

INCIDENTAL RHINO SINUSITIS FINDINGS IN PATIENTS REFERRED FOR BRAIN MRI

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ABSTRACT

BACKGROUND AND AIM: During brain magnetic resonance imaging (MRI), unexpected abnormalities are occasionally discovered this study aimed to assess the frequency of incidental rhino sinusitis findings in patients referred for brain MRI. **METHODS AND MATERIAL:** In this cross sectional study the frequency of incidental findings of 210 patients who referred to Besat MRI center for some other reasons, were evaluated. **RESULTS:** 210 patients (39.5% male and 60.5% female) with mean age 42.23 ± 18.67 years (range 11-88) were evaluated. 41 patients (19.5%) showed sinusitis in MRI images(thickening more than 4mm was) that among these patients sinusitis was confirmed in 33 patients (15.7%) by ENT specialists. 125 patients (59.5%) had at least one abnormality in their MRI. The most involved sinus was maxilla followed by ethmoid, frontal and sphenoid and the difference between sinuses regarding the frequency of involvement was significant ($P=0.001$). Furthermore the commonest finding was mucosal thickening and the rarest was opacity. **CONCLUSION:** The incidental findings of sinusitis in MRI were prevalent, maxilla was more involved sinus followed by ethmoid moreover the most common findings were mucosal thickness and opacity was an uncommon finding.

Keywords: incidental findings, sinusitis, brain MRI, thickening,

Introduction

Sinusitis is an inflammation of the mucosal lining of the paranasal sinuses. As the mucosa of the sinuses is continuous with that of the nose, rhinosinusitis is a more suitable term. Normally, sinuses are filled with air, but when sinuses become blocked and filled with fluid, germs (bacteria, viruses, and fungi) can grow and cause an infection. Conditions that can cause sinus blockage include the common cold, allergic rhinitis (swelling of the lining of the nose), nasal polyps or a deviated septum.^{1,2} Sinusitis can be subdivided into acute, subacute, and chronic disease. Acute sinusitis is defined as disease lasting less than 1 month, subacute disease lasts 1-3 months, and chronic sinusitis lasts longer than 3 months and is generally related

to suboptimally treated acute or subacute disease. Acute and subacute sinusitis are treated medically, whereas chronic sinusitis may require surgical intervention.^{3,4} Magnetic resonance imaging (MRI) is generally reserved for the evaluation of any complications of local sinus infections, particularly suspected intracranial extension and the ability to image in any plane is a considerable advantage in MRI.⁵ During brain magnetic resonance imaging (MRI), unexpected abnormalities are occasionally discovered and several experiences have conducted to perform the occurrence of sinus abnormalities on MRI examinations that had been performed for other reasons.⁶⁻¹⁰ A review article and meta-analysis indicated that the incidental findings on brain MRI are common and the rate of these findings increase with age.¹¹ Another study in Britain reported that

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the prevalence of incidental findings was 49 % and the abnormalities included mucosal thickening, air fluid level, opacity, retention cyst and polyp. The prevalent findings in this study was mucosal thickening and maxilla was the most common involved sinus.⁷

To address these concerns we steered this study to assess the frequency of incidental rhino sinusitis findings in patients referred for brain MRI in Besat MRI center in Kerman University of Medical Science in Iran in 2011.

Material and Methods

In this cross sectional study the T2-weighted axial, coronal and sagittal MRI of 210 patients who referred to Besat MRI center in Kerman for some other reasons, in 2011 were evaluated. The ethics committee of the Medical University of the Kerman found the protocol ethically acceptable, and the imaging was carried out in the department of radiology at Besat University Hospital. Exclusion criteria included implanted metal objects and any other condition in which MR imaging is contraindicated. The demographic information of recruited patients as sex, age history of surgery, smoking, allergy etc. was recorded. All MRI images were evaluated by one expert radiologist and the incidental findings were categorized based on anatomic and characteristics of MRI findings in sinuses such as opacity, mucosal thickening (< 2 mm, 2-4 mm and > 4 mm), air fluid level, retention cyst, polyp, mass and nasal septum deviation. The mucosal thickening more than 4 mm was consider as sinusitis.

Statistical Analyses

Data were analyzed using SPSS version 21. Categorical data are presented as numbers (%), and continuous data as mean \pm SD. We used the Chi₂ or Fisher's exact test to compare categorical variables. Correlations between BNP concentrations and hemodynamic variables were calculated by Spearman rank correlation analysis. $\alpha < 0.05$ was consider significant.

Results

In this cross sectional study the T2-weighted axial, coronal and sagittal MRI images of 210 patients with mean age 42.23 ± 18.67 years (range 11-88) were evaluated (Tab. 1). Eighty three patients

Patients characteristics		
Age(mean \pm SD)		42.23 \pm 18.67
Sex	male	83(39.5%)
	female	127(60.5%)
Sinusitis	acute	17(8.1%)
	Subacute	4(1.9%)
	Chronic	12(5.7%)
Pollution Exposure		16(7.6%)
smoking		29(13.8%)
Allergy		40(19%)
Surgery history		6(3%)

Table1: The characteristics of patients
The data are presented as Mean \pm SD and frequency

39.5% were male and 127 patients 60.5% were female. 41 patients (19.5%) showed sinusitis in MRI images that among them 19 patients(46%) was male and 22 patients (54%) was female, the difference between male and female regarding MRI findings was not significant ($P = 0.32$), among these patients sinusitis was confirmed in 33 patients (15.7%) by ENT specialists.125 patients (59.5%) had at least one abnormality in their MRI. The most involved sinus was maxilla followed by ethmoid, frontal and sphenoid and the difference between sinuses regarding the frequency of involvement was significant ($P = 0.001$). Furthermore the commonest finding was mucosal thickening and the rarest was opacity, additionally mucosal thickening more than 4 mm was seen in 41 patients (19.5%) that was considered as sinusitis. Concha bullosa was seen on 38 patients (18%).

Discussion

The incidental findings detection is an unintended consequence of brain MRI in clinical situations where the frequency of any related finding is likely to be low. These findings would help clinicians and adequately inform people who pursue screening

by brain MRI. The overall prevalence of incidental brain findings in our experience was 59.5% and these patients had at least one symptom on their MRI scanning, that is higher than previous experiences (32 -49%) across the world,¹²⁻¹⁹ moreover was higher than Ghenaati et al. study in Iran in Imam Khomeini Hospital that indicted the prevalence of incidental findings was about 42% in their patients.²⁰ The reason of such a discrepancy is not clear but it might be related to the patients selection and different study design.

In current practice the common and uncommon involved sinus was maxilla and sphenoid respectively that was in agreement with previous experiences.¹²⁻¹⁹

The frequency of sinusitis in female was more than male in our practice, conversely, in Katzman et al. study²¹ the prevalence of incidental imaging findings in a healthy asymptomatic male gender was higher than female (54.6% male, 45.4% female), consistently, Kim et al. indicated male dominance in their report.²²

The most prevalent discovery in involved sinuses in current survey was mucosal thickening on the other hand opacity was uncommon finding, consistently, in Kristo et al. trial the common finding was mucosal swelling.¹⁷ However, as oppose to these results a practice in South Korea emphasized that the opacity was the most prevalent finding in patients.²³ We considered the mucosal thickening more than 4 mm as sinusitis and showed 41 patients (19.5%) had sinusitis based on this classification, however in clinic only 80% of these patients showed clinical sinusitis. Wani et al in their practice signified no relationship between patient's symptoms and MRI findings.¹³ Conversely, Trap et al. specified that the abnormality on MRI correlate with season and clinical symptoms.¹⁴ In line with Trap et al study, Del Rio et al signified that incidental sinus changes on MRI are a common finding, however, they bear little association with symptoms and their prevalence is influenced by season during cooler months in winter.²⁴

One of the most important cause of sinusitis is obstruction (1-3), in current practice 43% of patients had moderate to severe septum deviation however, polyp and mass was rare and detected on 0.5 percent of the patients, consistently, Trap et al.

specified that blocked nose was the most common symptoms in patients.¹⁴

Generally, these incidental findings deserve to be mentioned when obtaining for brain MRI in research and clinical practice but are not sufficient to justify screening healthy asymptomatic people. So, the radiologists must determine the correlation of these abnormal findings to the clinical patient's symptoms and consider its impact on the patients. To this end, decisions must be made concerning the seriousness of the finding, including whether it is merely within the realm of normal variation.

This was uncontrolled study with relatively small sample size that limit the ability to generalize the result of our survey more studies with larger series to validate the findings reported here.

Conclusion

The incidental findings of sinusitis in MRI were prevalent, maxilla was more involved sinus followed by ethmoid moreover the most common findings were mucosal thickness and opacity was an uncommon finding.

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