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Research

Differences in Post-Operative Complaints between Patients with and without Anatomical Variations of Ostiomeatal Complex Based on CT Scan of Chronic Rhinosinusitis at Dr. Moewardi Hospital

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ABSTRACT

Background: The ostiomeatal complex has various anomalous variants that can vary in type and number for each person. These anomalies can contribute to the development of chronic rhinosinusitis and the accompanying symptoms. This study aims to determine the differences in post-treatment complaints between patients with and without anatomical variations of the ostiomeatal complex in chronic rhinosinusitis at RSUD Dr. Moewardi.
Subjects and Method: A cross-sectional study was conducted in Dr. Moewardi hospital, Surakarta. A sample of 30 of chronic rhinosinusitis patients who were subjected to a CT scan in the radiology department and surgery by an ENT-KL specialist at Dr. Moewardi, from January 2019 to June 2020, was selected for this study. The study variables were anatomical variations of ostimeatal complex and post-operative complaints. Difference of post-operative complaints between chronic rhinosinusitis patients with and without anatomical variations of ostiomeatal complex were described in frequency (n) and percent (%).
Results: This study indicated that there is no difference in post-operative complaints between patients with and without anatomical variations of the ostiomeatal complex based on CT Scan of chronic rhinosinusitis (p= 0.856).
Conclusion: There is no difference in post-operative complaints between patients with and without anatomical variations of the ostiomeatal complex based on CT Scans of chronic rhinosinusitis.

Keywords: ostiomeatal complex, CT scan, post-operative complaints

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BACKGROUND

Chronic rhinosinusitis is an inflammation of the paranasal sinuses and often causes chronic sinonasal symptoms, such as facial pain, hyposmia/anosmia, rhinorrhea, and nasal obstruction (Aramani, 2014). Chronic rhinosinusitis is a common disease throughout the world with an estimated global prevalence of 10-15% (Bartosik et al., 2021). A study in Indonesia conducted by the sub-division of Rhinology, Department of ENT-KL FK-UI-RSCM revealed that 50% of patients in 1996 came with complaints of chronic rhinosinusitis (DeConde and Soler, 2016). Although the mortality rate due to chronic rhinosinusitis is low, this disease has the risk of reducing the quality of life of the patients (Gliklich and Metson, 1995; Halawi et al., 2013). Decreased sleep quality, fatigue, cognitive dysfunction, and

socioeconomic problems due to complaints and therapy may reduce the quality of life of patients with chronic rhinosinusitis (Halawi, Smith and Chandra, 2013).

The ostiomeatal complex is a small compartment located between the medial turbinate and the lateral wall of the nasal cavity at the medium meatus. It represents the drainage area for the anterior, maxillary, and frontal ethmoid sinuses (Juan et al., 2017). Obstruction of the ostiomeatal complex is one of the causes of chronic rhinosinusitis through mucosal congestion which then reduces airflow in the nose causing a further obstruction (Juan et al., 2017; Kurniasih and Ratnawati, 2019). The ostiomeatal complex has various variants of anomalies that can differ in type and number in each person (Kurniasih and Ratnawati, 2019). Those anomalies can contribute to the emergence of chronic rhinosinusitis and its symptoms (Lal et al., 2016; Juan et al., 2017). Computed tomography (CT) scan is the main diagnostic modality to check the anatomical variations of the ostiomeatal complex in patients with chronic rhinosinusitis (Juan et al., 2017).

Management of chronic rhinosinusitis can be performed through medicamentosa and surgery. Medicamentosa management is the main option, while surgery is an alternative if the medicamentosa fails. Endoscopic surgery is the latest surgical procedure to repair obstruction in the ostiomeatal complex that commonly occurs due to anatomical variations (Juan et al., 2017). Anatomical variations of the ostiomeatal complex are assumed related to complaints before surgery (Lal et al., 2016). However, this assumption is still controversial due to the lack of relevant studies. This study aims to identify the differences in post-operative complaints between patients with and without anatomical variations of ostiomeatal complex based on CT scan images of chronic rhinosinusitis at Dr. Moewardi.

SUBJECTS AND METHOD

1. Study design

This analytic observational quantitative study used a cross-sectional design. It was conducted in the Department of Radiology at Dr. Moewardi for three months from October to December 2020.

2. Population and sample

This study involved 30 subjects selected using a consecutive sampling technique. The inclusion criteria were adult patients (> 18 years), diagnosed with chronic rhinosinusitis by ENT-KL Specialist at Dr. Moewardi based on the 2020 EPOS guidelines, has undergone a CT-Scan examination to check the anatomical variations of the ostiomeatal complex, and has undergone surgical therapy for chronic rhinosinusitis at Dr. Moewardi Surakarta. The exclusion criteria were chronic rhinosinusitis caused by trauma, tumors, and congenital abnormalities.

3. Study variables

The study variables were anatomical variations of ostimeatal complex and post-operative complaints.

4. Data analysis

This study used the radiological modality of CT Scan Toshiba 64 slice with the multi-slice CT technique (MSCT) of the paranasal sinuses without contrast. The statistical analysis used SPSS version 25.0 software. The association between variables in this study was analyzed using a linear-by linear association test with $p < 0.05$ for statistical significance.

5. Research ethics

This research has been approved by the Ethics Committee of the Faculty of Medicine, Universitas Negeri Sebelas Maret and Dr. Moewardi.

RESULTS

As stated previously, this study involved 30 subjects with chronic rhinosinusitis. The characteristics of the subject are presented in Table 1. Mean of the study subjects was 42 years (Mean= 42.1; SD= 15.23). The subject consisted of 14 (46.7%) male patients and 16 (53.3%) female patients. Based on CT-Scan examination, anatomical variations of the ostiomeatal complex were found in 15 (50%) subjects with chronic rhinosinusitis consisting of 8 (26.7%) subjects with concha bullosa, 1 (3.3%) subjects with agger nasi, 2 (6.7%) subjects with deviated prosesus unsinatus, 2 (6.7%) subjects with bullosa prosesus unsinatus, 5 (16.7%) subjects with haller cells, and 1 (3.3%) subjects with interlamellar cell.

A. Characteristics of Samples

Table 1. Characteristics of Samples

Variable	Total (n)	Percentage (%)
Demography		
Gender		
Male	14	46.7
Female	16	53.3
Anatomy of the ostiomeatal complex		
With	15	50.0
Without	15	50.0
Anatomical variations of the ostiomeatal complex		
Concha bullosa media	8	26.7
Agger nasi	1	3.3
Deviated prosesus unsinatus	2	6.7
Bullosa prosesus unsinatus	2	6.7
Haller Cell	5	16.7
Intralamellar Cell	1	3.3

Before the treatment, the complaint of patients with anatomical variations of the ostiomeatal complex covers nasal congestion (14 subjects or 93.3%), rhinorrhea and post nasal drip (10 subjects or 66.7%), facial pain (5 subjects of 33.3%), olfactory disorders (5 subjects or 33.3%), and sleep disorders (4 subjects or 26.7%) (Table 2).

Before the treatment, the complaint of patients without anatomical variations of the ostiomeatal complex covers nasal congestion (15 subjects of 100.0%), rhinorrhea and post nasal drip (10 subjects or 66.7%) facial pain (3 subjects or 20.0%), olfactory disorders (4 subjects or 26.7%) subjects, and sleep disorders (3 subjects or 20.0%) (Table 2).

After the treatment, patients with anatomical variations of the ostiomeatal complex covers nasal congestion (3 subjects or 20.0%), rhinorrhea and post nasal drip (6 subjects or 40.0%), facial pain (1 subject or 6.7%), olfactory disorders (1 subject or 6.7%), and sleep order (0 subject).

After the treatment, patients without anatomical variations of the ostiomeatal complex covers nasal congestion (4 subjects or 26.7%), rhinorrhea and post nasal drip (5 subjects or 33.3%), facial pain (3 subjects or 20.0%), olfactory disorders (1 subject or 6.7%), and sleep order (1 subject or 6.7%) (Table 2).

Table 2. Characteristics of Antomical Variations of Ostiomeatal Complex based on Complaints

Variable	With Anatomical Variations of Ostiomeatal Complex		Without Variations of Ostimeatal Complex	
	Total	Percentage (%)	Total	Percentage (%)
Pre-operative Complaints				
Nasal congestion	14	93.3	15	100.0
Rhinorrhea/post nasal drip	10	66.7	10	66.7
Facial pain	5	33.3	3	20.0
Olfactory disorders	5	33.3	4	26.7
Sleep disorder	4	26.7	3	20.0
Post-operative Complaints				
Nasal congestion	3	20.0	4	26.7
Rhinorrhea/post nasal drip	6	40.0	5	33.3
Facial pain	1	6.7	3	20.0
Olfactory disorders	1	6.7	1	6.7
Sleep disorder	0	0.0	1	6.7

Based on the EPOS 2020, there are pre-operative complaints of patients with anatomical variations of the ostiomeatal complex including controlled subjects (0%), partially controlled subjects (60.0%), and uncontrolled subjects (40.0%). However, patients without anatomical variations of the ostiomeatal complex cover controlled subjects (0%), partially controlled subjects (66.7%), and uncontrolled subjects (33.3%) (Table 3).

Based on the EPOS 2020, there are post-operative complaints of patients with anatomical variations of the ostiomeatal complex including controlled subjects (53.3%), partially controlled subjects (33.3%), and uncontrolled subjects (13.3%). However, for patients without anatomical variations of the ostiomeatal complex cover controlled subjects (53.3%), partially controlled subjects (26.7%), and uncontrolled subjects (20.0%) (Table 3).

Table 3. Characteristics of Complaints based on the Presence and Absence of Anatomical Variation of Ostiomeatal Complex According to EPOS 2020

Variable	With Anatomical Variations of Ostiomeatal Complex		Without Variations of Ostimeatal Complex	
	Total	Percentage (%)	Total	Percentage (%)
Pre-operative complaint control				
Controlled	0	0.0	0	0.0
Partially controlled	9	60.0	10	66.7
Uncontrolled	6	40.0	5	33.3
Post-operative commplaint control				
Controlled	8	53.3	8	53.3
Partially controlled	5	33.3	4	26.7
Uncontrolled	2	13.3	3	20.0
Change in Post-operative Status Control				
Improve	10	66.7	9	60.0
Not improve	5	33.3	6	40.0

Patients with anatomical variations of the ostiomeatal complex, changes in control status based on post-operative complaints showed 10 subjects (66.7%) with improvement and 5 subjects (33.3%) without improvement. On the other hand, for patients without anatomical variations of the ostiomeatal complex, changes in control status based on post-operative complaints showed 9 subjects (60.0%) with improvement and 6 subjects (40.0%) without improvement.

Based on the analysis of the post-treatment complaint control, there is no difference in complaints between patients of rhinosinusitis chronic with and without anatomical variations of the ostiomeatal complex (p=0.856; R^2<0.001) (table 4).

Table 4. Differences in post-treatment complaints between patients with and without anatomical variations of the ostiomeatal complex

Post-operative Complaints	Anatomical Variation of the Ostiomeatal Complex		p
	With	Without	
Uncontrolled	2	3	0.856
Partially controlled	5	4	
Controlled	8	8	

DISCUSSION

Chronic rhinosinusitis includes varied inflammatory reactions and infectious diseases occurred in the nose and paranasal sinuses. Chronic rhinosinusitis is a disease widely found throughout the world with a global prevalence of 10-15% and includes 50% of patients visiting the sub-division of Rhinology, ENT-KL, Department FKUI-RSCM (DeConde and Soler, 2016; Bartosik et al., 2021). It is a risky disease and disturbs the quality of life of the sufferer, even though the mortality rate is very low (Gliklich and Metson, 1995; Halawi, Smith and Chandra, 2013). The quality of life of the patient highly depends on various factors, ranging from etiology, pathology, clinical manifestations, severity, and clinical prognosis (Mahdavinia and Grammer, 2013).

The anatomical variation of the ostiomeatal complex is one of the factor that contributes to the symptoms accompanying chronic rhinosinusitis, even after the treatment. Therefore, this study aims to identify whether the anatomical variation of the ostiomeatal complex based on CT-scan results can affect the post-treatment complaints of chronic rhinosinusitis patients.

The results of this study showed that the ratio of male and female patients with chronic rhinosinusitis was almost the same (46.7% versus 53.3%). A study showed that there was no significant gender difference in chronic rhinosinusitis patients, including those who would undergo endoscopic sinus surgery (Lal et al., 2016). Another study by Bartosik showed that there was no difference in incidence between genders in chronic rhinosinusitis patients (Bartosik et al., 2021).

Further, the result showed that the mean age of chronic rhinosinusitis patients was 42.1 years (Mean= 42.1; SD= 15.2). A study by Xu revealed no difference in the incidence of chronic rhinosinusitis by age (Xu et al., 2016). Another study by Mahdavinia revealed that chronic rhinosinusitis is a disease that can be found at almost all ages, without any significant difference (Mahdavinia and Grammer, 2013).

This study showed that there are 50% of chronic rhinosinusitis patients with anatomical variations of the ostiomeatal complex. A study conducted by Neto revealed that the anatomical variation of the ostiomeatal complex has an incidence of 65% in chronic rhinosinusitis patients (Araújo et al., 2006). A study by Aramani found that there were 87% of chronic rhinosinusitis patients with anatomical variations of the ostiomeatal complex (Aramani, 2014). The results of this study indicate a relatively lower number compared to other studies which may be due to differences in racial and genetic factors between countries.

The results of this study indicate that the highest anatomical variation of the ostiomeatal complex is the concha bullosa with a total of 53.4% of all chronic rhinosinusitis patients with anatomical variations of the ostiomeatal complex. Then, it is followed by Haller Cells of 33.3%, deviated septum and prosesus unsinatus of 13.3% of each, and agger nasi as well as intralamellar cell of 6.7% of each. A study by Bandyopadhyay (2015) found that the prevalence of anatomical variations of the ostiomeatal complex in patients with chronic rhinosinusitis is concha bullosa (15.9%), paradoxical conchae medial (11.36%), Haller cell (27.3%), and agger nasi cell (18.2%).

A study by Riello revealed that there were 2 or more anathomical variations of the ostiomeatal complex in 83.5% of patients with chronic rhinosinusitis (Riello and Boasquevisque, 2008). The highest is middle turbinate (84%) and nasal septum (34%) (Kurniasih and Ratnawati, 2019). A study by Aramani et al (2016) stated that 53.7% of patients with chronic rhinosinusitis have two or more anatomical variations of the ostiomeatal complex, while 33.3% of patients have one anatomical variation of the ostiomeatal complex (Aramani, 2014).

The results of this study indicate that there is no difference in complaints between chronic rhinosinusitis patients with and without anatomical variations of the ostiomeatal complex. Surgery is the main choice for patients with drug-refractory chronic rhinosinusitis. This procedure has an important role, especially in the management of patients with anatomical variation of the ostiomeatal complexes. Through surgery, the anatomical variations of the ostiomeatal complex can be stabilized and restored by creating ventilation and drainage channels for the paranasal sinuses that can return the normal function of the nasal mucosa (Mahdavinia and Grammer, 2013). Theoretically, it is difficult to predict whether the complaints of chronic rhinosinusitis patients will improve after treatment (Tan et al., 2013). A study by Venkateswaran showed that improvement in complaints reaches 96% of chronic rhinosinusitis patients with anatomical variations of the ostiomeatal complex (Venkateswaran, Muthukumar and Anandan, 2017).

The limitation of this study is the cross-sectional design which makes the association analysis can only be done at one time. The likelihood of controlled or uncontrolled complaints at some post-operative periods could not be analyzed. The number of subjects and the time of the study is thought to be related to insignificant findings in this study. Increasing the number of subjects will increase the power of the study which in turn will increase the probability of the significance in the association analysis. The presence of uncontrolled confounding factors such as sociodemographics and comorbidities cause the results obtained to potentially have bias.

AUTHOR CONTRIBUTION

Prasetyo Sarwono Putro, Yudo Duswanto, and Hari Wujoso, collected the data, measured the post-operative complaints after anatomical variation of the ostiomeatal complex, and wrote the paper.

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CONFLICT OF INTEREST

There are no conflicts of interest

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