

EOSINOPHILS PROFILE AND LUND-MACKAY SCORE OF NASAL POLYPS IN ARIFIN ACHMAD HOSPITAL, RIAU PROVINCE

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Abstract:

Theories suggest that nasal polyps occur as a result of chronic inflammation of the nasal and sinus mucosa. Eosinophils are the main inflammatory cells found in nasal polyp tissue. The severity of nasal polyps can be seen from the CT Scan of the Paranasal Sinus (PNS) using the Lund-Mackay score. The purpose of this study was to determine the description of the eosinophil count of nasal polyp tissue and the Lund-Mackay score of CT Scan PNS of nasal polyps patients in Arifin Achmad Hospital, Riau Province. Examination of the eosinophil count was carried out microscopically using histopathological preparations of nasal polyp tissue with semiquantitative assessment, and Lund-Mackay score was assessed from the CT Scan of the PNS. From the 14 samples collected, there were 8 men (57.1%) more than 6 women (42.9%) with an average age of 30.43 ± 17.36 years old. Eosinophil counts were obtained in 5 (35,7%) samples 1/2+, 5 (35,7%) samples 1+, and negative in 4 samples (28,6%). While the Lund-Mackay score obtained an average value of 10.21 ± 6.87 with a low category in 11 (78.6%) and high in 3 (21.4%) samples. Patients with high Lund-Mackay scores tend to have higher eosinophil counts which reflect a more severe degree of disease severity in nasal polyps.

Keywords: Eosinophil; Lund-Mackay Score; Nasal polyp; Paranasal sinus

Introduction

Nasal polyps are soft masses that grow in the nasal cavity, clear white or grayish in color, shiny, soft because they contain a lot of fluid. This nasal polyp is one of the global health problems that can affect the quality of life of sufferers – Mangunkusuma et al. 2016.⁷

The pathophysiology of polyps is multifactorial such as infection, allergies, Bernoulli phenomenon, vasomotor imbalance, anatomic abnormalities and genetic abnormalities. Several theories suggest that nasal polyps result from chronic and recurrent inflammation of the nasal and sinus mucosa, with a characteristic presence of stromal edema, signs of inflammation and a variety of cell infiltrates. Nasal polyps are thought to have a predisposition to a type 1 hypersensitivity reaction. Therefore, symptoms of runny nasal secretions, mucosal edema, and an increase in eosinophils in nasal secretions were found – Mangunkusuma et al. 2016, Alsaleh et al. 2020.^{1,7}

The prevalence of nasal polyps in the world varies from 1-4%. Epidemiological studies in Indonesia show that the ratio of men and women is 2-3:1 with a prevalence of 0.2-4.3%. Sutrawati et al (2019) study in Sanglah Hospital found that the prevalence of nasal polyps was reported to be 1-4% of the population with a peak incidence of 40-60 years. More often in men, namely 21 people (53.8%). Nasal congestion was the main complaint most often felt by 31 people (79.5%). The duration of the complaint was felt around 1-3 years (56.4%) before treatment. A total of 21 people (53.8%) had a history of atopy, of which 20 people (51.3%) had a positive skin prick test result. Rhinosinusitis was the most common

comorbidity experienced by 24 patients (61.5%).¹⁰

Computed-Tomography (CT) Scan of the paranasal sinuses (PNS) is the supporting investigation of choice for the radiological diagnosis of rhinosinusitis with and without nasal polyps. Advantages of this CT scan can evaluate the nasal cavity, osteomeatal complex, paranasal sinuses and can show the extent and complications of disease. Lund and Mackay have developed a system based on scores from the CT scan of the PNS to assess the quantification of the inflammatory process in the paranasal sinuses before surgery. This system was selected by the Chronic Rhinosinusitis (CRS) Task Force of the American Academy of Otolaryngology-Head and Neck Surgery (AAO-HNS) for use in various studies because of its easy and clear assessment so that it can be used without the need for special radiological training. In the Lund-Mackay system, each sinus (maxillary, anterior ethmoid, posterior ethmoid, sphenoid and frontal) is scored between 0 and 2 (0: no abnormality; 1: partial opacification; 2: total opacification). The ostio-meatal complex was scored as 0 (no obstruction) or 2 (obstruction). The total possible score is 0 – 24 and each side if assessed separately the score is 0-12 – Lund 1993 dan Lund 1997.^{5,6}

Some studies have shown an association between mucosal eosinophilia and disease severity, but there are also studies that suggest otherwise. Aslan et al (2017) found that the mean Lund-Mackay score and Lund-Kennedy endoscopy score were higher in patients with high mucosal eosinophil counts than those with low eosinophil counts.² Virkkula et al (2020) found that eosinophilic polyps were significantly associated with endoscopic sinus surgery rates ($p < 0.001$), whereas peripheral blood eosinophil counts,

Lund-Mackay scores and endoscopic scores were not associated with endoscopic sinus surgery.¹²

Research Method

This type of research is descriptive with a cross-sectional study approach. The study was carried out from June to October 2021 in the ENT (Ear Nose and Throat) polyclinic Arifin Achmad Hospital, Riau Province. The research received ethical clearance from the committee to review the ethics of the Faculty of Medicine, University of Riau. The sample was all nasal polyps patients who went to the ENT polyclinic of Arifin Achmad Hospital during the study period.

Eosinophil Count

Examination of the eosinophil count using histopathological preparations of nasal polyp tissue using Hematoxylin – Eosin (HE) staining. The assessment was carried out by counting eosinophils under a microscope in 10 fields of view using a semiquantitative score, namely: 1/2+ if eosinophils were obtained (0.1 – 1.0 cells/LPB); 1+ (1.1 – 5.0 cells/LPB); 2+ (6.0 – 15.0 cells/LPB); 3+ (16.0 – 20.0 cells/LPB); 4+ (> 20 cells/LPB) – Meltzer et al.1991.⁸

Lund-Mackay CT Scan Score

Nasal polyp staging was based on the Lund-Mackay score assessed from the CT

Scan of the PNS. Every sinus (maxilla, anterior ethmoid, posterior ethmoid, sphenoid and frontal) were scored between 0 and 2 (0: no abnormality; 1: partial opacification; 2: total opacification). The ostiomeatal complex was scored as 0 (no obstruction) or 2 (obstruction). The scores are then summed. The total possible score is 0 – 24 - Lund 1993 dan Lund 1997.^{5,6}

Furthermore, the Lund-Mackay score is categorized as low if the value is < 15, high if the value is ≥15 – Tao et al.2018.¹¹

Data Analysis

The data obtained were processed and analyzed by univariate analysis and presented in the form of narratives and frequency distribution tables.

Results

Sample characteristic

This study obtained a sample of 14 people with an age range of 10 - 63 years with an average age of 30.43 ± 17.36 years, and the male gender (57.1%) is more than female (42.9%).

Eosinophil Count

The results of the eosinophil count of nasal polyp tissue can be seen in table 1.

Table 1 Frequency distribution of semiquantitative eosinophil counts of nasal polyps in Arifin Achmad Hospital

Eosinophil count	n	%
negative	4	28,6
½ +	5	35,7
1 +	5	35,7
2+	0	0
3+	0	0
4+	0	0

Jumlah	14	100
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It can be seen from table 1 that in 5 people (35.7%) the eosinophil count value was 1/2+, the value 1+ in 5 people (35.7%), negative in 4 people (28.6%) and none of samples with eosinophil counts of 2+, 3+ and 4+ were obtained.

Lund-Mackay Score

From 14 PNS CT Scans assessed by the Lund-Mackay score, the lowest score was 2 and

the highest score was 24 with an average score is 10.21 ± 6.87 . By category, the Lund-Mackay score can be seen from table 2 below:

Table 2. Frequency distribution of Lund-Mackay scores of nasal polyps patients in Arifin Achmad Hospital

Lund-Mackay Score	n	%
Low	11	78,6
High	3	21,4
Total	14	100

Based on table 2, it can be seen that most of the patients (78.6%) had low Lund-Mackay scores (11 samples) and 3 (21.4%) had high Lund-Mackay scores.

Discussion

The pathophysiology of chronic rhinosinusitis and nasal polyps remains unclear, however, it has been reported that

eosinophil inflammation plays an important role. Histological studies showed high levels of eosinophils in nasal polyp tissue. In this study, we got 5 people (35.7%) with an eosinophil count value of 1/2+, and 5 people (35.7%) with a value of 1+. The value of 1/2+ indicates 0.1 – 1.0 cells/LPB, 1+ indicates 1.1 – 5.0 cells/LPB. This is relatively low compared to the results obtained by several

other studies. Aslan et al (2017) found 62.3% of nasal polyps patients with high mucosal eosinophilia (eosinophil count > 10/LPB).²

Although allergy is considered a cause of nasal polyps, other studies have shown the opposite hypothesis, where nasal polyps was found more common in non-atopic than in atopic patients and positive skin test results are less common in nasal polyps than in the general population – Mygind et al.2000.⁹

Steroid therapy and endoscopic sinus surgery are common treatments for nasal polyps. Steroids can reduce symptoms by decreasing the production and expression of cytokines such as interleukin-5 (IL-5), which can reduce eosinophil counts. Previous use of steroids in patients before surgery may result in low eosinophil counts – Mygind et al.2000.⁹

Although tissue eosinophilia is found in the majority of nasal polyps patients, it seems to be more common in western countries than in eastern countries. However, how to calculate tissue eosinophilia and what the appropriate upper limit value is still under debate. There are many studies using different methods and limit values. The boundary value of eosinophils as a diagnostic criterion in nasal polyps needs to take into account geographic and ethnic differences – Lou et al.2018.⁴

The supporting investigation of choice for chronic rhinosinusitis with nasal polyps is a CT scan. Many clinicians use CT scans to confirm the diagnosis, assess the severity of the disease and to decide on treatment options. The Lund-Mackay system is a simple method for assessing disease severity and selecting therapy – Lund et al.1993.⁵

In this study, the average Lund-Mackay score was 10.21 ± 6.87 . This is similar to that found by Aslan et al.2017,² who obtained a mean Lund-Mackay score for patients was 10.7 ± 1.1 . Likewise with our study previously on chronic rhinosinusitis with and without polyps in M.Djamil Hospital, the Lund-Mackay score on average was 10.35 ± 4.99 - Yolazenia et al.2017.¹⁴

Based on categories, most of the patients, namely 11 (78.6%) had low Lund-Mackay scores and 3 (21.4%) had high Lund-Mackay scores. This categorization is based on the study of Tao et al (2018) in China who suggested the limit value in patients with uncontrolled rhinosinusitis describing a higher degree of severity was the Lund-Mackay score 15. Patients with high Lund-Mackay scores tend to have a poorer prognosis.¹¹

Aslan et al (2017) found the mean score of CT-Scan Lund-Mackay and Lund-Kennedy endoscopy scores were significantly higher in

patients with high mucosal eosinophil counts compared with low eosinophil counts.² Kim et al (2019) found that age, Lund-Mackay CT Scan score, and tissue eosinophil count were associated with disease control status.³ Yildirim et al (2020) also found significantly higher Lund-Mackay scores in patients with high tissue eosinophil levels.¹³ Meanwhile, Virkkula et al (2020) found that eosinophilic polyps were significantly associated with endoscopic sinus surgery but not with the Lund-Mackay score.¹² In this study, we found that patients with higher Lund-Mackay scores tended to have a higher eosinophil count too, but we could not perform statistical tests considering the small number of samples.

Conclusions

Eosinophil count values in nasal polyps patients in Arifin Achmad Hospital obtained the same 1/2+ and 1+ values. Most of the patients had low Lund-Mackay scores with a mean Lund-Mackay score of 10.21 ± 6.87 .

Further research is needed to see the relationship between the eosinophil count and the severity of the disease as seen from the Lund-Mackay score with a larger number of samples.

Acknowledgements

The authors would like to thank to the nasal polyps patients, the leader, medical records, ENT polyclinic, and Anatomical Pathology staffs of Arifin Achmad Hospital, Riau province for their permission and assistance in collecting research data. Thanks also to the Faculty of Medicine, University of Riau for facilitating the use of the laboratory and funding this research.

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