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Effects of systemic steroids on life quality in sinonasal polyposis

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Abstract. *Effects of systemic steroids on life quailty in sinonasal polyposis*. *Objective*: To determine the effectiveness of short-term glucocorticoid therapy on nasal polyposis.
Methodology: A total of 60 patients with sinonasal polyposis were given oral glucocorticoid therapy (1 mg/kg) for 20 days. Patient symptoms were evaluated with the Sino-Nasal Outcome Test 20 (SNOT-20). Computerized tomography (CT) images of the paranasal sinus were acquired before and after treatment and were evaluated with the Kennedy scoring system.
Results: Evaluation of paranasal CTs showed complete disease resolution in 15 patients and partial disease resolution in 25 patients. Patients with complete and partial resolutions, based on CT images, exhibited significant decreases in disease stages. Statistical analysis revealed a significant change in the SNOT-20 results ($P<0.01$). There were no statistically significant differences among the evaluations based on the paranasal sinus CTs, the SNOT-20, and the SNOT-20 combined with a subjective selection of the five most disturbing symptoms (SNOT-20(+5)) ($P>0.05$).
Conclusion: The results showed a strong correlation between radiological changes and improvements in quality of life, assessed with the SNOT-20 or the SNOT-20(+5).

Introduction

The European Academy of Allergy and Clinical Immunology defines nasal polyposis (NP) as a specific form of chronic rhinosinusitis characterized by bilateral and multifocal polyps.[1] The incidence of NP has been increasing recently, and approximately 4% of the general population is currently affected.[1] Corticosteroids have been proven to be effective for treating NP symptoms, and this treatment may reduce local inflammation, one of the main underlying factors of nasal polyposis[2] Although topical steroids may reduce the polyp size,[3-5] relieve nasal symptoms,[6,7] and decrease the recurrence rate,[8,9] they are not effective in all patients. Therefore, systemic steroid therapy or surgical intervention is frequently required.[10] The aim of this study was to compare the radiological and subjective evaluations of short-term glucocorticoid therapy on NP.

Materials and methods

Patients

This study was approved by the Okmeydani Training and Research Hospital Ethics Committee. A total of 60 patients diagnosed with NP were included in the study. Patients were excluded when they had an allergy, asthma, aspirin intolerance, cystic fibrosis, ciliary dyskinesia, inverted papilloma, antrochoanal polyp, uncontrolled psychosis, hepatitis, shingles, or herpes virus infection. Allergy was analyzed with a skin prick test. The patients with negative test results were included in the study. In addition, patients were excluded when they had a peptic ulcer, steroid allergy, diabetes mellitus, or steroid treatment for a disease other than NP. All patients were treated and followed by the same physician; however, the CT evaluations were performed by other researchers.

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All patients underwent a proper otorhinolaryngologic examination, which included an endoscopic nasal examination. The diagnosis of NP was based on the presence of bilateral nasal polyps originating from the middle meatus and accompanied by chronic sinusitis.

CT evaluation

The Kennedy grading system was used to assess the extent of disease.[7] The stages were defined as follows: Stage 0, normal; Stage I, anatomical anomalies and all unilateral sinus diseases and bilateral diseases limited to the ethmoid sinus; Stage II, bilateral ethmoid sinus disease accompanied by one communicated sinus disease; Stage III, two or more ipsilateral communicated sinus diseases on both sides; and Stage IV, diffuse sinonasal polyposis.

Quality of life

The Sino-Nasal Outcome Test 20 (SNOT-20) was used for subjective evaluations. The SNOT-20 comprised 20 questions, each of which was scored on a scale from 0 and 5; a 0 score indicated no problem, and a 5 score indicated the worst symptoms. Patients were also asked to identify the five items (need to blow nose, sneezing, thick nasal discharge, postnasal drip, facial pain/pressure) that were the most disturbing (SNOT-5). The SNOT-20 was administered before and after treatment.

Treatment

All patients were administered 1 mg/kg oral methyl prednisolone once daily. This dose was continued for 5 days; then, it was tapered down for 15 days and terminated at 20 days. The paranasal sinus CT (PNCT), the SNOT-20, and the SNOT-20 plus the SNOT-5 (SNOT-20(+5)) tests were applied at the beginning and end of treatment. Results were compared statistically.

Statistical analysis

Statistical analyses were performed with the Number Cruncher Statistical System (NCSS) 2007 and Power Analysis and Sample Size (PASS) 2008 Statistical Software (UT, USA). The paired samples test and Wilcoxon's signed-rank test were used to assess the defining data and to compare the results from data acquired at the beginning and end of the study. The chi square test was used for normally distributed data. Significance was accepted at $P<0.05$ and $P<0.01$.

Results

Seventeen of 60 (27%) patients were female, and 43 of 60 (73%) were male. The mean age was 40.6±11.04 years, and the range was 17 to 80 years. All of the patients were treated for the first time.

CT results

The PNCT results are shown in Table 1. Figure 1. Kennedy staging revealed that 25% (n=15) of patients showed complete regression, 41.7% (n=25) showed partial regression, and 33.3% (n=20) showed no response. There was a statistically significant improvement in PNCT results after treatment ($P<0.01$). Complete or partial healing was assessed in 66.7% of patients.

Among patients that completely regressed, there was a statistically significant difference between the CT stages before and after treatment ($P<0.01$) (Table 2). Among patients that partially regressed, there was a highly significant improvement in the CT stage at the end of treatment ($P<0.01$) (Table 2). Among patients that did not respond to therapy, there was no statistically significant difference between the CT results before and after treatment ($P=1.000$; $P>0.05$) (Table 2). The mean CT stages of all patients before and after treatment were 3.43±0.65 and 1.98±1.44, respectively. The change in the mean stage before and after treatment was statistically significant ($P=0.001$)

SNOT-20 results

Completely regressed cases

The SNOT-20 results significantly changed after treatment ($P<0.01$) (Table 3, Figure 2). Comparison of SNOT-20 scores before and after treatment showed a 63.51% improvement at the end of the study.

Partially regressed cases

The SNOT-20 scores showed a significant decrease at the end of the treatment compared to those recorded before treatment ($P<0.01$) (Table 3, Figure 2). The improvement, based on the SNOT-20 scores, was 51.10%.

Table 1
Evaluations of paranasal sinus computed tomography (CT) images acquired before and after treatment

	Pre-treatment CT	Post-treatment CT				
		Stage 0 (n=15)	Stage 1 (n=7)	Stage 2 (n=12)	Stage 3 (n=16)	Stage 4 (n=10)
		n (%)	n (%)	n (%)	n (%)	n (%)
Complete regression	Stage 1 (n=0)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	Stage 2 (n=2)	2 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	Stage 3 (n=7)	7 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	Stage 4 (n=6)	6 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Partial regression	Stage 1 (n=0)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	Stage 2 (n=1)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	0 (0%)
	Stage 3 (n=9)	0 (0%)	3 (33,3%)	6 (66,7%)	0 (0%)	0 (0%)
	Stage 4 (n=15)	0 (0%)	3 (20,0%)	4 (26,7%)	8 (53,3%)	0 (0%)
No response to treatment	Stage 1 (n=0)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	Stage 2 (n=2)	0 (0%)	0 (0%)	2 (100%)	0 (0%)	0 (0%)
	Stage 3 (n=8)	0 (0%)	0 (0%)	0 (0%)	8 (100%)	0 (0%)
	Stage 4 (n=10)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	10 (100%)

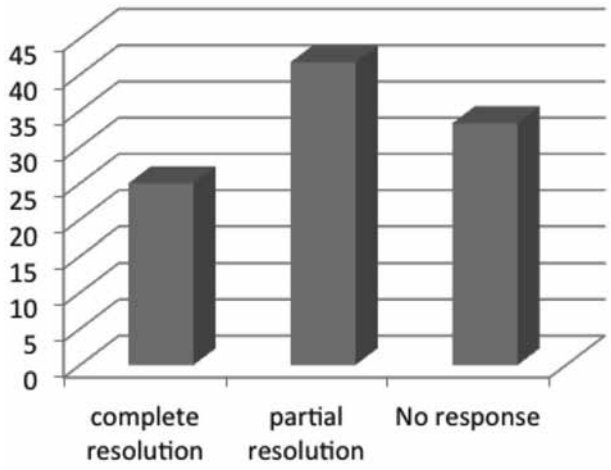

Figure 1
Computed tomography results

Cases with no response

The SNOT-20 scores showed a highly significant decrease at the end of the study compared to those at the start of the study ($P<0.01$) (Table 3, Figure 2). The rate of improvement in SNOT-20 scores was 35.78%.

SNOT-20(+5) results

Completely regressed cases

SNOT-5 scores significantly changed after treatment ($P<0.01$) (Table 4). There was a 55.74% improvement in the SNOT-20(+5) scores at the end of the treatment.

Partially regressed cases

SNOT-5 scores significantly changed after treatment ($P<0.01$) (Table 4). There was a 48.28% improvement in the SNOT-20 (+5) scores at the end of the treatment.

Cases with no response to treatment

SNOT-20 (+5) scores significantly changed after treatment ($P<0.01$) (Table 4). There was a 33.45% improvement in the SNOT-20 (+5) scores at the end of the treatment.

A comparison of the improvement rates based on the PNSCT and SNOT-20(+5) showed no significant difference between these evaluation methods ($P>0.05$). The CT and SNOT-20 (+5) improvement rates are given in Table 4. Similarly, there was no significant difference between the regression rates based on the PNSCT and SNOT-20 evaluations ($P>0.05$). The median rates based on the PNSCT and SNOT-20 scores are illustrated in Table 5.

Discussion

NP is a major health problem that affects the quality of life in both pediatric and adult patients. There is a continuing discussion about the treatment of

Table 2
Analysis of evaluations of computed tomography (CT) images acquired before and after treatment

	CT		*P*
	Pre-treatment	Post-treatment	
	Mean ± SD (Median)	Mean ± SD (Median)	
Complete regression (n = 15)	3.27 ± 0.65 (3,00)	0.00 ± 0.00 (0,00)	*0.001***
Partial regression (n = 25)	3.56 ± 0.58 (4,00)	2.04 ± 0.79 (2,00)	*0.001***
No response to treatment (n = 20)	3.40 ± 0.68 (3,50)	3.40 ± 0.68 (3,50)	*1.000*

Wilcoxon's signed-rank test.
***P* < 0.01.

Table 3
Sino-Nasal Outcome Test 20 (SNOT-20) test results

	SNOT-20 Scores		*P*
	Before treatment	After treatment	
	Mean ± SD (median)	Mean ± SD (median)	
Complete regression (n = 15)	14.80 ± 5.03 (14.00)	4.93 ± 3.03 (4.00)	*0.001***
Partial regression (n = 25)	18.40 ± 6.37 (21.00)	9.32 ± 5.10 (10.00)	*0.001***
No response to treatment (n = 20)	19.30 ± 6.09 (18.00)	12.80 ± 5.78 (12.00)	*0.001***

Paired-samples *t*-test.
***P* < 0.01.

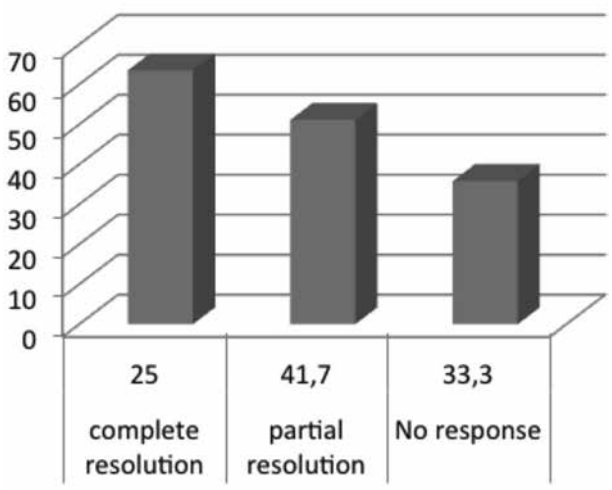

Figure 2
SNOT 20 improvement dependent on CT results

sinonasal polyposis, although different drugs have been used for its treatment. The mainstay treatment is a combined approach, which involves both medical and surgical treatments. Topical and systemic corticosteroids are the first choice. Surgery is the next choice in patients that do not respond to medical therapy or exhibit recurrent polyps. The aim of treatment is to reduce polyp size, eradicate polyps, when possible, and ameliorate symptoms (particularly nasal obstruction, hyposmia, and anosmia).[11-14] Corticosteroid therapy has achieved good results, based on both objective and subjective assessments.[3-6,15] Kirtsreesakul *et al*.[16] stated that earlier relief could be achieved with systemic treatment. Prokopakis *et al*.[17] also recommended systemic steroid treatment for nasal polyps.

The present study revealed that both CT and SNOT-20 scores improved in most patients, consistent with results from previous studies.

Although it is a common illness, sinonasal polyposis presents a number of diagnostic challenges to the practicing clinician.[18] Intranasal polyps can be assessed with nasal endoscopy, and various measurement techniques have been used to assess the results of treatment,[19] including objective (nasoendoscopy, CT, magnetic resonance) and subjective (SNOT and physician's assessment) methods.[8,9] Grading nasal polyps enables the physician to evaluate the response to treatment. Although different grading systems have been suggested, there is currently no consensus. Grading can be performed with nasal endoscopy or, when available, imaging methods, like CT and magnetic resonance imaging.[5-9] Quality of life can be assessed with questionnaire-based, visual analog scales for

Table 4

Results from the Sino-Nasal Outcome Test 20 plus the five most disturbing symptoms (SNOT-20(+5))

	SNOT-20 (+5) Scores		*P*
	Before treatment	After treatment	
	Mean ± SD (median)	Mean ± SD (median)	
Complete regression (n = 15)	12.00 ± 4.60 (10.00)	4.87 ± 2.90 (4.00)	*0.001***
Partial regression (n = 25)	16.16 ± 6.03 (18.00)	8.52 ± 5.03 (10.00)	*0.001***
No response to treatment (n = 20)	16.40 ± 5.86 (15.00)	11.10 ± 5.14 (10.00)	*0.001***

Paired-samples *t*-test.
***P* < 0.01.

Table 5

Cases with regression: evaluation of improvement rates after treatment compared with before treatment

Patients with regression (n = 60)	Change in percentage		*P*
	Min–Max	Median	
CT regression	0–100	33.33	*0.369*
SNOT-20 (+5) improvement	0–94.7	41.66	
CT regression	0–100	33.33	*0.072*
SNOT-20 improvement	12.5–85.7	46.03	

Wilcoxon Signed Ranks Test.

scoring symptoms and for subjective evaluations. The SNOT test is a patient-based, self-administered, multiple-choice questionnaire used for assessing quality of life in sinonasal disorders, including rhinosinusitis and NP. The SNOT-20, developed in 1998, was a modification of the 31-question Rhinosinusitis Outcome Measure (RSOM-31).[20] It is currently one of the most widely used quality of life instruments for sinonasal conditions.[19,21,22] The SNOT-20 is scored with a single summary score (0-5), with no domains or subscales.[23]

We found a correlation between the SNOT-20 assessment of the effectiveness of short-term steroid therapy for NP and the assessment based on CT results.

Some previous studies have concluded that there was a correlation between the improvement in quality of life and radiological evidence of sinonasal polyposis regression,[24] but others have suggested that no correlation existed.[8,9,24] Bhattacharya and Picirillo studied 586 patients and concluded that there was no correlation between SNOT-20 and Lund-Mackay scores.[10] Sewart *et al*.[9] compared the quality of life and radiological scores and found no correlation between them. Arrango and Kountakis[25] found that symptom scores were higher in patients with pathological findings that were confirmed with CT compared to other patients, and that this difference was statistically significant. Despite those findings, they found no correlation between the symptom scores and Lund-Mackay scores. We also found that patients with higher SNOT-20 scores showed more improvement than patients with lower scores. We suggest that patients with higher scores may have been more sensitive to changes in airflow than patients with lower scores.

Conclusion

Our data revealed that SNOT-20 scores were higher in patients with higher Kennedy grades than in patients with lower Kennedy grades. In addition, we confirmed a statistically significant correlation between quality of life, evaluated by the SNOT-20, and disease resolution, based on CT scores. Currently, the CT scan is not required in all cases for follow up. Based on our findings, CT scans should not be used for assessments of treatment response; this recommendation will avoid unnecessary radiation exposure and reduce the cost of treatment for both the patient and the insurance agency.

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