

Incidental paranasal sinus inflammatory changes in a Jordanian population

M. Hiari¹ and M.A. Hiari²

التغيرات الالتهابية الطارئة في الجيوب المجاورة للأنف في مجتمع أردني
محمد الحيارى ومحمد علي الحيارى

خلاصة : أجريت دراسة استمادية لتحديد معدل انتشار شذوذات الجيوب جنية الأنف في مرضى أردنيين تم فحصهم لوجود علامات وأعراض عصبية لديهم ، باستخدام التصوير التفرسي بالرنين المغنطيسي . وتمت دراسة الصور التفرسية التي أخذت على المحور T2 لثنتين وثمانين مريضاً . وتبين أن 64.3% من هؤلاء المرضى كان لديهم شذوذ واحد أو أكثر . وكان تغلظ المخاطية هو أكثر الشذوذات التي لوحظت ، كما كانت الجيوب الغربالية هي أكثر المواقع تأثراً . إن التغيرات الالتهابية الطارئة بالجيوب المجاورة للأنف هي مشاهدات مألوفة في التصوير التفرسي بالرنين المغنطيسي التي تجرى للمرضى الذين يفحصون أصلاً بسبب أمراض عصبية . ويعتبر تصوير الرنين المغنطيسي طريقة حساسة لتقييم شذوذات الأنسجة الرخوة ، بما فيها التغيرات الالتهابية .

ABSTRACT A retrospective study was conducted to determine the prevalence of abnormalities in the paranasal sinuses in Jordanian patients who had undergone magnetic resonance imaging (MRI) scans for neurological signs and symptoms. The T2-weighted axial MRI scans of 280 patients were studied. Of these patients, 64.3% showed one or more abnormality. Mucosal thickening was the most common abnormality observed and the ethmoid sinuses the most commonly affected site. Incidental paranasal sinus inflammatory changes are a common finding in MRI scans performed for patients primarily scanned for neurological diseases. MRI is a sensitive method for assessing soft tissue abnormalities including inflammatory changes.

Changements inflammatoires occasionnels des cavités annexes des fosses nasales dans une population de Jordaniens

RESUME Une étude rétrospective a été réalisée pour déterminer la prévalence des anomalies des cavités annexes des fosses nasales chez des patients jordaniens ayant subi un examen IRM à la recherche de signes et symptômes neurologiques. Les images IRM en plan de coupe axiale réalisées en séquence pondérée T2 de 280 patients ont été étudiées. Parmi ces patients, 64,3% présentaient au moins une anomalie. L'épaississement muqueux était l'anomalie observée le plus fréquemment et le groupe ethmoïdal des cavités pneumatiques annexées aux fosses nasales était le site le plus couramment affecté. Les changements inflammatoires occasionnels des cavités annexes des fosses nasales constituent un élément fréquemment trouvé dans un examen IMR pratiqué sur des patients examinés en premier lieu pour des affections neurologiques. L'IMR (imagerie par résonance magnétique) est une méthode sensible pour évaluer les anomalies des tissus mous y compris les changements inflammatoires.

¹Department of Radiology; ²Department of Otolaryngology, King Hussein Medical Centre, Amman, Jordan.
Received: 24/06/97; accepted: 21/08/97

Introduction

Plain X-ray is still the most commonly used tool to investigate chronic sinusitis. Both computed tomography (CT) and magnetic resonance imaging (MRI) are more sensitive than X-ray. CT scanning has the advantage of demonstrating bone abnormalities while MRI is excellent at showing soft tissue changes. On T2-weighted MRI scans most soft tissue changes show as high signal intensity. Previous studies have reported changes on CT [1] and MRI [2] in the paranasal sinuses of asymptomatic patients, which would be regarded as abnormalities in symptomatic patients.

The present study was performed to investigate the incidence of sinus abnormalities shown on brain MRI scans performed primarily for neurological signs and symptoms.

Materials and methods

Patients included in this study were those referred by neurologists, neurosurgeons, ophthalmologists and physicians to exclude intracranial pathologies. Patients referred by ear, nose and throat surgeons to investigate sinus problems were excluded.

MRI scans from 280 patients were selected and studied. The scans were performed on a 1.0 tesla superconductive MRI scanner (Siemens Impact, Germany). The T2-weighted axial scans were examined in each patient; when sagittal and coronal scans were available these were also examined. The abnormalities studied were mucosal thickening, sinus opacification, fluid levels and retention cysts/polyps. Retention cysts and polyps were grouped together as it is often difficult to differentiate between the two on MRI scans. The presence and site of the abnormality were recorded. As this was a retro-

spective study, clinical correlation with any paranasal complaint was not available.

Results

Of the 280 patients, 156 were males and 124 females. The ages ranged from 10 years to 70 years with a mean age of 34 years. In all, 180 (64.3%) patients studied showed abnormality in one or more sinus group.

Mucosal thickening was the most common abnormality observed. It was divided into minimal (≤ 2 mm thickness), significant (> 2 mm thickness) and polypoidal; 2 mm was used as the dividing level as thicknesses of less than 2 mm are difficult to measure on most MRI machines. It has also been reported that mucosal thickness of ≤ 2 mm is physiological in the ethmoid sinuses, presumably due to the nasal cycle [3]. However, these observations cannot be applied to the maxillary, frontal or sphenoid sinuses. In all, 118 patients showed mucosal thickening. Of these, 76 (64.4%) had significant thickening and 10 (8.5%) polypoidal. Polypoidal changes were seen only in maxillary sinuses.

The ethmoid sinuses were the most commonly affected, with changes seen in 88 of the 180 patients (48.9%), followed by the maxillary sinuses with changes seen in 76 patients (42.2%); the least affected sinuses were the frontal and sphenoid sinuses—16 (8.9%) patients each (Table 1).

Opaque sinuses were seen in 14 patients, affecting maxillary (14 patients), frontal (2 patients) and sphenoid sinuses (2 patients). Fluid levels were seen in 18 patients and affected only the maxillary sinuses. Fourteen (14) patients showed retention cysts or polyps, affecting only the maxillary sinuses. Of the 180 patients with abnormalities, 133 (73.9%) showed bilateral changes and 79 (43.9%) had abnormalities in more than one sinus group; the maxillary and ethmoid were

the most common combination. Sixteen (8.9%) patients showed bilateral pansinusitis. There was no significant difference between the two sexes in the pattern of incidence of abnormality.

Discussion

MRI is an excellent technique to demonstrate soft tissue abnormalities because of its inherent superior tissue contrast in comparison with CT and because of its ability to give multiplanar imaging. Using different pulse sequences on MRI scans, most tumours can be differentiated from inflammatory processes [4,5]. The only disadvantage of MRI compared with CT is that bone changes or calcification are not precisely detected. In this area CT is superior and complements MRI [6].

Our study showed inflammatory changes in the paranasal sinuses in patients scanned for neurological problems. Of these patients, 64.3% showed inflammatory changes in one or more sinus group. The most common finding was mucosal thickening. The most commonly affected sinus group was the ethmoid sinuses followed by the maxillary sinuses. Fluid levels and retention cysts and polyps were found only in the maxillary sinuses. The pattern of abnormality correlates

well with previous studies [1]. However, the incidence of sinus abnormality is significantly higher compared with previous studies which have found sinus abnormalities in 42.5% [1], 39% [7] and 24.7% [2] of asymptomatic patients.

In our study 43.9% of the patients had abnormalities in more than one group of sinuses, with the ethmoid and maxillary sinuses being the most common combination. Zinreich et al. studying the normal nasal cycle using MRI, showed that in normal adults there are cyclical changes in the nasal mucosal volume [8]. These changes are also observed in the mucosa of the ethmoid sinuses, the turbinates, nasal septum, lateral nasal wall, the nasal cavity floor and the nasolacrimal duct, but they do not affect the frontal, maxillary or sphenoid sinuses. This may explain the increased incidence of mucosal thickening observed in the ethmoid sinuses in our study.

The findings in the present and previous studies, including that of Gwaltney et al. [9] and Leopold et al. [10], should be kept in mind when assessing and evaluating paranasal sinus abnormalities. As already mentioned, MRI is superior for the assessment of soft tissue abnormalities including inflammatory changes.

Table 1 Abnormalities in the paranasal sinuses found by magnetic resonance imaging

Sinus	Mucosal thickening	Fluid level	Opacification	Retention cyst/polyp
Ethmoid	88	0	0	0
Maxillary	76	18	14	14
Frontal	16	0	2	0
Sphenoid	16	0	2	0
Total ^a	196	18	18	14

^aThe total reflects the total number of abnormalities, not the number of patients

Conclusion

The significance of the study can be summarized as follows:

- Incidental paranasal sinus inflammatory changes are a common finding in MRI scans performed for patients primarily scanned for neurological diseases.
- MRI is a sensitive method for detecting even minimal and early inflammatory changes in the sinuses.
- The ethmoid sinuses are the most commonly affected sinus group.
- Patients can have significant inflammatory disease of the sinuses without apparent symptoms.

References

1. Havae TE, Motbey JA, Gullane PJ. Prevalence of incidental abnormalities on computed tomographic scans of the paranasal sinuses. *Archives of otolaryngology, head and neck surgery*, 1988, 114:856-61.
2. Moser FG et al. Incidental paranasal sinus abnormalities on MRI of the brain. *Clinical radiology*, 1991, 43:252-4.
3. Rak KM et al. Paranasal sinuses on MRI images of the brain: significance of mucosal thickening. *American journal of radiology*, 1991, 156:381-4.
4. Lloyd GA et al. Magnetic resonance imaging in the evaluation of nose and paranasal sinus disease. *British journal of radiology*, 1987, 60:957-68.
5. Shapiro MD, Som PM. MRI of the paranasal sinuses and nasal cavity. *Radiology clinics of North America*, 1989, 27:447-75.
6. Lloyd GA. Diagnostic imaging of the nose and paranasal sinuses. *Journal of laryngology and otology*, 1989, 103:453-60.
7. Lloyd GA. CT of the paranasal sinuses: a study of a controlled series in relation to endoscopic sinus surgery. *Journal of laryngology and otology*, 1990, 104:477-81.
8. Zinreich SJ et al. MR imaging of normal nasal cycle: comparison with sinus pathology. *Journal of computer-assisted tomography*, 1988, 12:1014-9.
9. Gwaltney JM et al. Computed tomographic study of the common cold. *New England journal of medicine*, 1994, 330:25-30.
10. Leopold DA et al. Clinical course of acute maxillary sinusitis documented by sequential MRI scanning. *American journal of rhinology*, 1994, 8:19-27.