AMSER Case of the Month
November 2023

91-year-old with headache and left sided weakness

Christian Pawelek M3, Creighton University School of Medicine
Erik Pedersen, MD
Creighton University Medical Center
Patient Presentation

• 91-year-old female presented with acute onset left sided weakness and facial droop. The patient was brought to the ED after a nurse noticed the facial droop and unsteadiness while ambulating. The patient also endorses a 6-month history of worsening right-sided headache. Past medical history significant for hypertension and heart failure.

• In the emergency department physical and neurological exam showed 5/5 strength in all extremities and facial symmetry.
  • Right sided cranial nerve VI palsy. The rest of the exam was normal.

• Labs were largely unremarkable.
What Imaging Should We Order?
### ACR Appropriateness Criteria

These imaging modalities were ordered by the ER physician

<table>
<thead>
<tr>
<th>Scenario Id</th>
<th>Procedure</th>
<th>Adult RRL</th>
<th>Peds RRL</th>
<th>Appropriateness Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focal neuro deficit, new, fixed or worsening, &gt;6 hours, stroke suspected</td>
<td>MRA head and neck without IV contrast</td>
<td>0 mSv</td>
<td>0 mSv [ped]</td>
<td>Usually appropriate</td>
</tr>
<tr>
<td></td>
<td>MRA head and neck without and with IV contrast</td>
<td>0 mSv</td>
<td>0 mSv [ped]</td>
<td>Usually appropriate</td>
</tr>
<tr>
<td></td>
<td>MRI head without IV contrast</td>
<td>0 mSv</td>
<td>0 mSv [ped]</td>
<td>Usually appropriate</td>
</tr>
<tr>
<td></td>
<td>CT head without IV contrast</td>
<td>1-10 mSv</td>
<td>0.3-3 mSv [ped]</td>
<td>Usually appropriate</td>
</tr>
<tr>
<td></td>
<td>MRI head without and with IV contrast</td>
<td>0 mSv</td>
<td>0 mSv [ped]</td>
<td>Usually appropriate</td>
</tr>
<tr>
<td></td>
<td>CTA head and neck with IV contrast</td>
<td>1-10 mSv</td>
<td>3-10 mSv [ped]</td>
<td>Usually appropriate</td>
</tr>
<tr>
<td></td>
<td>Arteriography cervicocerebral</td>
<td>1-10 mSv</td>
<td>3-10 mSv [ped]</td>
<td>Usually appropriate</td>
</tr>
<tr>
<td></td>
<td>MRI head perfusion with IV contrast</td>
<td>0 mSv</td>
<td>0 mSv [ped]</td>
<td>May be appropriate</td>
</tr>
<tr>
<td></td>
<td>CT head perfusion with IV contrast</td>
<td>1-10 mSv</td>
<td>Not Assigned</td>
<td>May be appropriate</td>
</tr>
<tr>
<td></td>
<td>US duplex Doppler carotid</td>
<td>0 mSv</td>
<td>0 mSv [ped]</td>
<td>Usually not appropriate</td>
</tr>
<tr>
<td></td>
<td>CT head with IV contrast</td>
<td>1-10 mSv</td>
<td>0.3-3 mSv [next]</td>
<td>Usually not appropriate</td>
</tr>
</tbody>
</table>
Findings: (labeled)

Expansile lucent lesion at the right petrous apex with thinning of the overlying bone
Findings: (labeled)

Inherently T1 signal hyperintense, mildly expansile lesion at the right petrous apex.

Well demarcated, mildly expansile, T2 hyperintense lesion at the right petrous apex.
Final Dx:

Petrosus Apex Cholesterol Granuloma
Case Discussion

• Etiology
  • More common in middle aged patients
  • Usually in patients with a history of middle ear infections

• Pathology and formation theories
  • One theory states there is a chronic foreign body reaction to cholesterol in the aerated portion of the temporal bone. This is attributed to eustachian tube dysfunction and repeated episodes of bleeding into blocked air cells
  • A second theory postulates that hyperplastic mucosa erodes bone and exposes marrow that bleeds.
  • In both scenarios, cholesterol is released and it is inefficiently absorbed by giant cells, causing a chronic inflammatory response, which creates a granuloma.
Case Discussion

• Clinical features
  • Variable presentation depending on the location of the granuloma, most are asymptomatic.
    • Petrous apex can present with: headache, hearing loss, tinnitus or cranial nerve VI dysfunction
    • Middle ear can present with: ear pain, hearing loss, dizziness, tinnitus, cranial nerve VII dysfunction or blue tympanic membrane
    • Mastoid bone can present with headache
Case Discussion

• Imaging Findings
  • CT
    • Expansile lesion with thinned overlying bone. Peripheral enhancement post-contrast
    • At the petrous apex, they are often associated with bone erosion
  • MRI
    • T1: Hyperintense expansile signal. Low signal rim due to hemosiderin ring
    • T2: Central signal with thinned adjacent bone
    • Difficult to differentiate between cholesterol granuloma and hydrated mucocele, but hydrated mucoceles are much rarer.
    • Can also have similar appearance to thrombosed ICA aneurysm. ICA aneurysm will usually have a central flow void.
Case Discussion

• Treatment
  • Asymptomatic lesions can be periodically monitored with imaging
  • There is no effective medical management for cholesterol granulomas
  • Definitive management requires surgical intervention
    • Different surgical approaches are available including an endoscopic endonasal approach or an infracochlear approach
      • Complete removal of the granuloma and cyst wall must be accomplished to reduce the risk of recurrence
    • Petrous apex granulomas are unique in that these lesions can be drained and stented as an alternative to surgical removal
References:


