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OVERVIEW OF PATIENTS WITH CHRONIC RHINOSINUSITIS UNDERGOING SURGERY IN PADANG, WEST SUMATRA, 2018-2022

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ABSTRACT

Introduction: Chronic rhinosinusitis (CRS) remains a health problem that affects the quality of life of patients and often requires surgery. Approximately >60% of CRS patients undergo surgery. **Aims:** This study aims to identify an overview of patients with chronic rhinosinusitis undergoing surgery in Padang, West Sumatra, 2018-2022. **Methods**: This type of study is a descriptive observational study conducted by observing the medical records of CRS patients at the ENT-HNS Outpatient Department of RSUP Dr. M. Djamil Padang for the period January 2018 – December 2022 with a total sample of 138 patients. Samples were collected using a total sampling technique and then analyzed univariately. **Results:** The results of this study showed that CRS patients were found mostly (21.7% each) in the 41-50 years and 51-60 years age groups, more than half (52.2%) were male, and most (86.2%) lived in West Sumatra area. Most (89.9%) patients presented with nasal congestion and more than half (55.1%) had CRSwNP. Staphylococcus epidermidis was the most common microbe type (29.8%) found in patients. Most total Lund-Mackay scores (24.6%) were found in the 5-8 score range. Most (83.3%) patients visited postoperatively for ≤ 3 months with an average of 3.6 visits per patient. **Conclusion**: This study provides an overview of CRS patients who underwent surgery, which is crucial for determining the most appropriate management strategies to prevent the worsening of patient symptoms. Furthermore, this study may provide an overview of the duration of post-sinus surgery control.

Keywords: Chronic rhinosinusitis, polyp, sensitivity test, Lund-Mackay, postoperative

INTRODUCTION

Sinusitis is one of the common upper respiratory infections in the community with a high incidence rate (Soepardi et al., 2017). In contemporary medical terminology, the term 'sinusitis' is often replaced by 'rhinosinusitis.' This is because the disease's pathophysiology is almost always accompanied or triggered by rhinitis. Rhinosinusitis may be classified as acute or chronic, based on its onset. Chronic rhinosinusitis is characterized by the presence of nasal congestion or nasal discharge, facial pain and a reduction or loss of olfactory function that persists for more than 12 weeks (Fokkens et al., 2020).

Chronic rhinosinusitis (CRS) affects approximately 5-12% of public health problems which greatly affects the economy, health burden, and quality of life of patients (Zhang and Bachert, 2022). Research in the Asia-Pacific region shows that CRS is the third most common chronic respiratory infectious disease in general practice with the highest percentage found in Singapore 10.7% (Wang et al., 2018). The prevalence of CRS in Indonesia remains uncertain. The results of a study at Sanglah Hospital in Denpasar in 2018 showed that 53 patients (29,4%) were CRS patients with an average age of 41.2 years and most of them were male 60.4% (Dewi, Setiawan and Sutanegara, 2018). A recent study at Dr. M. Djamil Padang General Hospital in 2022 found 241 CRS patients with the most age group in the 46-55 year age group (22%) and based on gender, the

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most number of male patients was 121 patients (50.6%), while 118 patients were women (49.4%) (Nugraha, Irfandy and Yenny, 2022).

CRS is commonly found in association with nasal polyps, affecting between 2% and 4% of the general population, and may persist (Wirananda, Asthuta and Saputra, 2019). The prevalence of CRS with polyps is mostly found at the age of 40 years and above and increases with age) (Fokkens et al., 2020). The appearance of polyps in CRS is often refractory to medical therapy, thus leading to surgical intervention (Mangunkusumo, 2019). The choice of surgical therapy in CRS patients is quite high (69.5%) seen from the results of previous studies (Nugraha, Irfandy and Yenny, 2022). Following surgical intervention, patients are required to receive post-operative care, and then be evaluated for 6-12 weeks to assess the patient's clinical control (Decree of the Minister of Health of the Republic of Indonesia Number HK.01.07/MENKES/ 1257/2022 on National Guidelines for the Managements of Chronic Rhinosinusitis). Assessment of the clinical control of CRS patients is divided into 3, namely controlled, partially controlled, and uncontrolled patients. The success rate of surgery is estimated to be 80%, although study has indicated that there are still a significant number of patients with uncontrolled clinical conditions (van der Veen et al., 2017; Fokkens et al., 2020). A long follow-up time is needed to confirm postoperative patients who are considered uncontrolled (Zhang and Bachert, 2022).

RSUP Dr M. Djamil Padang is a tertiary national referral hospital located in the West Sumatra region (RSUP Dr. M. Djamil, 2019). The health services provided are of a tertiary level, comprising specialized and subspecialized services. RSUP Dr M. Djamil offers a comprehensive range of services, including a national referral service (Regulation of the Governor of West Sumatra Number 39 year 2015; RSUP Dr. M. Djamil, 2019). As a national referral hospital, RSUP Dr M. Djamil Padang receives patient referrals from regional hospitals 1, 2, and 3 in the West Sumatra region, class C private hospitals, and other public hospitals that permit patients from areas outside Padang to be treated at the hospital (Regulation of the Governor of West Sumatra Number 39 year 2015).

The high incidence of chronic rhinosinusitis, particularly in Indonesia, and the diverse characteristic of patients with chronic rhinosinusitis, prompted the researcher to study this topic. The objective of this study was to obtain an updated overview of the characteristics related to age, gender, patient domicile, main symptoms, CRS type, culture results, Lund-Mackay score, and postoperative visits of patients with chronic rhinosinusitis undergoing surgery at RSUP Dr M. Djamil Padang in 2018-2022.

METHODS

Study Design and Participants

This study is a descriptive observational study that takes secondary data from the medical records of CRS patients undergoing surgery at the ENT-HNS Outpatient Department of RSUP Dr M. Djamil Padang in the period January 2018 – December 2022. This study was conducted in the hospital medical records section from October 2023 – March 2024. The data were collected according to the inclusion and exclusion criteria. Inclusion criteria were as follows: all chronic rhinosinusitis patients with complete medical record data, culture test results indicating the type of microbes present, Lund-Mackay scores, and patients undergoing sinus surgery. Exclusion criteria were as follows: patients lacking complete medical record data and patients not undergoing sinus surgery.

Data Collection

The data were collected from the medical records section of RSUP Dr M.

Djamil Padang using the total sampling technique. In a total sampling technique, the entire population serves as the sample within the study. The study variables were age, gender, domicile, main symptoms, CRS type, culture results, Lund-Mackay score, and postoperative visit. The cultures were obtained from microbiological laboratory results of CRS patients who underwent bacterial culture examination. The results of the culture tests indicate the types of microbes present in the patients. The Lund-Mackay score is calculated based on the total sinus opacities observed on CT imaging. The opacities are scored as 0 if they are absent, 1 if they are partial, and 2 if they are total. All sinus and bone sections were summed and the total score ranged from 0-24. Postoperative visits of CRS patients were determined by the frequency of visits of each patient and then averaged, which was categorized as either within 3 months or more than 3 months postoperatively.

Statistical Analysis

The data were analyzed using the SPSS statistical software (version 15.0) with univariate analysis. The results of the data analysis are presented in tables, which describes the frequency distribution and percentage of each study variable.

Ethical clearance

This study was approved by the Health Research Ethics Committee of Dr M. Djamil Hospital Padang (number: DP.04.03/DXVI.XI/37/2024).

RESULT

This study recorded 260 medical records of patients undergoing surgery at Dr M. Djamil Padang Hospital in the period January 2018 - December 2022. Of these, 138 met the inclusion and exclusion criteria and were thus selected for analysis. Based on Table 1, more chronic rhinosinusitis cases were found in the 41 - 50 years age group and the 51 - 60 years age group (21.7%), and more than half were male (52.2%). The most common main symptom was nasal congestion (89.9%). More than half were CRSwNP type (55.1%). The highest number of Lund-Mackay scores was in the 5-8 score category (24.6%) (Table 1). Table 2 shows that the majority of CRS patients undergoing surgery at RSUP Dr. M. Djamil Padang most were domiciled in the West Sumatra region (86.2%), with the greatest concentration of patients in the Padang City area (Table 2).

Table 1. Distribution of CRS Patients Undergoing Surgery Based on Age, Gender, Main Symptoms, CRS Type, and Lund-Mackay Score (n = 138)

Variable	n (%)
Age (year)	
≤20	22 (15.9)
21-30	22 (15.9)
31-40	21 (15.2)
41-50	30 (21.7)
51-60	30 (21.7)
>60	13 (9.4)
Gender	
Female	66 (47.8)
Male	72 (52.2)
Main Symptom	
Nasal congestion/obstruction	124 (89.9)
Nasal discharge	6 (4.3)
Facial pain	2 (1.4)
Hyposmia/anosmia	1 (0.7)
Other	5 (3.6)
CRS Type	
CRSwNP	76 (55.1)
CRSsNP	53 (38.4)
ACP	4 (2.9)
Ethmoid choanal polyp	1 (0.7)
Odontogenic sinusitis	1 (0.7)
Mucocele	3 (2.2)
LM Score	
0 – 4	28 (20.3)

Variable	n (%)
5 – 8	34 (24.6)
9 – 12	26 (18.8)
13 – 16	14 (10.1)
17 – 20	20 (14.5)
21 – 24	16 (11.6)

Note: CRSwNP = Chronic Rhinosinusitis with Nasal Polyp; CRSsNP = Chronic Rhinosinusitis without Nasal Polyp; ACP = Antrochoanal polyp; LM = Lund-Mackay.

Table 2. Distribution of CRS Patients Undergoing Surgery Based on Patient Domicile (n = 138)

Domicile origin	n (%)
West Sumatra*	**119 (86.2)**
Dhamasraya – Sawahlunto – Sijunjung	7 (5,1)
Solok Selatan – Lima Puluh Kota – Tanah Datar	5 (3,6)
Bukittinggi – Agam – Pasaman Barat – Payakumbuh	18 (13)
Padang – Pariaman – Padang Pariaman – Pesisir Selatan	89 (64,5)
Other provinces	**19 (13.8)**

Note: *distribution is divided into several city regions in West Sumatra; The total numbers of patients from both within and outside the province of West Sumatra are shown in bold.

The distribution based on culture results was found to be 121 samples from CRS patients. Another 17 samples were excluded as no growth was observed in the culture results. Of those tested, 29.8% yielded positive results for the bacterium Staphylococcus epidermidis (Table 3).

Table 3. Distribution of CRS Patients Undergoing Surgery Based on Culture Result (n = 121)

Species	n (%)
Gram-positive bacteria	
Enterococcus faecalis	1 (0.8)
Staphylococcus aureus	18 (14.9)
Staphylococcus coagulase negatif	8 (6.6)
Staphylococcus epidermidis	36 (29.8)
Staphylococcus equorum	1 (0.8)
Staphylococcus haemolyticus	1 (0.8)
Staphylococcus hominis	1 (0.8)
Staphylococcus pseudintermedius	1 (0.8)
Staphylococcus sp	1 (0.8)
Sterptococcus agalactiae	1 (0.8)
Streptococcus beta hemolyticus	2 (1.7)
Streptococcus sp	2 (1.7)
Gram-negative bacteria	
Acinetobacter baumannii	2 (1.7)
Burkholderia pseudomallei	1 (0.8)
Citrobacter amalonaticus	1 (0.8)
Citrobacter koseri	2 (1.7)
Enterobacter aerogenes	2 (1.7)
Enterobacter cloacae	1 (0.8)
Enterobacter cloacae complex	1 (0.8)
Escherichia coli	2 (1.7)
Klebsiella oxytoca	1 (0.8)
Klebsiella ozaenae	1 (0.8)
Klebsiella pneumoniae	12 (9.9)
Klebsiella sp	5 (4.1)
Pantoea sp	2 (1.7)
Proteus mirabilis	3 (2.5)
Pseudomonas aeruginosa	8 (6.6)
Raoultella ornithinolytica	2 (1.7)
Serratia fonticola	1 (0.8)
Fungi	
Candida sp	1 (0.8)

Table 4 shows that most patients make routine postoperative visits within ≤ 3 months (83.3%) with an average visit of 3.6 times per patient (Table 4).

Table 4. Distribution of CRS Patients Undergoing Surgery Based on Postoperative Visit (n = 128)

Period of visit	n (%)	Average Postoperative Visit
≤ 3 month	115 (83,3%)	3,6
> 3 month	13 (9,4%)	9,8

Note: A further 10 patients were excluded due to the absence of postoperative visits.

DISCUSSION

Age

The results of this study showed that the majority of CRS patients were found in two age groups, the 41-50 years and the 51-60 years age group (each 21.7%). The lowest number of patients was observed in the >60 years age group (9.4%). The findings were in accordance with those of previous research conducted in 2020, with the largest age group being 41–50 years old (31%) (Putri, Dolly and Novita, 2020). A further study by Nugraha et al. (2021) also demonstrated comparable outcomes, indicating that the majority of CRS patients were found in the age group 46–55 years (22%) and a smaller proportion in the age group >65 years (5%) (Nugraha, Irfandy and Yenny, 2022). Chronic rhinosinusitis is common in adult patients, with the incidence rising with age. The highest prevalence is observed at the age of >40 years. However, there is a decline in prevalence in those over 60 years of age (Fokkens et al., 2020). These findings may be attributed to aging factors that affect the immune system, particularly related to the mucosal epithelial barrier which has decreased function (Putri, Dolly and Novita, 2020; Nugraha, Irfandy and Yenny, 2022). Such epithelial changes may disrupt to the function of mucociliary clearance, which plays a role in the pathophysiology of CRS (Irfandy, Budiman and Huryati, 2019). Furthermore, the habit of adults engaging in outdoor activities and frequent exposure to hazardous substances may also contribute to the high incidence of CRS in adulthood (Swari, Dwi Saputra and Wiranadha, 2021).

Gender

The finding of this study indicate that more than half of CRS patients were male (52,2%), with a male-to-female ratio of 1.09:1. A similar study was conducted at RSUP Sanglah Denpasar on patients who underwent surgery for CRS, indicated that the majority of patients were male (59.02%) (Kurniasih and Ratnawati, 2019). It is more probable that men will be frequently exposed to harmful substances in their work environment or through smoking. (Dewi, Setiawan and Sutanegara, 2018). This can lead to impaired cilia and sinus epithelial function, polypoid growth, disruption of the mucociliary system, and increased oxidative stress. (Nurmalasari and Nuryanti, 2017; London, Lina and Ramanathan, 2018). In addition, another study have identified that women have the highest prevalence rate of CRS (Poluan and Marlina, 2021; Rahmannanda Laksanadi, Sutikno and Sahudi, 2021). These results may be related to preventive efforts prioritized by most women toward their health, the influence of anatomical structure in the nose and paranasal sinuses, and the influence of female sex hormones such as estrogen, progesterone, and PGH (Nurmalasari and Nuryanti, 2017; Rahmannanda Laksanadi, Sutikno and Sahudi, 2021; Nugraha, Irfandy and Yenny, 2022).

To date, no definitive reason for the difference in prevalence by gender in CRS patients has been identified. The disparate outcomes observed in some

studies may be influenced by the type of research methodology employed or the total population within the research area (Rahmannanda Laksanadi, Sutikno and Sahudi, 2021; Riskia, 2022). For example, the population of West Sumatra over the past three years demonstrates a greater proportion of males than females (Central Bureau of Statistics, 2023). This result may be the reason why a greater proportion of the CRS patients in this study were male.

Domicile

The majority of CRS patients in this study were domiciled in West Sumatra, with the highest concentration in the Padang, Pariaman, Padang Pariaman, and Pesisir Selatan City area (64,5%). This result is consistent with research at RSUDZA Banda Aceh, which found that most patients are domiciled in the city, specifically in Banda Aceh City, at 33.13% (Riskia, 2022). These results may be influenced by the impact of environmental conditions in urban areas. Pollution levels in urban areas are typically higher than in rural areas, and this can lead to respiratory system disorders including more severe CRS. Prolonged exposure to pollution can cause inflammation and other immune disorders by damaging the epithelial barrier of nasal mucosa and paranasal sinuses, impairing ciliary function, and increasing oxidative stress in the mucosa, which in turn results in symptoms of CRS (Zhang and Bachert, 2022).

Another reason for the high CRS case rate in urban areas may be due to considerations of travelling distance to health facilities, the distribution of doctors and the availability of adequate health services are more prevalent in urban areas (Jang et al., 2021; Riskia, 2022). Not only in West Sumatra, 19 other patients were also found to have come from outside West Sumatra. Of these, the highest concentration was in Jambi Province. This can be explained by the status of RSUP Dr M. Djamil Padang as a national referral hospital, which receives referrals from regional hospitals throughout West Sumatra, as well as from neighboring provinces (Regulation of the Governor of West Sumatra Number 39 year 2015).

Main Symptoms

This study identified nasal congestion as the most frequently reported symptom among CRS patients at RSUP Dr M. Djamil Padang (89,9%). It was similar in a previous study by Muthia Sani (2020), a total of 88 patients presented with nasal congestion as the most prominent symptom (Sani, 2020). Another study by Laksanadi et al. (2022) also found similar results with nasal congestion as the most common symptom at 45.83% (Rahmannanda Laksanadi, Sutikno and Sahudi, 2021). According to EPOS 2020, nasal congestion remains the primary symptom of CRS patients and is considered a crucial aspect of treatment following sinus surgery (Fokkens et al., 2020).

The process of inflammation in CRS is characterized by edema of the mucosa in the part of osteomeatal complex. Then the mucosa faces together each other and narrows, thereby disrupting ventilation and mucus flow, and impairing the function of the cilia (Soepardi et al., 2017). This process is thought to be the cause of nasal congestion in many patients. Additionally, other researchers have identified a probable correlation between prolonged mucociliary clearance activity and the accumulation of foreign particles that cannot be expelled through the nasal cavity (Rahmannanda Laksanadi, Sutikno and Sahudi, 2021). In addition to the inflammatory process, conditions such as septal deviation, conchal hypertrophy and the presence of polyps or other nasal tumors can also induce nasal congestion in CRS patients (Dewi, Setiawan and Sutanegara, 2018). In addition to the four typical symptoms of CRS, 3.6% of CRS patients in this study presented with other

major symptoms, including nasal odor, epistaxis, and forehead lumps.

CRS Type

The findings of this study demonstrated CRS subtypes based on differential diagnosis. The highest prevalence (55.1%) was observed in CRSwNP, while the lowest (0.7%) were observed in odontogenic sinusitis and ethmoid choanal polyp. The findings of Putri (2021) align with this study, which revealed that 58.9% of cases were CRSwNP and greater than chronic rhinosinusitis without nasal polyposis (CRSsNP) cases (Putri, 2021). Furthermore, research conducted by Nugraha et al. (2021) aligns with the outcomes of this study, which indicating that cases of CRSwNP were the most prevalent at a rate of 50.6% (Nugraha, Irfandy and Yenny, 2022).

Chronic rhinosinusitis with nasal polyposis (CRSwNP) is a type of CRS that is accompanied by the finding of a grey-white mass on nasal endoscopic examination. It has a high prevalence in various countries, including Europe (10.9%), America (13.4%), and China (8%) (Soepardi et al., 2017; Fokkens et al., 2020). CRSwNP has a significant impact on the lives of patients with CRS. Treatment frequently requires surgery, which carries high costs, and also affects the quality of life for these patients. CRSwNP cases are often found in adulthood, resulting in decreased productivity for adult workers (Fokkens et al., 2020). This statement may support the results of this study, as many cases of CRSwNP also occur in adulthood. In addition to CRSwNP and CRSsNP, there are other differential diagnoses in some cases, including antrochoanal polyps (ACP), ethmoid choanal polyps, odontogenic sinusitis, and mucocele. Some of these cases are relatively uncommon, yet they present diagnostic challenges due to the lack of specific symptoms (Soepardi et al., 2017; Cobzeanu et al., 2020; Zhang and Bachert, 2022). Consequently, a diagnosis must be made not only on the basis of the patient's symptoms and medical history, but also correlated with the results of physical and supporting examinations.

Culture Result

A total of 121 samples were obtained in this study, while 17 other samples were excluded due to the absence of growth in the culture results. The results of the cultures performed on the 121 samples revealed that the majority of bacteria belonged to the Gram-positive bacteria group, 36 of which were identified as *Staphylococcus epidermidis* (29.8%). In contrast, the most prevalent bacteria in the Gram-negative group were the *Klebsiella pneumoniae* species, with 12 samples (9.9%).

Staphylococcus epidermidis is a Gram-positive bacterium commonly found in the culture results of CRS patients. It is assumed that S. epidermidis represents a normal flora that is found on the skin and mucous membranes, including the mucosa of the sinuses (Yolazenia et al., 2018; Putri, Dolly and Novita, 2020). S. epidermidis is included in a group of coagulase-negative bacteria that are believed to have similar roles in the formation of polysaccharides and adhesive protein substances. These materials enable the bacteria to colonize and cause sustained infection (Yolazenia et al., 2018). The colonization of S. epidermidis and a microbial imbalance in the nose and sinuses will initiate a chronic inflammatory process and immune response (Putri, Dolly and Novita, 2020). Another opinion posits that S. epidermidis also affects the colonization of other pathogenic bacteria. For instance, the colonization of S. aureus is inhibited due to the secretion of serine protease by S. epidermidis. This statement may support the reason why S. epidermidis is more commonly found in cultures of patients with CRS (Zhang and Bachert, 2022).

In addition to S. epidermidis, *Staphylococcus aureus* was found to be the second most prevalent Gram-positive bacterium. S. aureus has been linked to thedevelopment of polyps and edema in CRSwNP patients and is frequently associated with the recurrence of post-sinus surgery symptoms (Thunberg, Söderquist and Hugosson, 2017; Maniakas et al., 2018). Furthermore, S. aureus has the capacity to form biofilms comparable to S. epidermidis. These biofilms are thought to enhance the ability of bacteria to enter and survive within host cells, and to contribute to the development of antibiotic resistance in patients (Yolazenia et al., 2018; Putri, Dolly and Novita, 2020; Zhang and Bachert, 2022). Additionally, several cultures of gram-negative bacteria were also identified. The most prevalent species was *Klebsiella pneumoniae*. It is postulated that the bacterial finding originated from the respiratory or gastrointestinal tract, where regurgitation occurred and the bacteria were subsequently transported up the nose (Putri, Dolly and Novita, 2020). An understanding of the distinctions between gram-negative and gram-positive bacteria is essential for the selection of an appropriate antibiotic to prevent the development of resistance.

In addition to bacteria, the study demonstrated the presence of fungal cultures, specifically *Candida sp.* These fungi were present in 1 sample. As with the research of Ismi et al. (2018), the highest fungal culture was found in the type of *Candida sp.* in 11 samples (Harahap, Siregar and Nasution, 2018). In contrast, a study conducted in India in 2017 revealed that the most prevalent fungal isolate was *Aspergillus flavus*, with an occurrence rate of 75% (Singh et al., 2017). The incidence of fungal sinus infections remains low, although it can increase as a consequence of the extensive use of antibiotics, immunosuppressant drugs and radiotherapy. Among patients with CRS, the most commonly isolated fungal pathogens are *Aspergillus sp.* and *Candida sp* (Soepardi et al., 2017). According to the EPOS 2020, fungi are naturally present on all mucosal surfaces of the body. However, they also have the potential for colonization imbalances that can negatively impact the development of CRS (Fokkens et al., 2020; Zhang and Bachert, 2022). Furthermore, some studies have indicated that fungi may play a role in CRS development, particularly through their interaction with S. aureus (Fokkens et al., 2020).

Lund-Mackay Score

The findings of this study indicate that CRS patients undergoing surgery exhibited the highest distribution of LM scores 5-8, with the lowest distribution observed in patients with LM scores 13-16. These results are similar to those of previous research conducted in 2021. The highest distribution of LM scores was observed in the range of 5-8, with a total of 21 patients (Rahmannanda Laksanadi, Sutikno and Sahudi, 2021). In contrast, the study by Alshammari et al. (2021) revealed that a significant proportion of patients exhibited LM scores >10, indicating a severe form of CRS (Alshammari et al., 2021). The discrepancy in outcomes may be attributable to variations in the study population between different research studies. The majority of CRS patients in this study had previously received medical treatment, which may have influenced the LM score obtained (Yolazenia et al., 2018).

The Lund–Mackay score is a diagnostic tool used to assess the level of sinus opacities through CT scan results. The cut-off point often used in the LM score is >4, with results demonstrating stronger sensitivity and specificity in diagnosing CRS (Decree of the Minister of Health of the Republic of Indonesia Number HK.01.07/MENKES/1257/2022 on National Guidelines for the Managements of Chronic Rhinosinusitis).

In addition to serving as supportive diagnostic evidence, LM scores are frequently correlated with the severity of the CRS symptom (Yolazenia et al., 2018; Rahmannanda Laksanadi, Sutikno and Sahudi, 2021). The results of several studies indicated a significant correlation between elevated LM scores and increased preoperative symptom scores, particularly in relation to rhinological symptoms and sleep disturbances (Brooks et al., 2018; Shirama et al., 2022). By contrast, the postoperative findings indicated that patients with high preoperative LM scores were more likely to experience symptom improvement postoperatively (Brooks et al., 2018; Alshammari et al., 2021).

Postoperative Visits

This study revealed that the majority of CRS patients made repeated visits following surgical sinus treatment. A total of 115 patients required ≤3 months to complete their postoperative visits, while 13 other patients required >3 months. The study calculated the average number of visits in the group of patients who made postoperative visits for ≤3 months, which was found to be 3.6 visits per patient. Another finding of the 2015 study revealed that the majority of patients had at least one post-operative visit (Hopkins, Andrews and Holy, 2015). Meanwhile, a study by Ryan et al. (1995) revealed that the 18-month post-FESS surgery average number of patient visits was 2.8 (Ryan et al., 1996). Postoperative visits are conducted with the objective of evaluating and treating the postoperative mucosa in agreement with the patient and the doctor. According to the EPOS 2020 guidelines, such evaluation visits are conducted for a duration of 6 weeks to 3 months, in alignment with the typical healing period of nasal and sinus mucosa. However, in some instances, repeat visits may be required for a longer duration or with greater frequency (Sari, 2018; Fokkens et al., 2020).

One theory posits that patients should undergo a follow-up examination 1 week following surgery to evaluate the nasal cavity via endoscopy. Subsequent follow-ups are scheduled at 2-weekly intervals for 2 months postoperatively, after which patients may undergo endoscopic examination once a month (Zhang and Bachert, 2022). It can be concluded from this theory by calculating the estimated frequency of follow-up for each patient that at five repeated follow-ups in the first three months after sinus surgery is necessary. It can be concluded that the frequency of follow-up in the group of patients with a follow-up duration of ≤3 months is lower than theorized, given that the average result of postoperative follow-up is only 3.6 times. Furthermore, only 22 patients made more than five visits within three months of surgery. It can be assumed that the low frequency of follow-up may be due to the patients' significant improvement in their condition, which may negate the need for frequent follow-up. The optimal frequency of post-sinus surgery follow-up remains uncertain and may vary depending on the condition of each patient.

The findings of this study allow for the formulation of several policies aimed at preventing a decline in quality of life and reducing the necessity for surgical intervention in patients diagnosed with CRS. Firstly, it would be beneficial to conduct educational and counselling activities in the community regarding chronic rhinosinusitis and its management, with a particular focus on the city of Padang in West Sumatra. It is anticipated that the dissemination of information will enhance public awareness and knowledge of the progression of CRS and its management, whether through pharmacological or surgical intervention.

In the case of patients undergoing surgery, it is also essential to establish a protocol governing the frequency of visits that are required by postoperative CRS patients. The implementation of a

postoperative visitation protocol is intended to facilitate the effective evaluation of postoperative patients and prevent the exacerbation of symptoms following surgery. The weakness of this study include the postoperative visit variable, which only shows the average value of patient visits and does not re-evaluate the symptoms experienced by the patients to prove that the patients' condition is truly uncontrolled, and not many theories have examined the topic.

CONCLUSIONS

This study concluded that patients with chronic rhinosinusitis undergoing surgery were mostly in the 41-50 and 51-60 years age groups. More than half the patients were male and most lived in West Sumatra. In general, nasal congestion was the most common symptom and more than half of the patients had CRSwNP type. Most bacterial cultures were Staphylococcus epidermidis. Most total Lund-Mackay scores undergoing surgery were between 5-8. Most patients were followed up ≤3 months after surgery with a mean of 3.6 visits per patient.

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