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Research Article

Pathological and microbiological analysis of maxillary sinus in chronic sinusitis by Functional Endoscopic Sinus Surgery.

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ABSTRACT

Background and objective: With respect to the correct diagnosis of pathological and microbiological agent as chronic rhinosinusitiscreator and predisposing factors, this study performed by the objective to determine Pathological and microbiological of maxillary sinus in chronic sinusitis by Functional Endoscopic Sinus Surgery.

Material and Methods: In this cross-sectional study the FESS specimens were collected from 94 patients with rhino sinusitis with inclusion criteria and was studied in terms of bacteriology and pathology.Collected data were analyzed using descriptive tests, Chi- Square by the 16 version SPSS software.The significance level of the test was considered to be less than 0.05.

Results: In this study, out of 94 samples, bacterial growth was reported in 53 samples (56.4%).Staphylococcus epidermis in 12 cases (12/8%), Staphylococcus aurous in 11 cases (11/7%) and Enterobacter in 10 cases (10/6%) were the most common. There was a statistically significant difference between the growth or non-growth of bacteria and the species of bacteria (gram positive, gram negative) with allergies (P = .003). Nasal polyp was observed in 92 (97.9%) in Pathological analysis. Not significant difference between growth and no growth of bacteria also between species of bacteria with pathological specimens.

Conclusion: In this study gram positive bacteria's were the most common bacterial growth in culture. The variability of the results from studies may be due to the different techniques used as collection method, variation in culture methods, previous antibiotic therapy, and difficulty in distinguishing bacterial flora from pathogenic agent.

Key words: Microbiological, Pathological, maxillary sinus, chronic sinusitis, Functional Endoscopic Sinus Surgery.

INTRODUCTION

Chronic rhinosinositis (CRS) is a common inflammatory disease that is referred to as a recurrent inflammatory process that involves paranasal sinuses (1). The prevalence of this disease has increased in the world and is estimated to be 2 to 16% in the United States (2 and 3). Due to the fact that these statistics increase in hot and humid areas, more attention should be paid to the prevalence of this disease in the Middle East (4). In an attempt to justify and explain the activation factors of inflammatory events in this disease, there is a hypothesis that infectious agents, especially bacteria and fungi, are among the main factors responsible for the incidence and survival of CRS (5). Most studies claim that immune deficiencyand exposure to infectious agents such as viruses, fungi, bacteria and environmental contaminants cause chronic rhinosinositis (1, 2).

Despite various studies about chronic sinusitis, there is still no clear understanding of pathogenic mechanisms and factors involved in this disease. There is no definitive and consistent understanding about the distribution of bacterial species in patients with CRS. The variability of the results from studies in CRS may be due to the different techniques used as collection method, variations in culture methods, previous antibiotic use, and difficulty in distinguishing bacterial flora from pathogenic agents (5).CRS is one of the diseases that is often resistant to routine treatments, and without microbiological analysis, the choice of antibiotic regiment is difficult(6, 7). Functional Endoscopic Sinus Surgery (FESS) is widely used as a method for sample collection for microbiological and pathological analysis with the least risk of contamination, also for the treatment of sinus and nasal disorders (8, 9 , 10).Also there are studies have shown that FESS is not an effective method to secretion collection for study fungal agents (11, 12). Background and objective: Therefore, due to the necessity of proper and correct diagnosis of pathological and microbiological agent as chronic rhino sinusitis creator and predisposing factors, for effective and beneficial treatment in these patients, this study performed by aimed to determine Pathological and microbiological of maxillary sinus in chronic sinusitis by Functional Endoscopic Sinus Surgery.

Materials and Methods: In this cross-sectional study, 94 patients with chronic rhinosinositis referring to ENT clinic of Dastgheib Hospital and Motahari clinic of Shiraz were studied.

inclutive criteria include patients with chronic rhinosinositis, which have not been improved after the use of primary treatments such as antibiotics, normal saline irregation, topical and systemic steroids. Patients who received antibiotics at intervals of at least one month before taking FEES.

exclutive criteria include Patients with recurrence of rhinosinusitis (4 times in one year), Having an anatomical disorder in the nose and sinuses that prevents the observation of middle meatous.

In the first stage, demographic information such as age, gender, and geographical area, history of previous illness (immune deficiency,diabetes and other cases of rhinocynosis) were collected and recorded. The results of pathology and radiology were also collected of patient documentation.

Patients were referred to Shahid Dastgheib Hospital for bilateral or unilateral FESS. To perform FESS operation, after anesthesia, the nasal cavity was irrigationbynormal saline solution and then the solution Epinephrine and lidocaine1/10000 were injected at the site, then insertion the endoscope and removing the anesthetic appendage and the maxillary hole(maxilotomy). If there is a visible pathologic,one biopsy, or inflammation, 3 biopsy of the sinus tissue with BLAKSLY was taken. with a 2 cm texture and a 0.1 cm texture to one side of the sterile spout In that 1 cc normal saline sterile solution was transferred.sample was sent to pathology for analysis. Also, about 1 mm of tissue was transferred to a test tube containing 1 ml of thioglycolate solution for microbial culture. After entering the tissue in the tube containing the thioglycolate solution, the incubator was

incubated at 37 ° C for 24 hours, and then from the contents of the thioglycolateenvironment, on mannitol salt agar culture media, AndMacConkey agar, were re-cultivated. By observing bacterial colonies on the environments mentioned, the following diagnostic tests were performed. In order to identify Staphylococcus species, cultured colonies were used in mannitol saltagar medium and the following diagnostic tests were used including catalase, tube coagulase and DNAse. Blast agar culture medium was used to identify the susceptible colonies of this bacterium. Bacitracin susceptibility test, sulfomethoxazole susceptibility, campus test, ethylhydrocuprein hydrochloride and bile solubility were used to identify the members of this genus. To detect Enterobacteriaceae from bacteria grown on a MacConkey agar, biochemical reactions of bacteria on TSI agar, SIM, urea agar, Simon citrate agar, MR-VP broth and lysine and carboxylase were used.

Data were collected and analyzed using spss16 software and analyzed by descriptive statistics and Chi-square. The significance level of the test was considered to be less than 0.05.

Findings:

In this study, the mean age of the cases was 38/83 ±13/72 years and the age range of the cases varied from 13 to 75 years. 38 (40.4%) were female and 59 (59.6%) were male. Most of the cases were 83 (87.3%) from Fars province and the rest were from Bushehr provinces, respectively Kohgiluyeh and Boyer Ahmad, Khuzestan and Hormozgan provinces.

29 (30.9%) had a history of underlying illness and 65 (69.1%) had no underlying illness. 82 (87.2%) of the cases had no history of cigarette smoking and Tobacco use, and 12 (12.8%) had a positive history of cigarette smoking and Tobacco use.

Of the 94 cases, bacterial growth was reported in 53 cases (56.4%). The bacterial species were gram positive in 26 (27.7%) and gram negative bacteria in 27 (28.7%) bacteria. The most prevalent bacteria were Staphylococcus epidermidis in 12 cases (12.8%) and Staphylococcus aureus in 11 cases (11.7%) and Enterobacter in 10 cases (10.6%). Table 1 shows the frequency of the species of microorganism in the studied samples.

There was no statistically significant difference between growth and non-growth of the bacterium as well as the species of bacteria (gram positive, gram negative) in the cultivation of sinuses with age group, gender, underlying disease, positive history of cigarette smoking and Tobacco use.

The highest prevalence of clinical symptoms was related to hyposmia in 64 (68.1%) and fever in 5 (5.3%) patients. The frequency of clinical symptoms in the cases in both groups with bacterial growth and no bacterial growth is shown in Table 2.

61 (64.9%) patients had no positive history of allergies and 33 (35.1%) had a positive history of allergies. There was no statistically significant difference between allergies with underlying disease, cigarette smoking and Tobacco use.

There was a statistically significant difference between the growth or absence of bacterial growth and the species of bacteria (gram positive, gram negative) with allergies (P = .003), so that in 7 cases (21.2%), no microbial In 11 cases (33.3%) were gram positive bacteria and in 15 cases (45.5%) were gram negative bacteria. Also, in non-allergic subjects, no bacteria were grown in 34 cases (55.7%) and Gram positive bacteria were grown in 15 cases (24.6%) and gram negative bacteria in 12 cases (19.7%).

There was no statistically significant difference between the allergy and the patient's clinical symptoms including hyposmia, postnasal drainage, Nasal congestion, Facial Pain and pressure, Fatigue, Halitosis, pus in the nose and sinus examination, Headaches, Feeling of fullness, Cough, Toothache and Fever.

There was no statistically significant difference between bacterial growth or non-growth, as well as the species of bacteria (gram positive, gram negative) withthe patient's clinical symptoms including hyposmia, postnasal drainage,Nasal congestion, Facial Pain and pressure, Fatigue, Halitosis, pus in the nose and sinus examination,

Headaches,Feeling of fullness, Cough, Toothache and Fever.

Pathologic findings indicated that 92 (97.9%) samples had nasal polyps. Chronic sinusitis with calcification was also reported in one case (1. 1%) and squamous cell carcinoma in one case (1.1%). Relative and absolute abundance of pathological cases in the samples of the studied cultures is shown in Table 3. There was no statistically significant difference between growth or non-growth of the bacterium as well as between the bacterial species (gram positive, gram negative) in the cultivation of sinus secretions with pathologic specimens.

Discussion: In the present study, 53 samples (56.4%) were positive.positive microbial culturereported (83%) in the study by Cleland and et al (13), 91% in the Islami and et al study (14), 70% in the study by Bhattacharyya and et al (15) and about 53.2% in the Mantovani study (5). Some researchers have reported that the rate of growth of the bacterium varies between 17 to 60%, and this difference may be due to the difference in the method of transfer or the method of collecting samples (16).

In this study, the result of microbial culture showed that gram-positive bacteria isthe highest microbial growth rate (28.7%). The bacterial type was gram negative in 26 samples (27.7%). Unlike this study, Mantovani study showed that Gram-negative bacteria (58.6%) had a higher growth rate (5).

The results of our study showed that Staphylococcus coagulase negative (Staphylococcus epidermidis) had the highest growth rate in the studied specimens, followed by Staphylococcus aureus and Enterobacteriaceae, with a higher growth rate than other microorganisms.

In most studies, coagulase-negative staphylococcus is the most commonly grown organism group in the samples, which is similar with the result of our study (15-19).

On the opposite there are also studies that, the results are not similar with the current study. most common organism in the study of Islami et al In Iran Klebsiella pneumoniae (14), in the study of Cleland et al,was golden staphylococci (13) and in the Mantovani study (5) and the Panduranga study (20) was Pseudomonas aerosinosa.

A wide range of microorganisms can be the cause of chronic rhinosinusitis (15). The variation in the results of studies of chronic sinusitis may be due to differences in the methods for collecting samples, culture methods, antibiotic therapy, and mistakes in the differentiation of normal flora bacteria from pathogens (5).

In this study, the majority of people without a history of underlying illness had no history of allergies, cigarette smoking and Tobacco use. The relationship between allergies and background variables, such as cigarette smoking and Tobacco useand clinical signs of the patient was not statistically significant.

The association of allergy with growth or non-growth factor of bacteria and type of bacteria (gram positive, gram negative) was statistically significant (P = .003), so that in patients with a history of allergy, in 11 cases (33.3 %) Of gram positive bacteria and in 15 cases (45.5%) of the gram-negative bacterium has grown.

CRS is most commonly seen in patients with concomitant illnesses, such as asthma, environmental allergies, and pulmonary obstruction (21).

In this study, hyposmia, postnasal drainage and Nasal congestion were the most common clinical symptoms. In the Islamic study, postnasal drainage (90%) and Nasal congestion (81%) were the most common clinical symptoms (14). In the Panduranga study, headache (78%), the most common clinical symptom and the Nasal congestion (76%) were the second most common symptom in the specimens (20).

Pathologic findings indicated that 92 (97.9%) samples had nasal polyps. Chronic sinusitis with calcification was also reported in one case (1. 1%) and squamous cell carcinoma in one case (1.1%).

The highest bacterial growth was observed in inflammatory-allergic polyp, but the relationship between bacterial growth and pathological samples was not statistically significant. Gram-positive bacteria were more prevalent in the group with a pathologic pathology of allergic-inflammatory polyps and gram-negative bacteria in the group with a pathologic sample of inflammatory polyps. But the relationship between bacterial types (Gram positive and Gram-negative) with pathologic samples was not statistically significant.

Other studies have reported that nasal polyposis has no effect on the level of positive culture and the type of organism causing chronic rhinosinusitis (13), and there is no significant difference in the type of bacteria between patients with polyps and non-polyps (22).

Most studies have reported only the growth of aerobic microorganisms, and no anaerobic microorganism has been found in cultured samples. Probably not a good way to detect anesthesia (20, 5, 15). There are other studies that show the prevalence of anaerobic microorganisms (12).

conclusion: Bacteriology, pathophysiology, management and treatment of chronic rhinosinusitis is one of the challenging issues in ENT science (21). According to the results of this study and other studies conducted in this field, gram positive cocci (staphylococcal family) are the most common organisms causing chronic rhinosinusitis. Due to the limited research done in this field and especially in Iran, further studies are recommended.

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Table 1: Frequency of microorganisms isolated from patients with chronic sinusitis with endoscopic sinus surgery

Type of microorganism	Number	Percent
Staphylococcus epidermidis	12	22.65
Staphylococcus aureus	11	20.75
Enterobacteriaceae	10	18.87
Klebsiella	6	11.32
Escherichia coli	5	9.43
Citrobacter	4	7.55
pseudomonas aeruginosa	2	3.77
staphylococcus saprophyticus	1	1.89
Streptococcus Group D	1	1.89
streptococcus viridans	1	1.89

Table 2: Frequency of clinical signs in the subjects in two groups with bacterial growth and no bacterial growth

Clinical signs - abundance	People with bacterial growth		People without bacterial growth		p-value
	Number	Percent	Number	Percent	
hyposmia	33	62.3	31	75.6	p = 0.124
postnasal drainage	37	69.8	26	63.4	p = 0.001
Nasal congestion	29	54.7	23	56.1	p = 0.531
Facial Pain and pressure	27	50.9	14	34.1	p = 0.078
Fatigue	24	54.3	12	29.3	p = 0.085
Halitosis	19	35.8	15	36.6	p = 0.556
pus in the nose and sinus	24	45.3	6	14.6	p = 0.332

examination					
Headaches	15	55.6	13	50	p = 0.258
Feeling of fullness	11	20.8	13	31.7	p = 0.166
Cough	12	22.6	10	24.4	p = 0.516
Toothache	7	13.2	4	9.8	p = 0.428
Fever	3	5.7	2	4.9	p = 0.521

Table 3: Relative and absolute abundance of pathologic cases in the studied samples

Pathological sample (number)	**Has a bacterial growth**				**Lack of bacteria growth**	
	Gram-positive bacteria		**Gram-negative bacteria**			
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Allergic-inflammatory polyps (47)	17	65.4	10	37	20	48.8
Allergy polyps (31)	5	19.2	7	25.9	19	46.3
Inflammatory polyps (14)	4	15.4	9	33.3	1	2.4
Chronic sinusitis associated with calcification (1)	0	0	1	3.7	0	0
Squamous cell carcinoma (1)	0	0	0	0	1	2.4

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