Traumatic pseudomeningocele

A 20 year old male presented with a gradually progressive weakness in the right upper extremity in the form of weakened grip for the last 6 weeks. He also complained of tingling and numbness in the right hand and arm, especially the little finger. He had met with a road traffic accident before that and had sustained injuries on the face and neck. There was no history of any fracture sustained at that time. Clinical evaluation revealed grade-3 power in the wrist and finger flexors and extensors. Pin prick sensation was found to be reduced along the C7-T1 dermatome. An MR evaluation of the cervical spine and brachial plexus was suggested for further evaluation. MR evaluation of the brachial plexus revealed a well-defined lobulated outpouching from the thecal sac at C7-T1 level, extending through the right C7-T1 neural foramen into right apical region. It demonstrated signal characteristics similar to CSF on T1- and T2-weighted images. It contained no neural elements. Right exiting nerve roots were not visualised at this level, whereas the left side neural elements were normally seen. MR-myelography demonstrated continuity of this sac with the thecal sac. No overt osseous injury was evident. Based upon the imaging findings and relevant clinical history, a diagnosis of a traumatic pseudo-meningocele with associated nerve root avulsion was made.

Discussion:

Pseudomeningocele, as the name implies, is referred to an extradural encapsulated collection of CSF, which unlike a meningocele is not contained by dura. The escaped cerebrospinal fluid (CSF) gets encapsulated in a fibrous sac forming a pseudomeningocele. Most common cause is iatrogenic i.e. following spine surgery, which is attributed to incomplete dural closure or dural laceration during surgery. Less frequent cause includes post-traumatic pseudomeningoceles. Post-traumatic pseudomeningoceles are rare events, often seen in cervical spine secondary to high-energy trauma mostly a traction injury. Traction forces draw the cervical nerve root sleeves into the intervertebral neural foramen. Initially, the meninges get torn, and if the trauma is severe enough, it can result in nerve root avulsion. The torn nerve root stumps retract and CSF escapes into the neural foramen. Leaked CSF then accumulates in the juxta-spinal soft tissues and gets encapsulated by connective tissue. Transmitted CSF pulsations keep the sac patent and result in gradual enlargement of the sac. Within several days, cellular proliferation may result in closure of the dural tear, leaving a loculated pouch-like extradural collection of CSF. Formation of pseudomeningocele was previously considered a pathognomonic sign of nerve root avulsion; however it does not always imply nerve root avulsion. Dura can get torn with varying degrees of neural trauma, ranging from a mild stretching to complete root avulsion. Moreover, nerve root avulsion can also occur without formation of a pseudomeningocele. MRI owing to its non-invasive nature, multiplanar imaging capabilities, lack of radiation and high contrast resolution is the preferred imaging tool. Pseudomeningocele is typically identified as a well-circumscribed cystic lesion with signal intensity characteristics similar to CSF on all sequences. MR-myelography i.e. heavily T2-weighted 3D-MRI permits superior visualization of the nerve roots within the spinal canal and is especially useful in depicting root avulsion. MRI is particularly useful in depicting those meningocele, which do not
communicate with thecal sac owing to dural scarring and consequently fail to opacify on conventional or CT-myelography. MR-imaging also plays an invaluable role in depicting nerve root avulsions without pseudomeningocele, as well as those pseudomeningoceles which occur without nerve root avulsion. CT-myelography and conventional myelography have also been used in imaging of brachial plexopathy. However both studies are invasive requiring a lumbar puncture and intrathecal administration of contrast medium with subsequent radiation exposure. CT myelography scores superior to conventional myelography in visualizing the nerve rootlets. Coronal and oblique-coronal views of CT-myelography are considered superior to conventional axial images, for the visualization the number of roots and in determining the exact level of the roots.

Traumatic pseudomeningocele with root avulsion represent pre-ganglionic brachial plexus injury and carry a poor prognosis. They are usually managed conservatively with physical therapy and rehabilitation. Re-anastamosis of avulsed root to spinal cord is not generally advocated. However newer microsurgical techniques are prompting re-review, especially in infants with brachial plexus birth injury.  

**Differential Diagnosis List:** Traumatic pseudomeningocele

**Final Diagnosis:** Traumatic pseudomeningocele

**References:**


Figure 1

**Description:** There is a well-defined lobulated outpouching arising from the thecal sac at C7-T1 level, extending through the right C7-T1 neural foramen into right apical region. **Origin:**
Description: There is a well-defined lobulated outpouching arising from the thecal sac at C7-T1 level, extending through the right C7-T1 neural foramen into right apical region. Origin:
Figure 2

Description: The bright-signal pseudomeningocele sac is well visualised on these T2-w axial images. Right side nerve root is not seen, however the left exiting nerve root is normally visualised in the left neural foramen. Origin:
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Description: Pseudomeningocele sac demonstrates isointense signal to the CSF. Origin:
Description: Pseudomeningocele sac demonstrates isointense signal to the CSF. No neural elements are evident within the sac. Origin:
Figure 4

Description: MR myelogram demonstrates well the CSF-filled outpouching from the right lateral aspect of the thecal sac at C7-T1 level. Origin:

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