



ORIGINAL RESEARCH PAPER

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RISK FACTORS INVOLVED IN RECURRENCE OF CHRONIC RHINOSINUSITIS AFTER FUNCTIONAL ENDOSCOPIC SINUS SURGERY IN KASHMIRI POPULATION.

KEY WORDS: Chronic rhinosinusitis, computed tomography scan, functional endoscopic sinus surgery

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ABSTRACT

BACKGROUND: Chronic rhinosinusitis (CRS) is one of the most common chronic diseases, which is defined as an inflammation of the nose and paranasal sinuses. Computed tomography (CT) scan of paranasal sinuses has become mandatory for all patients undergoing functional endoscopic sinus surgery (FESS), which is, nowadays, regarded as the gold standard for treatment of CRS after a trial of medical treatment. Our aim in this study is to explore the risk factors and anatomical findings on CT scan of CRS patients who had recurrence after undergoing FESS in Government Medical College, Srinagar.

METHODS: A retrospective chart review study was conducted in the department of otolaryngology head and neck surgery, GMC Srinagar, to assess the risk factors of patients with recurrent CRS after FESS. The study included all patients, who were adults 18 years of age and above of both genders that had FESS after a diagnosis of CRS between 2017 and 2019.

RESULTS: The study identified 129 patients with CRS, of which 19 (14.79%) patients had recurrence after FESS. Various risk factors were taken into consideration such as age, gender, airway and inflammatory autoimmune diseases, smoking, type of sinusitis, and anatomical variations and findings on CT scan. However, only fungal type of sinusitis was found to be a significant risk factor of a recurrent CRS. Anatomical findings on CT scan postoperatively were mucosal thickening, nasal polyps, nasal septum deviation, and obliterated osteomeatal complex.

CONCLUSION: CRS patients were assessed for various risk factors of recurrent CRS. The overall incidence of recurrent CRS was 14.79%. Fungal rhinosinusitis was found to be a significant risk factor. The most common anatomical findings on CT scan postoperatively were mucosal thickening in paranasal sinuses followed by nasal polyps.

INTRODUCTION:

Chronic rhinosinusitis (CRS) is one of the most common chronic diseases which is defined as an inflammation of the nose and paranasal sinuses that persists for 12 weeks or longer with two or more of the following symptoms: nasal congestion or blockade, anterior or posterior nasal discharge, facial pain or pressure, reduction or loss of smell (anosmia), complementary endoscopic signs, and computed tomography (CT) changes[1]. CRS may manifest as one of three major clinical presentations: CRS without nasal polyps, CRS with nasal polyps, or allergic fungal rhinosinusitis. These classifications possess a great deal of therapeutic significance[2]. Nowadays, functional endoscopic sinus surgery (FESS) is regarded as the gold standard for the treatment of CRS, with or without nasal polyposis refractory to optimal medical treatment. This surgery is based on the principles of improved function and patency of the complex bone-meat, through interventions in the sidewall of the nose[3]. The following conditions and risk factors have been identified in different studies that predispose patients to the development of CRS: anatomic abnormalities of the ostiomeatal complex (e.g., septal deviation, concha bullosa, deviation of uncinate process, and Haller cells), allergic rhinitis, aspirin sensitivity, asthma, nasal polyps, obstruction by tumor, immunologic disorders (e.g., common variable immunodeficiency, immunoglobulin [Ig] A deficiency, IgG subclass deficiency, and AIDS), cystic fibrosis, primary ciliary dyskinesia, kartagener syndrome, repeated viral upper respiratory tract infections, smoking, environmental irritants and pollutants, gastroesophageal reflux disease, and systemic diseases (e.g., granulomatosis with polyangiitis [Wegener granulomatosis], Churg-Strauss vasculitis, and sarcoidosis)[2-4]. It is estimated that the total recurrence rate of CRS resides in a spectrum of percentages between 9% and 16%. A study was done in the Department of Otolaryngology, Taichung Veterans General Hospital, showed 9.18% of all

patients with CRS have undergone revision of FESS within 1 year of the failure of primary FESS[4]. Even a higher incidence of 16.1% was reported by the Department of Otorhinolaryngology, Jikei University School of Medicine, Tokyo[5]. Moreover, our review of literature did not reveal any similar studies done in Indian subcontinent that studied the recurrence rate, and risk factors associated with CRS. Hence, our research will specify the number of adult CRS patients who had recurrence and determine the risk factors associated with such an event. Based on the findings of this study, we will identify a group of patients who are under the risk of developing the recurrence and estimate the success rates of their primary FESS.

METHODS:

A retrospective chart review study was conducted to assess the risk factors of patients with recurrent CRS after undergoing FESS and to evaluate the anatomical findings on CT scan postoperatively. Ethical approval was obtained from our Ethical Committee GMC Srinagar, and consents were not needed from patients. The list of patients was provided from the department of otolaryngology head and neck surgery after obtaining the institutional review board approval. The research team took the responsibility of collecting the data from the patients' file.

Study settings: The study conducted at Government Medical College, Srinagar, Jk, India.

Study subjects: The study included 129 patients who are all adults, 18 years of age and above, from both genders and from all nationalities who were admitted to do FESS after a diagnosis of CRS between 2017 and 2019.

Data collection: A chart review study was done, and the data were collected by Excel datasheet that includes different variables and risk

factors. The variables and risk factors include: anatomical findings on CT scan after FESS, airway diseases, inflammatory autoimmune diseases, presenting symptoms, history of paranasal sinus surgery, type of sinusitis and the organism found, age, and gender. The outcome variable is a recurrence of CRS after FESS or not.

Statistical analysis: Data were analyzed by using SPSS software (IBM Corp, Released 2013. IBM statistics for windows, Version 22.0. Armonk, New York, USA). Continuous variables were expressed as mean ± standard deviation and categorical variables were expressed as percentages. The Chi-square test was used for categorical variables. T-test and one-way analysis of variance were used for continuous variables. Logistic regression was used to assess the risk factors. P < 0.05 was considered statistically significant.

RESULTS:

The study identified 129 patients, of which 19 patients (14.79%) had recurrence of CRS after FESS. All patients with recurrence had CT scan postoperatively. Ten patients had a revision of FESS, yet symptoms improved after that. However, two patients improved with a medical treatment without a revision of FESS, but only seven patients did not show an improvement even after a revision of FESS. Various risk factors were taken into consideration such as age, gender, airway and inflammatory autoimmune diseases, smoking, type of sinusitis, and anatomical variations and findings on CT scan. Table 1 shows the characteristics of patients by recurrent CRS after FESS. However, only fungal type of sinusitis was found to be a significant risk factor of recurrent CRS. Anatomical findings on CT scan postoperatively were mucosal thickening that was found in six patients, followed by osseous defect or skull base defect that was found in four patients. Deviated nasal septum was found in three patients only, whereas nasal polyp or progression of polypoidal disease was found in four patients and only one of them had the sinonasal polyposis protruding to the orbit. Adenoid hypertrophy was not common and was found only in one patient. Figure 1 shows Computed tomography (CT) scan of a patient with fungal chronic rhinosinusitis that had recurrence after functional endoscopic sinus surgery. The majority of patients that were diagnosed with CRS and admitted for FESS had a nasal obstruction alone or accompanied with anosmia or postnasal drip. Facial pain that is considered to be one of the major criteria was not common. Table 2 shows the clinical presentation of CRS of all patients

Table 1: Characteristics of patients by recurrent chronic rhinosinusitis after functional endoscopic sinus surgery

		Recurrence				P-value
		yes		No		
		%	Number	%	Number	
Gender	Male	13	65	66	60.5	0.981
	Female	7	35	43	39.4	
Age		37.29	13.81	38.07	14.71	0.761
Airway diseases	Yes	11	57.8	48	43.6	0.177
	No	8	42.1	62	56.3	
Inflammatory Autoimmune diseases	Yes	2	10	6	5.5	0.646
	No	18	90	103	94.4	
Smoking	Yes	3	15.7	16	14.5	0.763
	No	15	78.9	92	83.6	
	Ex-smoker	1	5.2	2	1.8	
Previous Nasal paranasal sinus surgery	Yes	7	36.8	26	23.6	0.091
	No	12	63.1	84	76.3	
Type of sinusitis	Fungal	7	77.2	7	50	0.038
	Non fungal	2	22.2	7	50	
Other comorbidities	yes	7	36.8	38	34.5	0.997
	No	12	63.1	72	65.4	

Anatomical variations (conchae Bullosa, Onodi cell, Heller cells)	Yes	3	15	22	20.1	0.344
	No	17	85	87	79.8	

*Significant P

Table 2: Clinical presentation of chronic rhinosinusitis

symptoms	Number	%
Nasal obstruction (NO)	37	28.6
Ansomnia	1	0.7
post nasal drip (PND)	2	1.5
facial pain	1	0.7
Nasal obstruction & Ansomnia	33	25.5
Nasal obstruction & post nasal drip (PND)	23	17.8
Nasal obstruction & facial pain	3	2.3
Ansomnia & facial pain	1	0.7
Nasal obstruction & Anosmia & post nasal drip (PND)	14	10.8
Nasal obstruction & Anosmia & facial pain	2	1.5
Nasal obstruction & post nasal drip (PND) & facial pain	7	5.4
Nasal obstruction & Anosmia & post nasal drip (PND) & facial pain	2	1.5
Other symptoms	3	2.3

DISCUSSION :

As one of the most common chronic diseases, a controversy among various studies of the incidence of recurrent CRS leads us to the need of multiple studies to identify more of risk factors to develop recurrent CRS after a successful FESS. The variability of the prevalence and incidence among different studies can be related to different genetic and environmental factors. In this study, the prevalence of recurrent CRS is 14.79%, which is considered to be within the average of different studies [4,5,7]. However, patients of CRS presented to our institute in different presentations. Some patients had all the major symptoms in the diagnosis criteria of CRS and some had only minor symptoms with CT changes. Nasal obstruction alone was the most common presentation among 37 patients in 28.6%, followed by nasal obstruction with anosmia in 25.5% of 33 patients. As many previous papers agreed with our result in which nasal obstruction was the major Complaint, except Rafii study, who identified cough in 54% as the most common presenting symptom [6]. Various risk factors were taken into consideration; fungal rhinosinusitis was found to be a significant risk factor in 82%. On the other hand, other risk factors presented as airway disease in 55%, inflammatory diseases 7%, smoking 15.8%, and anatomical variation 13.2%. This association supports the study of Musy and Kountakis, when they explained a significant number of patients had systemic illnesses, including asthma in 18 (26%) [8]. Similarly, Matsuwaki et al. found that the recurrence rate of CRS and asthma, peripheral eosinophilic count, and mucosal eosinophilic count were significant risk factors for the recurrence. In opposite to our study, fungal infection was high in recurrence group but not significant [5]. Same Kim et al. were investigated the prevalence of CRS in Korea which present in 6.95% and among these population, persistent/moderate to severe allergic rhinitis was proven to be the most significant risk factor [9]. In opposite to our study, fungal infection was high in recurrence group but not significant. CT scan of the paranasal sinuses has become mandatory for all patients undergoing FESS as Jiang RS et al. studied the anatomical change on CT scan postoperatively in patients undergone revision of FESS within 1 year of failure of primary FESS, the most common cause of revision of FESS was adhesion in osteomeatal complexes, stenosis of middle meatus and recurrent polypoidal disease [10]. Furthermore, Pierre Y et al. found on CT the most common findings was lateralized middle turbinates in 78% but who had retained agger nasi cell were in 49% while recurrent polyposis found in 37% and undiagnosed allergic fungal sinusitis in 1% of

patients[8]. Our study found mucosal thickening followed by osseous defect or skull base defect as the most common anatomical findings on CT scan postoperatively while adenoid hypertrophy was not common and found only in one patient. Different results, high percentage of patient required FESS revision was due to postoperative nasal polyposis, Kuan et al. and Bassiouni and Wormald[11,12].

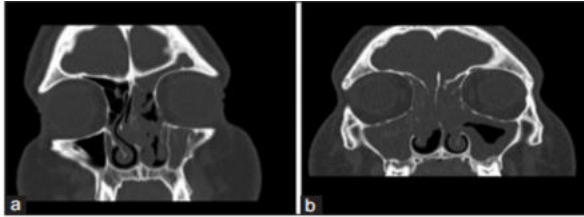


Figure 1: CT Scan of a patient with fungal chronic rhinosinusitis that had recurrence after undergoing FESS, (a) represents the CT preoperatively in 2017 (b) represents the CT postoperatively in 2019 which shows interval worsening of previously noted polypoid mucosal thickening involves the right maxillary antrum with near total opacification of rest of paranasal sinuses after 2 years of operation.

Limitations : There are multiple limitations of this study. The retrospective study design did not allow us to collect a full data from the medical records regarding the details of each case as well as other missing data that can be easily completed if we conducted the study prospectively. Furthermore, patients who had FESS operation in the last months of 2019, we could not follow them afterward to see whom of them have a recurrence of CRS.

CONCLUSION:

The prevalence of CRS was higher among males with a mean age of 37 years, and nasal obstruction alone was the major presentation. In conclusion, the prevalence of recurrent CRS is within the average that found in the literature (14.79%). This study suggests a significant association between fungal infection with recurrent CRS. The most common anatomical findings on CT scan postoperatively was mucosal thickening in paranasal sinuses followed by nasal polyps. A prospective multicentric chart review study taking into consideration more risk factors would make the relationship of risk factors and recurrent CRS patients more clear.

Financial support and sponsorship Nil.

Conflicts of interest: There are no conflicts of interest

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