Assessment of quality of life of patients with Chronic Rhinosinusitis in a short and long-term after sinus surgery

Original Article

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Article received on Setembro 11, 2021.
Accepted for publication on Abril 27, 2022.

Abstract

Objective: The purpose of this study was to assess the long-term quality of life after treatment with Functional Endoscopic Sinus Surgery (FESS) in patients with Chronic Rhinosinusitis (CRS) and possible existence of clinical features that could influence that result.
Methods: In this retrospective study, were included 75 patients with CRS submitted to FESS, between May of 2013 and October of 2014 at a tertiary otorhinolaryngology center in Lisbon. Quality-of-life (QOL) outcomes were evaluated by performing SNOT-22 preoperatively and in 2 postoperative different times (average 11.2 and 89.2 months respectively).
Patient and disease specific data that could influence quality of life were collected and statistical analysis was performed.
Results: There was an improvement in the SNOT-22 after surgical treatment both in the 1st ($\bar{x}$= 19,43; σ= 17,60) and 2nd ($\bar{x}$= 30,81; σ= 21,24) evaluation, compared to the preoperative period ($\bar{x}$= 58,24; σ= 19,32) ($p<0.001$).
A positive correlation was found between SNOT-22 (QOL) before surgery and their absolute short and long-term improvement ($p<0.05$).
Any patient and disease-specific data were not found to influence the long-term QOL in patients with CRS after surgical treatment with FESS.
Conclusion: Patients with a worse QOL and a high SNOT-22 result before surgery, will have better QOL in the long-term with CRS after FESS.

Keywords: Chronic rhinosinusitis; FESS; SNOT-22.

Introduction

Rhinosinusitis is a highly prevalent disease that affects approximately 10.9% of the population, according to the European Position Paper on Rhinosinusitis and Nasal Polyps 2020 (EPOS 2020). However, its prevalence varies considerably among countries, affecting approximately 19.2% of individuals in Portugal.[10] It has significant consequences for society, with some European studies indicating that

each patient spends about 2,500 euros per year on treatments.[13] Chronic rhinosinusitis (CRS), with or without nasal polyps, is defined as inflammation of the nasal mucosa and paranasal sinuses characterized by the presence of two or more symptoms, one of which should be nasal obstruction/congestion or anterior/posterior rhinorrhea; the remaining symptoms should be facial pain/pressure and hyposmia or anosmia for more than 12 weeks. The main nasal endoscopy findings are nasal polyps, mucopurulent secretions, and edema of the mucosa located in the medial meatus. Computed tomography of the paranasal sinuses (CT PNS) shows changes in the mucosa or in the ostiomeatal complex.[1]

The severity of any symptom may be partly determined by the extension of the disease. However, each patient has specific characteristics that, combined with other socioeconomic factors, are responsible for the range of severity of the disease, which is apparently similar considering objective criteria such as sex, ethnicity, age, and comorbidities.

Thus, discrepancies are often found between the scales of severity and radiological staging and/or symptom scores, hence the importance of using quality-of-life questionnaires to assess the impact of surgical treatment in sinonasal diseases.

Among the various available instruments and questionnaires, the 22-item Sinonasal Outcome Test (SNOT-22) is, according to EPOS 2020, the best at evaluating the quality of life of patients with CRS.[1] It is composed of 22 questions that aim to identify symptoms related to CRS. Each answer receives a score between 0 and 5, where 0 corresponds to the absence of the given condition and 5 corresponds to the worst possible situation. Thus, the higher the total score, the worse the quality of life.

SNOT-22 scores are classified into three degrees of severity: "mild" if the score is higher than 8 and lower or equal to 20, "moderate" if it is higher than 20 and lower or equal to 50, and "severe" if it is higher than 50.[1]

To complement the SNOT-22, observed changes can be quantified through imaging evaluation using CT PNS. The most frequently used scale is the Lund-Mackay scale, whose score is based on the degree of opacification of the maxillary, frontal, and sphenoid sinuses, the anterior and posterior ethmoid sinuses, and the ostiomeatal complex. Thus, three classifications (0 = none, 1 = partial, 2 = complete) may be attributed; in the case of the ostiomeatal complex, only the classifications "none" and "complete" (0 and 2, respectively) are attributed.

The main objective of this study was to evaluate the functional results in terms of the quality of life of patients with CRS submitted to endoscopic sinonasal surgery (ESS) to better understand the short- and long-term effects of surgery using the SNOT-22 and assess its relationship with the Lund-Mackay scale. Evaluations were performed preoperatively and in the short-term (mean ($\bar{x}$) 11.2 months) and long-term (mean ($\bar{x}$) 89.2 month) postoperative period.

We also set a secondary objective: to assess whether other characteristics influenced the long-term results, namely history of asthma, allergies, disease with nasal polyps, smoking habits, previous surgery, eosinophilia, and general demographic data.

Material and Methods

Cabral et al. (2015) 14 assessed the quality of life of patients submitted to ESS between May 2013 and October 2014 in the otorhinolaryngology department of a hospital in the Lisbon region. The SNOT-22 was administered before surgery and approximately one year afterward. The patients included in the study and the obtained results were reassessed 6–8 years after the surgery using the SNOT-22.

This was therefore a retrospective study that included all patients with a diagnosis of CRS (with and without polyps) submitted to surgical treatment via ESS within a period of 18 months between May 2013 and October 2014 in a tertiary hospital in the Lisbon region. The patients who did not consent to participate in

the study and those who were lost to follow-up were excluded. The final sample consisted of 75 patients who were followed until 2021.

Data regarding sex, history of asthma, allergies, nasal polyps, smoking habits, previous surgery, and eosinophilia were collected.

Fifty-nine patients CT PNS findings were evaluated, and the extension of the disease, per the imaging component, was analyzed using the Lund-Mackay classification.

The patients were assessed using the SNOT-22 questionnaire at three different times: first, in the preoperative period; then, approximately one year after the surgery (mean follow-up time of 11.2 months); and, lastly, in the second phase of the study, i.e., approximately seven years after the surgery (mean follow-up time of 89.2 months).

A statistical analysis of the variance in the patients' results across the three evaluations (T1 = preoperative, T2 = short term, and T3 = long term) was performed, and the relationships amongst them, namely T1–T2, T1–T3, and T2–T3, were analyzed using the Mann-Whitney test.

Lastly, to achieve the secondary objective, the influence of specific factors was evaluated at the three timepoints according to sex, asthma, allergies, disease with nasal polyps, smoking habits, previous surgery, and eosinophilia. More objectively, an evaluation of the statistically significant differences between the results of a group with a specific characteristic and a group without that characteristic was performed.

All these data were subjected to statistical analysis using IBM SPSS, version 26.

Non-parametric tests were used because the variables had a non-normal distribution. Specifically, Friedman's analysis of variance (ANOVA) was used to compare the means and distributions in paired samples in the three periods, and the Wilcoxon test was used to compare two periods only. Spearman's test was used to determine the correlations between the two scores. The Mann-Whitney test was used to determine statistically significant differences in the results of the SNOT-22 in the postoperative period between subgroups of patients with certain clinical characteristics.

Results

The frequency of a history of asthma, allergies, nasal polyps, smoking habits, previous surgery, and eosinophilia was determined in the sample of patients (Table 1).

According to the CT PNS of 59 patients, the extension of the disease per the imaging component was analyzed using the Lund-Mackay classification, and the data were statistically analyzed. The same statistical analysis was performed for the patients' age (Table 2).

The analysis of the results showed that $\bar{x}$ (mean) = 58 and mo(mode) = 43 for the SNOT-22 scores in the preoperative period and that $\bar{x}$ = 19 and mo = 8 for the SNOT-22 scores in the short-term postoperative period. The results of the SNOT-22 after the long-term follow-up were $\bar{x}$ = 31 and mo = 9 (Table 3).

A statistically significant improvement in the SNOT-22 scores was observed after the surgery. Although there was a slight worsening of the score in the long-term SNOT-22, the values remained lower than those observed before the surgery: preoperative SNOT-22 (mean rank: 2.80) > long-term postoperative SNOT-22 (mean rank: 1.87) > short-term

Table 1
Patients' characteristics (Frequency)

	Allergies	Asthma	Smoker	Eosinophilia	Polyposis	Previous surgery	Sex	
Yes	29 (39%)	53 (71%)	48 (64%)	6 (8%)	43 (57%)	66 (88%)	41 (55%)	Male
No	46 (61%)	22 (29%)	27 (36%)	69 (92%)	32 (43%)	9 (12%)	34 (45%)	Female
Total	75 (100%)							

Table 2
Patient-specific data (interval/ratio)
(Frequency and descriptive measures of central tendency)

	Age	Lund-Mackay classification
Total N	75	59
Mean	58	12
Mode	47	11[a]

[a] There are multiple modes. The selected value is the lowest.

Table 3
SNOT-22 results at the different follow-up times and absolute differences

	SNOT-22					
	Preoperative (T1)	Short term (T2)	Long term (T3)	T1–T2	T1–T3	T2–T3
Total	75					
Mean	58	19	31	+39	+27	-11
Mode[a]	43	8	9	+46	+20	-14

[a] There are multiple modes. The selected value is the lowest.

postoperative SNOT-22 (mean rank: 1.33) ($p < 0.001$). A statistically significant moderate positive correlation was found between the SNOT-22 score in the preoperative period and the absolute degree of improvement in the short- and long-term postoperative periods ($rs = 0.653$, $p < 0.001$; $rs = 0.486$, $p < 0.001$). Thus, patients with higher SNOT-22 scores before the surgery showed superior clinical improvement in the short- and long-term.

Additionally, there was a statistically significant positive correlation between the Lund-Mackay classification, with $\bar{x}= 12$ and mo = 11, and absolute improvement of the SNOT-22 score in the long-term follow-up, which did not exist in the first year after surgery ($rs = 0.281$, $p < 0.031$).

A statistically significant difference was found in absolute improvement of the SNOT-22 score between the short-term postoperative period (T2) and the long-term follow-up (T3) in the patients with asthma (mean rank: 25.59) and without asthma (mean rank: 43.15) ($p < 0.001$) (Table 4).

Lastly, there were no statistically significant differences in the sample's SNOT-22 scores regarding the remaining groups of specific clinical characteristics, including history of allergies, sinonasal polyposis, smoking habits, previous surgery, and eosinophilia (Table 4).

Discussion

In the study sample, the SNOT-22 scores improved significantly in the short-term postoperative period. Although the complaints worsened in the long term after the surgery, as evidenced by the poorer results for the long-term SNOT-22, these values remained below those obtained in the preoperative period.

In the present study, the scores obtained on the SNOT-22, a questionnaire used to assess the quality of life of patients with CRS, showed a statistically significant improvement after surgery, a result that is in line with the cited studies.[2,3]

The audit of sinonasal surgery conducted in United Kingdom was one of the first major studies to measure the efficacy of ESS. The study reported a statistically significant improvement in disease-specific quality of life, which persisted for a period of 5 years.[11] A more recent publication showed that quality-of-life improvement with ESS can last for over 10 years in patients receiving long-term monitoring.[12] In this context, it was deemed pertinent to evaluate the long-term surgical

Table 4
Differences in the subgroups of clinical characteristics according to the variance in the results of the preoperative SNOT-22 and the scores obtained in the two postoperative periods

		Clinical Characteristics								
		Allergies			Asthma			Smoker		
SNOT-22		N	Mean Rank	*p*	N	Mean Rank	*p*	N	Mean Rank	*p*
T1-T2	Yes	46	42,29	0,032	22	44,09	0,119	27	35,13	0,392
	No	29	31,19		53	35,47		48	39,61	
	T	75			75			75		
T1-T3	Yes	46	38,60	0,765	22	30,82	0,066	27	34,48	0,294
	No	29	37,05		53	40,98		48	39,98	
	T	75			75			75		
T2-T3	Yes	46	35,00	0,133	22	25,59	**0,001**	27	36,87	0,736
	No	29	42,76		53	43,15		48	38,64	
	T	75			75			75		

		Eosinophilia			Polyposis			Previous surgery		
		N	Mean Rank	*p*	N	Mean Rank	*p*	N	Mean Rank	*p*
T1-T2	Yes	69	37,96	0,961	32	38,91	0,756	9	32,39	0,41
	No	6	38,42		43	37,33		66	38,77	
	T	75			75			75		
T1-T3	Yes	69	37,58	0,571	32	36,83	0,688	9	29,61	0,218
	No	6	42,83		43	38,87		66	39,14	
	T	75			75			75		
T2-T3	Yes	69	37,20	0,283	32	35,41	0,374	9	29,33	0,203
	No	6	47,17		43	39,93		66	39,18	
	T	75			75			75		

T1 – pré-operatório; T2 – pós-operatório; T3 – Seguimento em longo prazo; T – Total; p - sig.

outcomes in our population. In our study, although these values did not remain as low as desired in the long term, the patients continued to have a better quality of life after the surgery. The procedure thus appears to be an adequate treatment for CRS, generating positive results in the long term. Accordingly, it was demonstrated that in patients with higher scores, that is, those with more complaints and a worse quality of life, clinical improvement lasted longer, as other authors have described.[3]

Also as expected, patients with more severe disease (i.e., with higher Lund-Mackay scores) exhibited a more significant long-term improvement in quality of life, which is considered a good indicator of disease severity and of surgical prognosis.[7] According to the EPOS 2020, the surgical indication for ESS in adult patients with CRS, with or without nasal polyps, should consider the Lund-Mackay score. Surgery should only be considered if the Lund-Mackay score is equal to or higher than 1 and if the SNOT- 22 score is equal to or higher than 20, after maximum optimization of the medical treatment.[1]

We hypothesize that asthma is a factor that promotes the worsening of quality of life in the long term because it creates an inflammatory environment conducive to a more relapsing course of CRS.

No statistically significant differences in quality of life were observed in any of the other subgroups, according to the potentially influential clinical characteristics, including history of allergies, sinonasal polyposis, smoking habits, previous surgeries, and eosinophilia. This suggests that these characteristics are correlated with a more severe disease but that none stands out individually as influencing long-term quality of life, which is in line with the findings of international studies.[9]

Although it was possible to evaluate the impact of ESS on the long-term treatment of CRS, the study had the following limitations: its retrospective nature, the fact that it was a single-center study, the limited patient sample, limited access to the relevant examinations (e.g., CT PNS), and the inclusion of patients in the same group despite the multiplicity of sinonasal involvement and the variety of surgical procedures within ESS.

Conclusion

This study concluded that although the surgical treatment of CRS is not curative, it has significant value in the improvement of patients' symptoms, even in the long term.

The preoperative SNOT-22 score may be used as a tool to predict the postoperative outcome because patients with more symptoms and thus a higher SNOT-22 score saw greater improvement in quality of life in the short and long term.

The Lund-Mackay score allows for the selection of patients who exhibit more extensive disease on imaging exams and, together with the SNOT-22, is an important instrument for the prediction and selection of patients for surgical treatment.

Acknowledgments

We thank the department of otorhinolaryngology of Egas Moniz Hospital for allowing us to conduct this study. We are particularly grateful to Dr. Filipe Correia who, although not an author, was very helpful in the preparation and structuring of the manuscript.

Conflicts of Interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

Data Confidentiality

The authors declare having followed the protocols in use at their working center regarding patients' data publication.

Protection of humans and animals

The authors declare that the procedures were followed according to the regulations established by the Clinical Research and Ethics Committee and to the 2013 Helsinki Declaration of the World Medical Association.

Funding Sources

This work did not receive any contribution, funding or scholarship.

Availability of scientific data

There are no datasets available, publicly related to this work.

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