Incidental parasinal sinus inflammatory changes in a Jordanian population

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Abstract A retrospective study was conducted to determine the prevalence of abnormalities in the parasinal 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. Mucoal thickening was the most common abnormality observed and the ethmoid sinuses the most commonly affected site. Incidental parasinal 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

Résumé 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 axial réalisé 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 IRM pratiqué sur des patients examinés en premier lieu pour des affections neurologiques. L'IRM (imagerie par résonance magnétique) est une méthode sensible pour évaluer les anomalies des tissus mous y compris les changements inflammatoires.

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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 retrospective 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 sinususes 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 [7]. However, the incidence of sinus abnormality is significantly higher compared with previous studies which have found sinus abnormalities in 42.5% [7], 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>
<thead>
<tr>
<th>Sinus</th>
<th>Mucosal thickening</th>
<th>Fluid level</th>
<th>Opacification</th>
<th>Retention cyst/polyp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethmoid</td>
<td>88</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Maxillary</td>
<td>76</td>
<td>18</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Frontal</td>
<td>16</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Sphenoid</td>
<td>18</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Total*</td>
<td>196</td>
<td>18</td>
<td>18</td>
<td>14</td>
</tr>
</tbody>
</table>

*The 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


