

Henry Ford Health System

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Case Reports

Medical Education Research Forum 2019

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5-2019

### Unusual Headaches due to Subarachnoid-Pleural CSF Fistula

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#### Recommended Citation

Thodge, Anay; Patel, Suresh C.; Stone, Michael; Marin, Horia; and Griffith, Brent, "Unusual Headaches due to Subarachnoid-Pleural CSF Fistula" (2019). *Case Reports*. 79.

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## Clinical Presentation

- 67-year-old female with long standing history of **occipital headaches**.
- Previously underwent **surgical decompression for suspected Chiari I Malformation** at an outside hospital without relief.
- Patch duroplasty was performed, but symptoms persisted with **new gait instability and altered mental status**.
- After presenting to our institution, **intracranial hypotension (IH)** was suspected.
- MR myelogram was notable for meningocele abutting pleural effusion.
- The right pleural effusion was tapped and found to be positive for **beta-2-transferrin**.
- After failed blood patch attempts, the meningocele was **surgically ligated** with resolution of the pleural effusion and IH.

## Initial Imaging

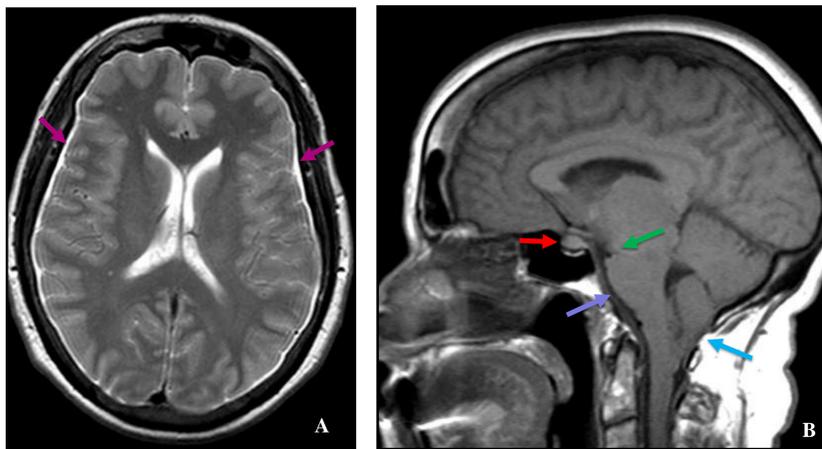


Figure 1. Axial T2 (A) and sagittal T1-weighted (B) images demonstrate findings of intracranial hypotension, including **bilateral subdural collections**, **pituitary enlargement**, **decreased mamillopontine distance**, **ventral pons flattening** and **caudal cerebellar tonsillar displacement**.

## Imaging After Chiari Decompression

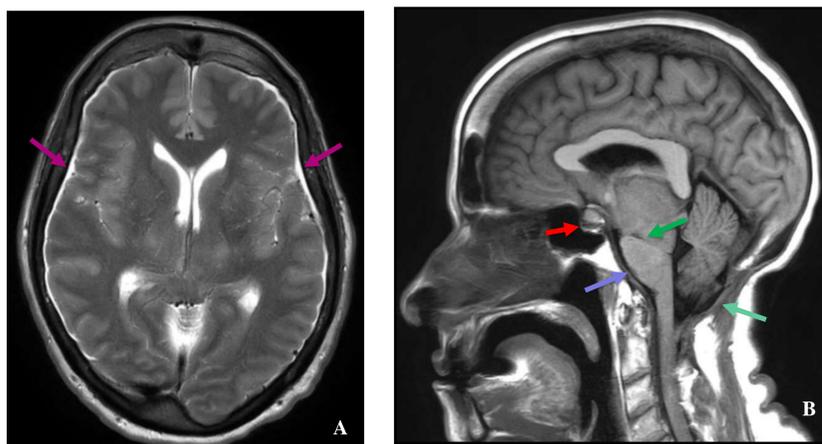


Figure 2. Axial T2 (A) and sagittal T1-weighted (B) images status post **suboccipital craniectomy** re demonstrate findings of IH including **edematous and enhancing dura**, **swollen pituitary gland**, **decreased mamillopontine distance** and **ventral pons flattening** similar to before.

## Further Imaging Workup

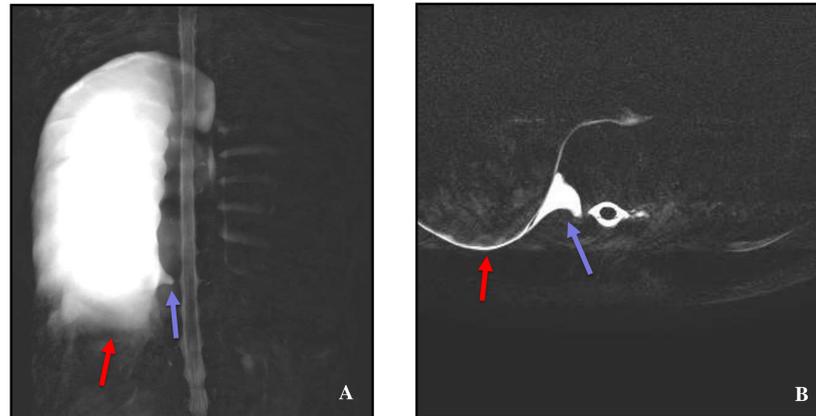


Figure 3. Coronal MIP (A) and axial (B) images from an MR myelogram of the thoracic spine shows a **meningocele** extending from the right T10-T11 neuroforamen towards the **right pleural effusion**.



Figure 4. Coronal (A) and axial (B) CT images re demonstrate the dependent **right pleural effusion** communicating with the **right T10 – T11 neural foramen**.

## Imaging Following Meningocele Ligation

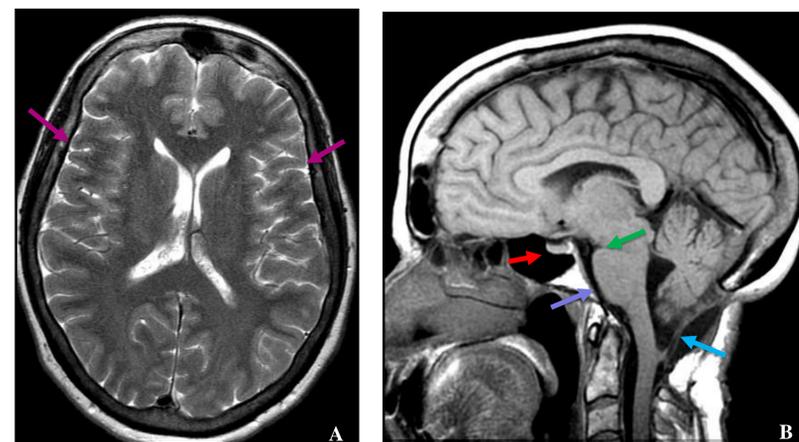


Figure 5. Axial T2 (A) and sagittal T1-weighted (B) images status **post meningocele ligation** show improvement in imaging appearance of IH including **resolution of the subdural collections**, **decreased pituitary size**, **increased mamillopontine distance**, **re-expansion of the prepontine cistern** and **decreased cerebellar caudal migration**.

## Discussion

- The headache was due to subarachnoid pleural CSF fistula, which is a rare type of fistula.
- Most of the cases are secondary to **traumatic injury and surgery**.
- Patients will usually present with **respiratory symptoms and headache**.
- Biochemical studies of pleural fluid will usually reveal **transudative effusion**, but it is not sufficient to diagnose the fistula especially in cases of trauma.
- **MRI** is the preferred modality for confirming the diagnosis, however, spine MRI, radioisotope cisternography and CT myelography can be useful.

## Mechanism

- Headaches usually accompany subarachnoid pleural CSF fistulas.
- The pleural space pressure ranges from -5 to -7.5 cm H<sub>2</sub>O and the CSF pressure ranges from 10 to 15 cm H<sub>2</sub>O.
- If parietal pleura is defective and visceral pleura is intact, **CSF follows pressure gradient** and intracranial CSF pressure decreases causing headache.
- Alternatively, if the visceral pleura is defective, the pleural space pressure overcomes CSF pressure during expiration and can cause **pneumocephalus leading to headache**.

## Treatment

- Although there is debate regarding the best approach for treatment of subarachnoid pleural CSF fistulas, many authors agree that **early treatment is critical**.
- In order to overcome pressure differences, **CSF drainage systems** should be used in **conjunction with chest tube**.
- Seven days of CSF drainage is adequate for closure of dural defect, however chest tube should remain in place for several additional days to protect the closed dural defect from pressure differences.
- Most reported cases required **surgical correction**.
- One study suggested **percutaneous treatment** with embolic agents can be effective as a minimally invasive approach.

## References

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