Traumatic Retropharyngeal Pseudomeningocele with Atlanto-Occipital Dislocation in a Neurologically Intact Patient

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SUMMARY – Traumatic retropharyngeal pseudomeningoceles occur rarely, are associated with severe trauma, and have been reported in patients with significant neurologic deficits at presentation. We report the rare occurrence of a pseudomeningocele following a high-speed motor vehicle accident. Neurological examination showed the patient to be briskly following commands, with intact cranial nerve, motor, and sensory function. CT/MR imaging showed subarachnoid hemorrhage involving the interpeduncular cistern, a clivus fracture, a right occipital condyle fracture, an atlanto-occipital subluxation, aortic arch transection (stable and contained on CT angiogram), multiple rib fractures on the right side with associated pneumothorax, hemothorax and pulmonary contusions. His cervical spine was stabilized in a halo. He was subsequently managed in the intensive care unit and remained neurologically intact. A repeat MRI showed the interval development of a 2×1.5 cm pseudomeningocele at the craniocervical junction medial to the left occipital condyle communicating with the left anterolateral aspect of the spinal canal. Traumatic pseudomeningoceles are associated with large deceleration forces at the time of injury and are usually associated with significant neurologic deficits at presentation. However, they can arise and give rise to symptoms in a delayed fashion in trauma patients who are neurologically intact at initial presentation.

Introduction

Traumatic retropharyngeal pseudomeningoceles are rare findings associated with severe trauma and have consistently been reported in patients with significant neurologic deficits at presentation. Most cases have been associated in patients with atlanto-occipital dislocation and hydrocephalus. Although traumatic pseudomeningoceles of the cervical spine can be asymptomatic, they can give rise to delayed symptoms such as airway compromise, dysphagia, suboccipital pain, and delayed neurological deficits.

This makes it important to recognize this condition in trauma patients.

Case Report

A 40-year-old male was brought to the emergency department following a high-speed motor vehicle accident. There was no Battle sign, raccoon eyes, no external hematomas, swelling or other obvious signs of trauma to the head and neck. Physical examination showed bilaterally symmetric chest movements, a soft, nontender abdomen, and a stable pelvis. His neurologic function was entirely intact.

CT imaging demonstrated subarachnoid hemorrhage involving the interpeduncular cistern, a clivus fracture, a right occipital condyle fracture (figures 1A,B), an atlanto-odontoid subluxation, stable aortic arch transection, multiple rib fractures on the right side with as-
sociated pneumothorax, hemothorax and pulmonary contusions.

The patient was intubated in the ED secondary to progressive tongue swelling that resulted in airway obstruction. His cervical spine was stabilized in a halo.

Repeat MRI at two weeks showed the interval development of a fluid collection at the craniocervical junction most prominent on the left, just medial to the left occipital condyle where it measured 2×1.5 cm (figures 2A-C). The fluid collection communicated with the left anterolateral aspect of the spinal canal at the craniocervical junction suggesting pseudomeningocele. Also seen was an extensive ligamentous injury at the craniocervical junction and C1/C2, including injury to the tectorial membrane, anterior atlanto-occipital membrane, posterior atlanto-occipital membrane, posterior atlanto-axial membrane, and the left alar ligament (figure 2C). Due to the absence of neurologic deficits and the presence of associated traumatic injuries, the patient was managed conservatively for his retropharyngeal pseudomeningocele.

Discussion

Pseudomeningoceles are abnormal outpouchings of the arachnoid membrane through a dural defect and are usually of congenital or iatrogenic (postsurgical) origin⁶. Traumatic pseudomeningoceles are uncommon, and rarely seen in the cervical spine. When present they have been described in varying anatomical locations such as retropharyngeal⁷,⁸, posterolateral⁹ and intracanalicular¹. The first documented traumatic cervical pseudomeningocele was reported by Louw in 1992⁸, while the first retropharyngeal pseudomeningocele was reported by Williams et Al in 1995⁹.

Retropharyngeal pseudomeningoceles are rare complications of high velocity blunt
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Figure 2  A) Left parasagittal T2-weighted MR scan showing a sausage shaped CSF density lying between and separating the occipital condyle and atlas. B) Left parasagittal T2-weighted MR scan showing the connection between the CSF collection and ventral subarachnoid space adjacent to the left vertebral artery (arrow). C) Axial T2-weighted scan at the craniocephalic junction showing the disrupted atlanto-occipital ligament (arrow) and the connection (asterisk) between the spinal canal and pseudomeningocele.
Table 1

<table>
<thead>
<tr>
<th>Authors and year</th>
<th>Age (yrs)</th>
<th>Neurological exam</th>
<th>Associated spine injury</th>
<th>Time (weeks) to pseudomeningocele presentation</th>
<th>Hydrocephalus</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Williams et Al 1995</td>
<td>3.5</td>
<td>Quadriplegia</td>
<td>Atlanto-occipital dislocation</td>
<td>4</td>
<td>Yes</td>
<td>VP shunt</td>
</tr>
<tr>
<td>Naso et Al 1997</td>
<td>26</td>
<td>Quadriplegia, multiple lower CN palsies.</td>
<td>Bilateral occipital condyle fractures</td>
<td>14</td>
<td>Yes</td>
<td>VP shunt</td>
</tr>
<tr>
<td>Naso et Al 1997</td>
<td>11</td>
<td>Quadriplegia, progressed to death.</td>
<td>Atlanto-occipital dislocation</td>
<td>5</td>
<td>Yes</td>
<td>None</td>
</tr>
<tr>
<td>Natale et Al 2004</td>
<td>33</td>
<td>Sensory loss on the left C2 region</td>
<td>No obvious bony injury</td>
<td>&lt;1</td>
<td>No</td>
<td>LP shunt</td>
</tr>
<tr>
<td>Reed et Al 2005</td>
<td>9</td>
<td>Paresis of both upper extremities</td>
<td>Atlanto-occipital dislocation</td>
<td>4</td>
<td>Yes, delayed</td>
<td>None</td>
</tr>
<tr>
<td>Cognetti et Al 2006</td>
<td>19</td>
<td>Quadriplegia</td>
<td>Atlanto-occipital dislocation</td>
<td>6</td>
<td>No</td>
<td>LP shunt</td>
</tr>
<tr>
<td>Achawal et Al 2006</td>
<td>38</td>
<td>Quadriplegia</td>
<td>Atlanto-axial dislocation</td>
<td>Immediate</td>
<td>No</td>
<td>Surgical drainage+ lumbar drain placement</td>
</tr>
<tr>
<td>Mathews et Al 2007</td>
<td>40</td>
<td>Normal</td>
<td>Atlanto-axial subluxation</td>
<td>2</td>
<td>No</td>
<td>Observation</td>
</tr>
</tbody>
</table>

Trauma and have been described in association with atlanto-odontoid dislocation and hydrocephalus. Thus far only five reports appear to be available from the literature with an additional case with questionable trauma at onset. Probably secondary to the nature and severity of the underlying trauma, all retropharyngeal pseudomeningoceles have been reported in patients with neurological deficits. Our case demonstrates that a retropharyngeal pseudomeningocele may occur in a neurologically intact patient.

Since traumatic pseudomeningoceles are rare, arise in a delayed fashion, and may be asymptomatic, it is entirely possible that pseudomeningoceles may arise following trauma more frequently than reported, and go undetected in neurologically intact patients lacking indications for delayed imaging of the spine (table 1).

Management strategies for pseudomeningoceles are controversial and include conservative management, lumboperitoneal shunting, and open surgical repair. Regarding lumbar pseudomeningoceles, Kitchen advocated conservative management with bed rest as the first approach with surgical repair of the tear in case of failure. However he considered lumboperitoneal shunting to be an alternative. In retropharyngeal pseudomeningoceles, if conservative management is not effective the surgeon must carefully weigh the options of CSF diversion with surgical dural defect repair. Because of the anatomical complexity of the retropharyngeal space and because of the location of the dural tear a surgical approach can be difficult and risky (sepsis).

In previous cases of retropharyngeal pseudomeningoceles with co-existing obstructive hydrocephalus, placement of ventriculoperitoneal
shunts has been used to decrease intracranial pressure and secondarily help to heal the pseudomeningocele (table 1). Others, in the absence of hydrocephalus, have placed lumboperitoneal shunts resulting in progressively reduced size of the CSF collection and improvements in clinical state44. More aggressive surgery is best reserved for the cases unresponsive to less invasive treatment.

Conclusion

Retropharyngeal pseudomeningocele is a rare complication of blunt occipitocervical trauma. However, it should be considered in the differential diagnosis of delayed onset respiratory, swallowing, or neurological disturbances, even in patients who are neurologically intact at presentation.

References