–20) scoring systems, respectively. The Lund-Mackay CT scoring system quantifies the severity of image opacification in the maxillary, ethmoidal, sphenoidal frontal sinuses and ostiomeatal complex regions [9]. The Lund-Kennedy endoscopy scoring system grades visual pathologic states within the nose and paranasal sinuses

Table 1. The CSS scores for total CRS cases, CRSwNP and CRSsNP subgroups before and after the surgery

	Preoperative mean±SD	Postoperative* mean ±SD	Change mean ±SD	P value
CSS symptom subscale	4.15±8.72	41.50±12.78	29.05±12.28	0.000
In all patients (CRS)(n:25)	2.07±7.76	41.50±9.84	31.12±10.27	0.001
In CRSsNP subgroup(n:14)	12.45±9.96	49.80±16.17	29.05±14.35	0.003
In CRSwNP subgroup(n:11)				
CSS medication subscale				
In all patients (CRS)(n:25)	12.45±10.62	49.80±10.18	24.90±14.01	0.000
In CRSsNP subgroup(n:14)	12.45±9.59	47.72±11.15	24.90±15.24	0.001
In CRSwNP subgroup(n:11)	12.45±12.28	49.80±9.16	29.05±12.76	0.003
CSS total				
In all patients (CRS)(n:25)	16.66±17.78	87.15±20.11	53.95±23.14	0.000
In CRSsNP subgroup(n:14)	18.67±15.73	83.00±17.42	53.95±22.87	0.001
In CRSwNP subgroup(n:11)	16.60±20.85	95.45±24.01	58.10±24.53	0.003

*At least 6 months after the operation, CSS: chronic sinusitis survey; CRS: chronic rhinosinusitis; CRSwNP: chronic rhinosinusitis with nasal polyposis; CRSsNP: chronic rhinosinusitis without nasal polyposis

including: polyps, discharge, edema, scarring, and crusting [10].

A total of 25 cases met the inclusion criteria and could be followed for at least 6 months. Patients were sub-grouped as chronic rhinosinusitis with nasal polyps (CRSwNP) (n.11) and chronic rhinosinusitis without nasal polyps (CRSsNP) (n:14). A single otolaryngologist performed all the ESS as defined by Messerklinger and Stammberger.

Two HRQoL surveys, the Rhinosinusitis Disability Index (RSDI) and the Chronic Sinusitis Survey (CSS) were used in this study. Patients were asked to complete each HRQoL instrument at both of the preoperative and at least the 6 month postoperative clinical visits. The RSDI contains 30

Table 2. RDSI scores for total CRS cases, CRSwNP and CRSsNP subgroups before and after the surgery

	Preoperative mean±SD	Postoperative* mean ±SD	Change mean ±SD	P value
RDSI physical subscale				
In all patients (CRS)(n:25)	27.00±7.61	9.00±8.94	-18.00±8.95	0.000
In CRSsNP group(n:14)	27.00±7.58	9.00±7.86	-18.00±8.39	0.001
In CRSwNP group(n:11)	27.00±7.96	8.00±10.01	-18.00±8.39	0.004
RDSI functional subscale				
In all patients (CRS)(n:25)	31.00±9.28	6.00±7.61	-22.00±8.67	0.000
In CRSsNP group(n:14)	31.00±8.26	6.00±6.45	-22.00±8.69	0.001
In CRSwNP group(n:11)	31.00±10.83	5.00±8.90	-22.00±8.92	0.003
RDSI total subscale				
In all patients (CRS)(n:25)	24.00±7.55	7.00±7.48	-17.00±6.56	0.000
In CRSsNP group(n:14)	21.00±6.65	6.00±5.65	-17.00±7.05	0.001
In CRSwNP group(n:11)	27.00±8.55	6.00±5.65	-20.00±7.45	0.003
RDSI emotional subscale				
In all patients (CRS)(n:25)	82.00±23.11	23.00±21.91	-18.00±8.95	0.000
In CRSsNP group(n:14)	76.50±21.43	20.50±18.07	-59.00±21.32	0.001
In CRSwNP group(n:11)	83.00±2584	23.00±25.57	-56.00±20.91	0.003

*At least 6 months after the operation, RDSI: Rhinosinusitis Disability Index CRS: chronic rhinosinusitis; CRSwNP: chronic rhinosinusitis with nasal polyposis; CRSsNP: chronic rhinosinusitis without nasal polyposis

Table 3. Endoscopic scores for total CRS cases, CRSwNP and CRSsNP subgroups before and after thesurgery

	Preoperative mean±SD	Postoperative* mean ±SD	Change mean ±SD	P value
Endoscopic scores				
In all patients (CRS)(n:25)	4.00±3.61	0.00±2.09	-4.00±1.52	0.000
In CRSsNP subgroup(n:14)	4.00±2.20	0.00±1.22	-4.00±2.55	0.001
In CRSwNP subgroup(n:11)	6.00±4.30	0.00±2.80	-6.00±3.16	0.003

*At least 6 months after the operation, CRS: chronic rhinosinusitis; CRSwNP: chronic rhinosinusitis with nasal polyposis; CRSsNP: chronic rhinosinusitis without nasal polyposis

questions (score range: 0-120) and consists of three subscales that measure disease-specific patient status in the physical, functional, and emotional domains. The physical subscale contains 11 questions (score range: 0-44), the functional subscale contains 9 questions (score range: 0-36), and the emotional subscale contains 10 questions (score range: 0-40). Lower RSDI total and subscale scores represent a lower impact of the sinus disease. The CSS is a six-item HRQoL monitor used to measure sinusitis-specific symptoms and medication use during the preceding 8-week period. The aggregate and subscale scores each range from 0 to 100 with lower scores representing a greater impact of sinus disease.

All analysis was performed using SPSS statistical software (version 16.0; SPSS Inc., Chicago, IL).

Results

The CSS symptom scores for total CRS cases and for CRSwNP and CRSsNP subgroups are shown in Table 1 before and after ESS. Statistically significant improvements were computed for the subgroups before and after surgery. ($p<0.05$) RSDI scores are shown in Table 2 for before and after ESS. Statistically significant improvements were found for the subgroups. ($p<0.05$)

Changes in endoscopic scores are shown in Table 3 before and after ESS. Statistically significant improvements were found for all cases and subgroups. ($p<0.05$)

The CRSsNP subgroup was compared to the CRSwNP subgroup regarding the survey scores that were applied before and after sinus surgery. Comparison of mean changes in survey scores between both subgroups are shown in Table 4. Statistical significant differences were not found between the subgroups. In Table 5, the mean change in endoscopic scores were compared to the mean change in HRQoL measures for all cases. No statistically significant correlation was found between these variables.

No major intraoperative or post-operative complications occurred in any cases.

Discussion

Sinusitis is one of the most common health problems around the world. The prevalence and incidence of this disease have recently been increasing [1]. The main goal in the treatment of a patient with CRS should be to decrease nasal blockage and nasal discharge complaints, which have a significant correlation with the life quality of the patient [11]. Objective and subjective methods can be used in the evaluation of treatment

Table 4. Comparison of mean change scores between both subgroups.

	Endoscopic Change mean	RSDI emotional change mean	RSDI functional change mean	RSDI physical change mean	RSDI total change mean	CSS total change mean	CSS medical change mean	CSS symptom change mean
Z =	-1,820	-0,414	-0,413	-0,441	-0,412	-0,914	-0,363	-0,330
P=	0,069	0,679	0,680	0,659	0,681	0,361	0,717	0,741

RDSI: Rhinosinusitis Disability Index; CSS: chronic sinusitis survey

Table 5. The comparison between endoscopic scores and HRQoL measures

		RSDI emotional change mean	RSDI functional change mean	RSDI physical change mean	RSDI total change mean	CSS symptom change mean	CSS medical change mean	CSS total change mean
Endoscopic Change mean	r=	-0,091	0,163	0,290	0.130	-0.218	-0.129	-0,215
	p=	0,666	0,436	0,380	0,534	0,296	0.539	0.302

HRQoL; Health related quality of life; RDSI: Rhinosinusitis Disability Index; CSS: chronic sinusitis survey

achievements. The objective methods are endoscopic scores, CT scores, rhinomanometry and acoustic rhinometry. The subjective methods are HRQoL and disease specific HRQoL [7]. Although medical and surgical reduction of polyps, discharge, edema and crusting significantly improves the inflammatory process and the corresponding endoscopy score, these improvements can explain only a small percentage of the association with patient based HRQoL and sinonasal symptom burden. These results are somewhat surprising since we intuitively expected that reducing mucosal inflammation, infection, and obstruction in the sinuses would result in a greater degree of improvement in the HRQoL domains. One plausible explanation is that disease-specific HRQoL is a complex, multidimensional construct that cannot be measured by endoscopic exams alone in this population [7].

A few previous studies have addressed consistent correlations between measures of endoscopic examination and survey responses in patients undergoing sinus surgery. However, the number of studies is not sufficient.

According to our study and also some analogous studies in the literature, ESS shows significant positive improvements in endoscopic and HRQoL scores for CRS patients. [12] This improvement was observed in both CRSwNP and CRSsNP subgroups. In our study, there were no significant differences between the success of ESS in CRSwNP and CRSsNP subgroups. Mehanna et al [13] reported that the greatest benefit was derived by patients undergoing surgery for polyps since nasal blockage and nasal discharge symptoms, which are more related to quality of life, recovered more dramatically after ESS. They also suggested that the subjective recovery of patients who had undergone anterior ethmoidectomy was greater than for patients who received a posterior ethmoidectomy. Co-existent asthma, allergic rhinitis or aspirin intolerance appeared not to result in a significant decrease in benefit after surgery, except in patients with non-polyp disease who also have both aspirin intolerance and asthma [13]. In the literature, one other study that was similar to our study was reported by Smith et al. [14]. They studied 119 patients and found that surgical management of CRS was associated with significant improvements in objective findings and quality of life measures, however, specific patient factors, in particular aspirin use and depression, predicted poorer outcomes.

Lund and Kennedy defended the use of objective materials for evaluation of patients. Kennedy followed up 120 patients for 18 months by endoscopic examination and surveys [15]. A significant improvement was determined in 85% of patients, whereas 2.5% of patients had regression. 49% of patients were observed to have residual disease endoscopically. Lund followed up patients by acoustic rhinometry and olfactrometry. Although subjective symptoms were significantly improved, acoustic rhinometry did not correlate with this improvement [16].

Senior et al [17] evaluated after 8 years 120 patients who had been included in the study by Kennedy in 1992. Results were obtained by questionnaires that were sent to the patients. They reported that 18% of patients had undergone revision surgery. In our study, the follow-up period was short so that patients could not be followed up for revision surgery.

Our study demonstrated that ESS has improvement effect on the quality of the life from the point of patient's perception. But this

improvement was not correlated significantly with Lund-Kennedy endoscopic scores. Similar to our results Wright and Agrawal [18] reported that there were not significant correlations between endoscopic scores and subjective measures. But, Mace et al [7] reported that there were statistically significant improvement between endoscopic score and all total and subscale HRQoL measures.

Toros et al [19] found a significant correlation between endoscopy score and total patient reported symptoms (on a visual analog scale: 0–10cm) preoperatively and 12 months postoperatively in 86 patients with and without polyps. Likewise, Giger et al [20] reported that the percentage of subjective symptom improvement correlated significantly with postoperative endoscopy findings in the ethmoidal cavities of 77 patients with CRS who did not have nasal polyposis.

Although the studies are similar, most of them used HRQoL surveys as clinical outcomes of interest in smaller populations with varied regard for nasal polyposis. However, they did not assess postoperative trends with the use of validated, disease-specific HRQoL survey instruments. In addition, Birch et al [21] reported finding a lack of correlation between endoscopy scores and selfrelated symptom scores or RSDI total scores in a nonsurgical population of 53 patients with CRS but without regard for polyp status. Although that study used a disease-specific HRQOL outcome measure, the study was limited to a cross sectional analysis of a smaller, non-surgical population.

Studies in literature supported that ESS for CRS patients who did not respond medical treatment has positive affect on quality of life. But controversial results that is 'the improvement in quality of life is not always correlated with improvement in the endoscopic scores' can be found in papers. That means; healing from the point of patient's perception may not be parallel to objective endoscopic scores. Technological development both in imaging modalities and ESC instruments will increase surgical success. But still diagnosis of depression, aspirin intolerance and maybe the polyposis can reduce success of ESS. In our study non-correlation between the objective endoscopic finding and disease-specific HRQoL outcome was a surprising result. Treatment of the endoscopic findings may not improve the quality of life. All of those similar and controversial results in literature may promote the researcher for further studies to find the answer of that question. As a physician, what do we focus on in the surgical treatment of CRS? Do we treat the patient complaints or findings on endoscopy and CT?

This study has the limitations of being a relatively small number of cases and short term follow–up. However, since we used HRQoL validated surveys instead of patient reported symptom scale to demonstrate the ESS on quality of the life, our results may be more reliable.

Conclusion

ESS improves the quality of life in patients with CRSwNP and CRSsNP. But the improvement may not be correlated with objective endoscopy scores.

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