Is There a Change in the Preoperatively Repeated Lund–Mackay Computed Tomography Scores of Nasal Polyposis?

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Abstract

Objective: Nasal polyposis is a chronic inflammatory disease of the paranasal sinuses, for which the physiopathology is not fully understood. The aim of this study was to evaluate whether or not there was a change in the Lund–Mackay scores of computed tomography scans repeated preoperatively in patients with nasal polyposis.

Methods: The study included 34 patients diagnosed with nasal polyposis between January 2016 and July 2023 with an indication for endoscopic sinus surgery. Computed tomography (CT) scan slices at 3 mm intervals in axial and coronal planes of all the patients were examined. Nasal polyposis was evaluated with the Lund–Mackay CT score. Separate scores for the right and left side of the nose were calculated, as was the total score.

Results: As a result of the preoperative CT examinations, the mean time between the 2 CT scans was found to be 22.3 months. No statistically significant difference was determined in the Lund–Mackay CT scores of the first and second CT scans.

Conclusion: Based on the absence of difference in the preoperative CT scores of the patients with nasal polyposis, taking a second CT close to the time of surgery can be said to be unnecessary.

Keywords: Computed tomography, nasal polyp, Lund–Mackay, steroid

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INTRODUCTION

Nasal polyposis is a chronic inflammatory disease of the nasal and paranasal sinuses with a prevalence of 5%-12% in the general population.[1] The physiopathology of nasal polyps has not yet been fully understood. It has been suggested that many factors, such as atopy, chronic inflammation, vasomotor imbalance, Bernoulli phenomenon, aspirin intolerance, epithelial rupture, cystic fibrosis, and infection, have a role in the etiology of nasal polyps.[2]

Computed tomography (CT) is accepted as mandatory before sinus surgery for surgical planning. The CT scores are evaluated using the Lund–Mackay score in a relatively high rate of patients who undergo surgery.[3]

In a previous study related to the indications for sinus surgery, the sinus surgery indication was summarized as "If the patient has an appropriate history, appropriate physical examination findings, and appropriate CT findings, endoscopic sinus surgery is typically indicated and will be beneficial."[4] In the 25 years since this publication, very little has been done to develop this definition.[4]

The aim of this study was to evaluate whether it is necessary to repeat CT imaging when a CT scan has been taken at an earlier point and no surgical procedures have been performed in the intervening period.

METHODS

In accordance with the Helsinki II Declaration, approval for this study was granted by the Kahramanmaraş Sütçü İmam University Clinic Research Ethics Committee (Date: October 25, 2023, Number 22).

A retrospective examination was made of the medical records of 50 patients who were diagnosed with nasal polyposis between January 2020 and September 2023, with the indication for endoscopic sinus surgery (ESS) and repeated CT scans. Of these, 34 patients met the study criteria, and the repeated paranasal CT scans of these patients were compared with those taken during previous examinations. During these years, 300 patients were operated on with the diagnosis of nasal polyps. Patients were excluded from the study if they had a history of surgery or trauma, a history of cystic fibrosis, antrachoanal polyps, or were taking steroids.

Nasal polyposis was evaluated with the Lund–Mackay CT score.[3] All the CT scans were evaluated by a single radiologist (NY). The scores were calculated for the maxillary, anterior and posterior ethmoid, and frontal and sphenoid sinuses using a 3-stage scale (0: no abnormality, 1: partial opacification, 2: total opacification) and for the ostiomeatal complex using a 2-stage scale (0: no obstruction, 1: obstruction present). Both sides of the nose were evaluated separately to provide separate right- and left-side scores and a total score.

Computed Tomography Protocol

All the examinations were performed with the patient positioned supine and using a multidetector (320) 640-slice Toshiba CT device (Aquilion ONE Vision edition; Canon Medical Systems Corporation, Otowara, Japan). The imaging parameters were 120 kVp, 100 mAs, slice thickness: 0.5 mm, field of view: 250 mm, and imaging matrix: 512 × 512. The images were evaluated with reformatting in the axial, coronal, and sagittal planes on a workstation.

The CT scans taken because of nasal polyposis closest and furthest in time from the operation were evaluated. The first CT taken was labeled as the first CT, and the one taken before the operation was labeled as the second CT. The mean time between the scans was calculated. The differences between the 2 scans were evaluated.

Statistical Analysis

The data were analyzed with the Statistical Package for the Social Sciences Statistics version 22.0 software (IBM Corp.; Armonk, NY, USA). The continuous variables were given as mean ± standard deviation (SD), while the median (minimum and maximum values) and categorical variables were given as numbers and percentages. The materiality test of the difference between 2 averages was used in the comparisons of the independent group differences provided by the parametric test assumptions, while the independent samples *t* test was used in the comparisons of the independent group differences not provided by the parametric test assumptions. The Chi-square analysis was used in the comparisons of the categorical variables, while Spearman's correlation analysis was used in the examination of the relationship between the continuous variables.

Main Points

- *Nasal polyposis is a chronic inflammatory disease of the nasal and paranasal sinuses. Computed tomography (CT) is accepted as mandatory before sinus surgery for surgical planning.*
- *The aim of this study was to evaluate whether it is necessary to repeat CT imaging when a CT scan has been taken at an earlier point and no surgical procedures have been performed in the intervening period.*
- *Based on the absence of a difference in the preoperative CT scores of the patients with nasal polyposis, taking a second preoperative CT can be considered unnecessary.*

Table 1. Demographic Data

Age, mean ± SD		40.40 ± 14.78
Sex	Male n (%)	19.00 (63.33)
	Female n (%)	16.00 (36.67)
Time, median (Q1-Q3)		18.00(6.00-48.00)

Power analysis was used to determine the sample size of the study. Alpha = 0.05 at the first type error level, beta = 0.20 at the second type error level, and test power = 0.80. Since there is no reference study using paired *t* test in this field, N = 34 patients were planned to be included in the study with a medium effect size: 0.50.[5]

RESULTS

An evaluation was made of the CT scans of 34 patients who underwent endoscopic sinus surgery for a diagnosis of nasal polyposis. The patients comprised 19 (63.33%) males and 16 (36.67%) females. The time between the 2 CT scans was calculated as a mean of 18 months (range: 6-48 months) (Table 1).

A total of 300 patients were operated on with the diagnosis of nasal polyps. Of these, 50 (16.6%) had repeat CT scans, and 34 (11.33%) were included in the study.

The Lund–Mackay total nasal score was determined to be a mean of 19 (range: 14-22) for the first CT and 18 (range: 13-21) for the second CT.

When the sinuses were evaluated separately on the CT scans according to the Lund–Mackay score, the differences in the right anterior ethmoid scores and the right Lund–Mackay total score were evaluated as statistically significant ($P < .05$). When the general total scores were examined, no statistically significant difference was determined ($P > .05$) (Table 2).

DISCUSSION

Although non-contrast CT has been defined to date as the preferred imaging method in the diagnosis of chronic rhinosinusitis (CRS) according to the criteria of the American College of Radiologists, previous versions of the European Position Paper on Rhinosinusitis and Nasal Polyps (EPOS) and other guidelines have given no clear directions on the subject of timing.[6] European Position Paper on Rhinosinusitis and Nasal Polyps has stated that CT may or may not be performed as part of the diagnostic work-up for CRS patients, and CT performed when there is no concern about unusual situations such as mucocele on the first presentation of patients with the diagnosis confirmed by endoscopic findings can be postponed until the period in which surgery is planned.[7]

Computed tomography is mandatory in the preoperative period to both determine the presence and extent of the disease and to identify any characteristics that could create an anatomic predisposition to the risk of complications. Multiplanar images are necessary for the full evaluation of the anatomy. A series of systems have been developed to facilitate the systematic interpretation of preoperative CTs; the CLOSE system is widely used.[8]

If CT scans have been taken earlier and no surgical procedure has been performed in the intervening period, it may not be necessary to repeat the CT scan. To date, no study has evaluated this. Huang et al reported that in 56 patients, imaging was repeated before ESS at an interval of a

Table 2. Repeated Consecutive Computerized Tomography Lund–Mackay Scores of Patients

	1. Score	2. Score	*P*
Right frontal, Median (Q1-Q3)	2.00 (1.00-2.00)	2.00 (0.00-2.00)	.084
Left frontal, Median (Q1-Q3)	1.00(0.00-2.00)	1.00 (1.00-2.00)	.480
Right ant eth, Median (Q1-Q3)	2.00(1.00-2.00)	2.00 (1.00-2.00)	**.025***
Left ant eth, Median (Q1-Q3)	2.00(1.00-2.00)	1.00 (1.00-2.00)	257
Right post eth, Median (Q1-Q3)	2.00(1.00-2.00)	1.00 (1.00-2.00)	.180
Left post eth, Median (Q1-Q3)	2.00 (1.00-2.00)	1.50 (1.00-2.00)	.096
Right sfenoid, Median (Q1-Q3)	1.00 (1.00-2.00)	1.00 (1.00-2.00)	.096
Left sfenoid, Median (Q1-Q3)	1.00 (1.00-2.00)	1.00 (1.00-2.00)	.782
Right maxiller, Median (Q1-Q3)	1.00 (1.00-2.00)	1.00 (1.00-2.00)	1.000
Left maksiller, Median (Q1-Q3)	1.00 (1.00-2.00)	1.00 (1.00-2.00)	.414
Right OM, Median (Q1-Q3)	2.00 (2.00-2.00)	2.00 (2.00-2.00)	1.000
Left OM, Median (Q1-Q3)	2.00 (2.00-2.00)	2.00 (2.00-2.00)	.317
Right nasal score, Median (Q1-Q3)	10.00 (7.00-11.00)	9.00 (6.00-11.00)	**.006***
Left nasal score, Median (Q1-Q3)	9.50 (7.00-11.00)	9.00 (7.00-11.00)	.847
Total score, median (Q1-Q3)	19.00 (14.00-22.00)	18.00 (13.00-21.00)	.056

Wilcoxon test: α: 0.05.*The difference between the first measurement and the second measurement is significant.

median of 782 days. There was no significant difference in the radiological extent of the disease measured using the Lund–Mackay score, and the extent of the surgery was not changed by the repeat CT.[6]

In a prospective study that examined 3128 patients undergoing sinus surgery in 87 different hospitals, with respect to the surgery applied, LMS was found to be ≤4 in 35% of 393 CRS patients without nasal polyps and in 8% of CRS patients with nasal polyps.[9] There was determined to be a weak correlation between preoperative LMS and quality of life measurements, and evidence of at least some disease findings on CT was expected.[10]

There has been a rapid increase in the number of CT examinations, and as CT scans contain a much higher dose of radiation than plain radiographs, there has been seen to be a significant increase in the rate of the general population exposed to radiation. Epidemiological studies have shown that the radiation dose obtained from 2 or 3 CT scans leads to a determinable increase in the risk of cancer, especially in children. An article by Brenner[11] sheds light on the realities of exposure to this type of radiation.

Our study also showed that 16.6% of the patients who underwent surgery for nasal polyps had repeated CT scans. However, we would like to emphasize that 11.3% of these were completely unnecessary CT scans; this is the rate of radiation exposure to off-label patients.

The limitations of this study are that it was retrospective and cross-sectional. Longer-term evaluations of patients according to age groups would be able to provide more meaningful data.

The results of this study have highlighted that it is not necessary to repeat CT scans preoperatively in patients with nasal polyps.

CONCLUSION

Based on the absence of a difference in the preoperative CT scores of the patients with nasal polyposis, taking a second preoperative CT can be considered unnecessary.

Ethics Committee Approval: This study was approved by Kahramanmaraş Sütçü İmam University Clinic Research Ethics Committee University (Date: October 25, 2023, Number: 22).

Informed Consent: Informed consent was waived because of the retrospective nature of the study.

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