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Original Research Article

Allergic Versus Non-Allergic Sinonasal Polyps; A Diagnostic Study Using Multi-Slice Non-Contrast Computed Tomography and Histopathology Results

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Abstract

Background: Chronic rhinosinusitis (CRS) is inflammation of the nasal cavity, and paranasal sinuses (PNS) persists for over three months. CRS can be differentiated into CRS with nasal polyps (CRSwNP) or without (CRSsNP). ***Aim:*** to determine the allergic cause of sinonasal polyps using the radiological findings of multi-slice Non-contrast computed tomography of the paranasal sinuses (NCCT-PNS) and histopathology results. ***Materials and Methods:*** A total of 41 patients with sinonasal polyps were involved in this study. Multislice NCCT-PNS for each patient was taken in coronal sections. Radiological diagnoses were made. Surgical samples were taken after Functional endoscopic sinus surgery (FESS). Histopathological results were collected. Comparison between the NCCT-PNS and histopathology results was made. Statistical analysis was done using the SPSS program. ***Results:*** Out of 41 patients involved in this study, 14 males and 27 females. The mean age was 37.4146 ± 16.65. Polyps predominantly were affecting the nose and paranasal sinuses together ($p<0.001$). Polyps were predominantly bilateral ($p<0.001$). Sinonasal polyposis was the most commonly diagnosed (58.5%) on CT ($p<0.001$). Allergic polyps were the most common type of polyps ($p=0.003$). No significant relationship between gender and allergic or non-allergic causes of polyps ($p=0.32$, OR= 1.7, 95% CI 0.460-6.280). No significant relationship between gender and specific cause of polyps ($p=0.779$) except in fungal cause that is more in female. ***Conclusion:*** Allergic polyps are the most common type in chronic rhinosinusitis with nasal polyps (CRSwNP). CRSwNP affects female twice as male. Most cases of CRSwNP are bilateral and involve the nose and paranasal sinuses.
Keywords: Chronic rhinosinusitis with nasal polyps (CRSwNP); Non-contrast computed tomography of the paranasal sinuses (NCCT-PNS); Allergic CRSwNP.

INTRODUCTION

Chronic rhinosinusitis (CRS) is the inflammation of the nasal cavity, and paranasal sinuses (PNS) persists for over three months [1]. CRS is a common medical problem worldwide. The prevalence rate is 5-15 in the general population [2]. CRS can be differentiated into two different genotypes, either associated with nasal polyps (CRSwNP) or not (CRSsNP) [3]. According to Benjamin *et al.*, 20% of CRS patient are CRSwNP, and 80% are CRSsNP [4]. Based on the presence of eosinophilic infiltration of the Sinonasal tissues, CRS is divided into eosinophilic CRS (ECRS) and non-eosinophilic CRS (non-ECRS) [5]. Sinonasal tissue eosinophilia is present predominantly in CRSwNP patients [6]. Allergies and bacterial colonization are common in patients with CRSwNP and more prominent polyposis observed in allergic patients [7]. According to the "Europian guidelines on rhinosinusitis and nasal polyps" (EPOS 2012), computed tomography (CT) is the primary imaging method for assessing the intensity of inflammatory lesions. Using bone windows of CT is the most suitable to avoid missing inflammatory lesions in the PNS [8]. Appropriate medical imaging and accurate interpretation of the standard and unusual anatomy is essential for safe and successful surgical management [9]. Histopathologic analysis can provide useful information on the endotype of CRS. Elaboration of endotype can give new possibilities in the prediction of prognosis and guidance of management [10]. Routine use should be standardized in cases of CRS refractory to medical and/or surgical treatment [11].

This study intended to classify the chronic rhinosinusitis with polyps into ECRS (allergic) and non-ECRS (non-allergic) according to the results of histopathology examination. This will be important for

Otorhinolaryngologists for planning the treatment strategies and improving treatment outcomes for the individual phenotype. This study is the first study to cover this topic in Yemen.

MATERIALS AND METHODS

Patients

A total of 41 patients was involved in this study. Demographic data, radiological findings, and histopathology results were retrospectively collected from the records of the patients who were diagnosed with sinonasal polyps from June 2016 to June 2018. The study was done at Alsafwa Specialized Medical Center in Almakalla city in Hadhramout government in the Republic of Yemen. All patients underwent multi-slice non-contrast computed tomography of the paranasal sinuses (NCCT-PNS) in coronal sections. The radiological diagnosis was made. Patients with sinonasal polyps underwent Functional endoscopic sinus surgery (FESS). Surgical samples were taken. Histopathological results were collected. Comparison between the PNS-CT and histopathology results was made. Inclusion criteria involve all patients diagnosed by NCCT-PNS and histopathology as CRSwNP. Exclusion criteria include all patients without sinonasal polyps.

Procedure

NCCT of the paranasal sinuses was done using Philips Brilliance 16 multislice computed tomography machine according to the protocol explained by [12].

Ethics

Institutional ethical approval was taken for this study. Informed consent was taken from each patient before sinus surgery. Confidentiality of the patients was assured during data collection.

Statistical Analysis

Data were analyzed using the "Statistical Package for Social Sciences" (SPSS). Descriptive statistics were used to write the results. Categorical data are presented as frequencies and percentages. P-value and Odds ratio (OR) with 95% confidence interval (95% CI) were used to explain the relationship between the different parameters.

RESULTS

A total of 41 patients involved in this study, 14 males and 27 females. The patients' age was range from 4 to 70 years (Mean= 37.4146 ± 16.65). Table-1 revealed a significant tendency of polyps to affect female (p=042). Table-2 revealed the predominance of polyps to affect the nose and sinuses together (p<0.001). Table-3 revealed the predominance of polyps to affect bilateral sinuses and nasal cavities more than unilateral (p<0.001). Table-4 CT diagnosis showed that sinonasal polyposis was the diagnosis in 58.5% of patients (p<0.001). Table-5 histopathology results revealed that allergic polyps were the most common type of polyps (p=0.003). Table-6 shows no significant relationship between gender and either the cause of polyps was allergic or non-allergic (p=0.32, OR= 1.7, 95% CI 0.460-6.280). Table-7 and Fig-1 show no significant relationship between gender and any cause of polyps (p=0.779) except in fungal cause that is more in female patients.

Table-1: Gender distribution of polyps

Male	14 (34.1%)	p=0.042
Female	27 (65.9%)	
Total	41 (100%)	

Table-2: Distribution sites of polyps

Nose	5 (12.2%)	p<0.001
Sinus	11 (26.8%)	
Sinus& Nose	25 (61%)	
Total	41 (100%)	

Table-3: Distribution side of polyps

Right	8 (19.5%)	p<0.001
Left	6 (14.6%)	
Bilateral	27 (65.9%)	
Total	41 (100%)	

Table-4: CT diagnosis of cases

Sinonasal plyposis	24 (58.5%)	p<0.001
Antrochoanal polyposis	6 (14.6%)	
Nasal polposis	4 (9.8%)	
Maxillary polyposis	6 (14.6%)	
Malignancy	1 (2.4%)	
Total	41 (100%)	

Table-5: Histopathology diagnosis of cases

Allergic	15 (36.6%)	p=0.003
Inflammatory	12 (29.3%)	
Malignant	4 (9.8%)	
Benign	1 (2.4%)	
Fungal	9 (22%)	
Total	41 (100%)	

Table-6: Cross tabulation between histopathology diagnosis and gender

	Male	Female	Total
Allergic cause	6 (42.85%)	9 (33.33%)	15 (36.60%)
Non-allergic cause	8 (57.14%)	18 (66.66%)	26 (63.41%)
Total	14 (100%)	27 (100%)	41 (100%)

Table-7: Cross tabulation between the cause of polyp on histopathology and gender

	Allergic	Inflammatory	Malignant	Benign	Fungal	Total
Male	6 (42.9%)	5 (35.7%)	1 (7.1%)	0 (0.0%)	2 (14.3%)	14 (100%)
Female	9 (33.3%)	7 (25.9%)	3 (11.1%)	1 (3.7%)	7 (25.9%)	27 (100%)
Total	15 (36.6%)	12 (29.3%)	4 (9.8%)	1 (2.4%)	9 (22%)	41 (100%)

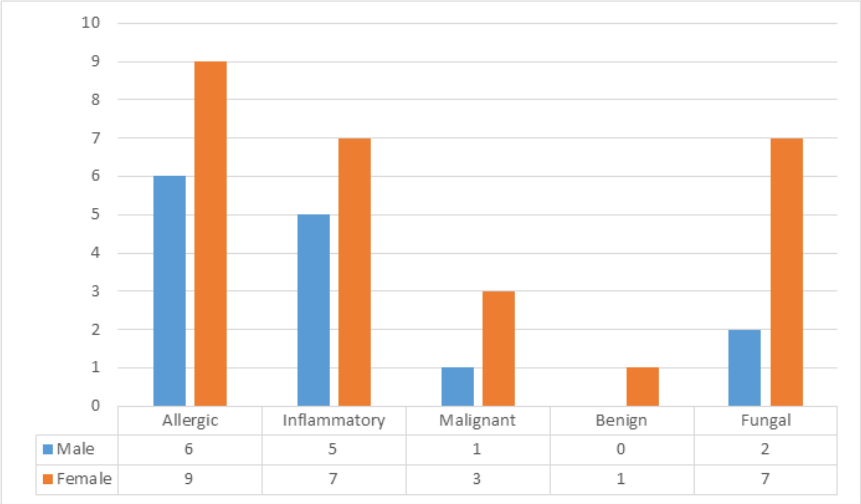

Fig-1: Distribution of the causes of polyps with gender of the patients

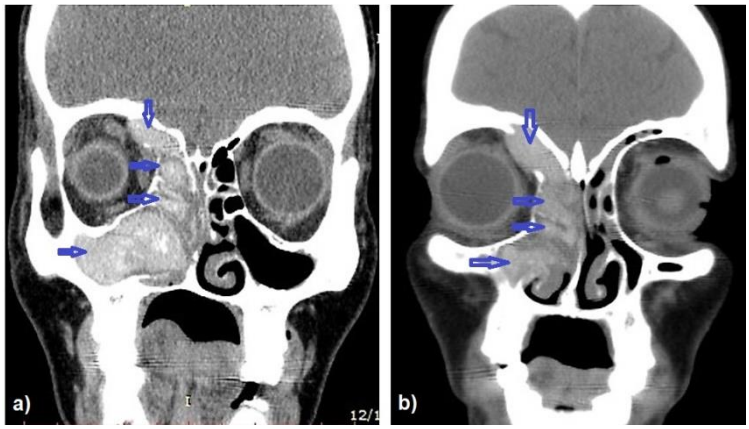

Fig-2: Coronal sections of NCCT soft tissue (a) and bone window (b) shows multiple polyps in the right ethmoid and maxillary paranasal sinuses (arrows)

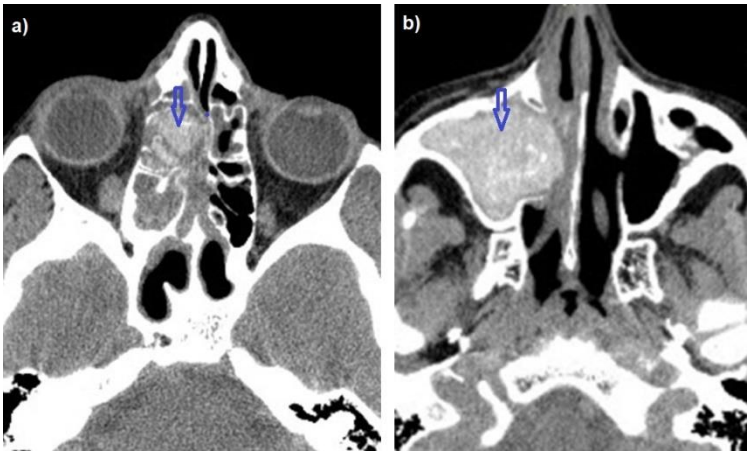

Fig-3: Axial sections of NCCT of ethmoid (a) and maxillary (b) paranasal sinuses shows multiple different size polyps in the right ethmoid and maxillary paranasal sinuses (arrows)

DISCUSSION

Sinonasal polyposis is the presence of multiple polyps in the nasal cavity and in the paranasal sinuses. This study designed to assess the allergic cause of polyps that was suspected to be the most common cause. Really allergic polyps were the most common.

The mean age of patients was 37.4146 ± 16.65. This is consistent with Stevens *et al*., who reported that CRSwNP is a disease of middle age that typically diagnose in 40-60 years old [13]. This also consistent with Meymane et al., who reported that the mean age of the patients with nasal polyps was 39.34 ± 16.63 years [14].

In this study, polyps were more common in female than in male (65.9% vs. 34.1%). This result is consistent with a study by Ference *et al*., who reported that females have a double rate of CRS than males [15]. However, another study by Stevens *et al.*, reported that females with CRSwNP have more severe disease than men, it is not known that CRSwNP more frequent in female [13]. Our results are the reverse of the results of a previous study by Newton *et al*., who reported that nasal polyps were twice common in males than in females [16]. The results also not compatible with the results of Muñoz *et al*., who reported that nasal polyps affect male more than female [17].

In this study, polyps were more common due to the allergic cause. This result is agreeing with the results of Brunner *et al*., who reported that nasal polyps more associated with allergic rhinitis [18]. This result also compatible with the results of Shin et al., who stated that allergic (Eosinophilic) type is the most common type (62.6%) of sinonasal polyps [19]. Another study by Chaaban also stated that the majority of polyps in CRSwNP are secondary to eosinophilic inflammation in Western countries [20].

In our study, 22% of the cases of CRSwNP were due to a fungal cause. This result is consistent with Barac *et al*., who reported that patients with fungal infections had often complicated by CRSwNP [21]. In our results, most cases of fungal CRSwNP were females; these results are consistent with the results of Siddiqui et al., who reported that female patients with nasal polyps and fungal infection were more than males [22].

In this study, 65.9% of CRSwNP were bilateral. This result is consistent with Stevens *et al*., who reported that nasal polyps most commonly present as bilateral lesions [23]. The result was also consistent with Wong et al., who reported that nasal polyps often present bilaterally [24].

CONCLUSION

Allergic polyps are the most common cause of chronic rhinosinusitis with nasal polyps (CRSwNP). CRSwNP affects female twice as male. Most cases of CRSwNP are bilateral and involve both the nose and paranasal sinuses.

Conflicts of Interests

There are no conflicts of interests to declare.

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