Arrested pneumatization of the sphenoid: a normal variant easily mistaken for a pathologic entity
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ABSTRACT

Objectives:
1. Describe the radiologic findings of arrested pneumatization of the sphenoid sinus.
2. Recognize this benign developmental variant to prevent unnecessary surgical intervention.

Methods: Between November 2012 to January 2014, six subjects presented with radiologic findings consistent with arrested pneumatization of the sphenoid bone, a benign developmental variant. In each case, review of imaging by a neuroradiologist at WFBMC confirmed this diagnosis. This series includes all cases encountered during routine clinical practice during this time period.

Results: All subjects underwent CT and/or MRI imaging as part of their initial work-up for a variety of Otolaryngology-related symptoms. In all cases, arrested pneumatization of the sphenoid sinus was initially not considered as part of the differential diagnosis by the Otolaryngologist. All subjects were recognized as having this benign developmental variant by our Neuroradiologists at WFBMC, and thus were managed conservatively, avoiding unnecessary interventions, such as further imaging and surgical biopsy.

Conclusion: Familiarity with this entity may prevent additional costly workup and unnecessary surgical intervention.

INTRODUCTION

Arrested pneumatization of the sphenoid sinus is a benign variant which can easily be mistaken for a pathologic entity. The purpose of this study is to describe the clinical presentation and radiologic findings of subjects who have this normal variant as to prevent unnecessary intervention and treatment.

METHODS AND MATERIALS

Design
Retrospective chart review

Setting
Academic medical center

Subjects
Subjects presenting to the Otolaryngology clinic between November 2012 and January 2014 that were identified during routine clinical practice to have a skull base mass that was radiologically or pathologically determined to be arrested pneumatization of the sphenoid sinus.

Intervention
A retrospective chart review was performed of all subjects during this time period. The electronic hospital medical record system was used to analyze data. In each case, review of imaging by a neuroradiologist at WFBMC confirmed the diagnosis of pneumatization of the sphenoid sinus using strict criteria, including a non-expansile lesion, internal curvilinear calcifications, sclerotic margins, and presence of internal fat. Charts were reviewed for demographic, clinical, and radiologic data.

RESULTS

Six patients were identified as having a sphenoid mass that was ultimately found to be secondary to arrested pneumatization of the sphenoid sinus. All subjects presented to clinic with a variety of symptoms, including headaches, vision changes, nausea, vomiting, tinnitus, facial numbness, nasal congestion, sinusitis and flashing lights in left eye.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Radiological Findings</th>
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<tbody>
<tr>
<td>1</td>
<td>CT without contrast shows a non-expansile lesion with the presence of sclerotic margins, internal matrix, and has a hounsfield unit (HU) of -55, indicating the presence of fat.</td>
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<tr>
<td>2</td>
<td>CT shows the presence of sclerotic margins and an internal matrix, both of which are characteristic of arrested pneumatization of the sphenoid sinus.</td>
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<tr>
<td>3</td>
<td>CT shows the presence of sclerotic margins and a non-expansile lesion, both of which are characteristic of arrested pneumatization of the sphenoid sinus.</td>
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<td>4</td>
<td>Oblique axial CT image highlights the Vidian canal, which is preserved by this normal variant. The internal matrix and sclerotic margins are also evident.</td>
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<tr>
<td>5</td>
<td>CT image shows a non-expansile lesion with sclerotic margins in image 6. In 2007 the diagnosis was suspected, but not confirmed, and thus a repeat CT (image 7) was performed 6 years later, which shows the lesion is stable in size, thus confirming the diagnosis.</td>
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<tr>
<td>6</td>
<td>CT shows the presence of an internal matrix in a non-expansile lesion. HU units measured are -36, indicating the presence of fat.</td>
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IN COMPARISON:

<table>
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<tr>
<th>Fibrous Dysplasia</th>
<th>Metastatic disease</th>
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<tbody>
<tr>
<td>No internal matrix</td>
<td>Permeative margin</td>
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<tr>
<td>No internal matrix</td>
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DISCUSSION

The normal process of pneumatization of the skull base and parasellar sinuses begins at the age of 4 months and continues through adolescence. This process of pneumatization can vary, with accessory, absent, hypoplastic, and arrested pneumatization recognized as normal variants. Arrested pneumatization occurs most frequently with the sphenoid sinus. This pathology leads to the persistence of atypical fatty marrow adjacent to the sphenoid sinus.

Characteristic features on CT include a non-expansile lesion with internal curvilinear calcifications and sclerotic margins.

Characteristic features on MRI include presence of internal fat and lack of mass effect.

If confident of these findings on imaging, no further interventions are necessary.

There is a broad differential diagnosis for a sphenoid lesion, including fibrous dysplasia, chordoma, and ossifying fibroma. It is important for the Otolaryngologist to recognize this benign variant in order to avoid unnecessary tests and interventions.

CONCLUSIONS

Considering the frequency of identification of arrested pneumatization of the sphenoid, there is a paucity of information about this diagnosis within the Otolaryngology literature.

Familiarity with this entity may prevent additional costly workup or unnecessary surgical intervention.

REFERENCES