Treatment of SIH: 
What’s new & what’s next

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Disclosures

1. No conflict of interest
2. Use of fibrin glue for epidural injection is off label
What’s new & what’s next?

What’s new?

CSF-venous fistula

Clinical/Scientific Notes

Figure: Direct CSF-venous fistula in spontaneous intracranial hypotension
What’s new?

CSF-venous fistula

ABSTRACT

SUMMARY: CSF-venous fistula is a newly reported cause of spontaneous intracranial hypotension that may occur in the absence of myelographic evidence of CSF leak. Information about the entity is currently very limited, but it is of potential importance given the large percentage of cases of spontaneous intracranial hypotension associated with negative myelography findings. We report 2 additional cases of CSF-venous fistula and describe the “hyperdense paraspinal vein” sign which may aid in its detection.

The “Hyperdense Paraspinal Vein” Sign: A Marker of CSF-Venous Fistula

Published February 11, 2016 as 10.3174/ajnr.A4682
CVF

Rolled patient, scanned immediately

Scanned decubitus
Rolled patient, scanned immediately
Paradoxically, the biggest challenge in treatment, in my opinion, is improving diagnosis.

Knowing who to treat and who will benefit is as important!

- Better dx criteria
- Quantification of positionality
- Outcomes tracking
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CT Guided Approach to Diagnosis and Treatment of Ventral CSF Leaks

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No disclosures except for confusion and ignorance

The more I know, the more I know I don’t know
(paraphrased) Aristotle
32-year-old female C/O positional headache for several months; now with no upright time, dizziness, tinnitus, nausea, foggy memory, OP 4; 1 blind BP with temporary relief; she has been to 4 different major medical centers with no DX

No MR imaging findings to suggest leak

What was missed? Subtle disc causing subtle leak
Strategies for evaluation of CSF leaks
- Optimized CT Myelography
- Dynamic Fluoroscopic Myelography
- MR Myelography with intrathecal Gd

Causes of ventral CSF leaks

CT fluoroscopic targeting of ventral leaks
### Imaging Options for Detecting Leaks

**Spinal MRI: Standard or Heavily T2W**

<table>
<thead>
<tr>
<th>Leak Type</th>
<th>Imaging Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate to fast leak</td>
<td>Optimized CT Myelography, Dynamic Fluoro Myelography, DSM</td>
</tr>
<tr>
<td>Fast &amp; super fast leak</td>
<td>Dynamic Fluoro Myelography</td>
</tr>
<tr>
<td>Slow leak</td>
<td>MR Myelography with Intrathecal magnevist</td>
</tr>
<tr>
<td>Super slow or intermittent leak</td>
<td>Delayed CT, Delayed MR, Nuclear Medicine</td>
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</tbody>
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### CT Fluoroscopic Guided Technique: Localize LP site, Lateral Decubitus

- Patient Scouted
- Patient marked for LP
CT Fluoroscopic Guided LP & CSF Pressure Measurement: legs extended, relaxed, atraumatic 24g Gertie Marx needle; standard and digital manometer

Distributing the contrast: CT “Yoga” and Log Roll Initial Scan Prone, may add Lateral Decubitus
Iatrogenic LPs epidural catheter placement surgery

Spontaneous or traumatic

Discs fast leaks intermittent or slower leaks OR no obvious leak seen
Ventral Leaks

- Iatrogenic
  - LPs
  - Epidural catheter placement surgery
- Spontaneous or traumatic
- Discs
  - Fast leaks
  - Intermittent or slower leaks
  - OR no obvious leak seen
Ventral Leak from LP

Small post op leak from nerve root

Ventral Leaks

- Iatrogenic LPs
  - Epidural catheter placement surgery
- Spontaneous or traumatic
- Discs
  - Fast leaks
  - Intermittent or slower leaks
  - OR no obvious leak seen

46-year-old female C/O 2yrs debilitating HA, with cranial neuropathies that started after Zumba and Boot Camp class, she was doing "burpees", Required prolong hospitalization; Normal MRI
Ventral epidural collection OP: 31.20

- Iatrogenic LPs
- Epidural catheter placement surgery
- Spontaneous or traumatic
- Discs
  - Fast leaks
  - Intermittent or slower leaks
  - OR no obvious leak seen
CT Myelography: Calcified Thoracic Disc penetrating the dura causing a leak: OP 8.25

Calcified thoracic disc treated with targeted fibrin glue and bloodpatch x2 required surgery

Surgical image of calcified disc

Surgical image courtesy Wouter Schievink
51-year-old woman with 2 week history of positional headaches that started abruptly; no inciting event
Leak originated at the site of the smaller disc.

DSM for Fast Leak: watching the contrast flow
Calcified Disc Causing Tear
Ventral Leaks

- Iatrogenic LPs
- Epidural catheter placement surgery
- Spontaneous or traumatic
- Discs
  - Fast leaks
  - Intermittent or slower leaks
  - OR no obvious leak seen

53 yo developed symptoms after coming in from golf
No obvious leaks on CT myelography

MR Myelography for slow leak: confirmed leak under a disc

This 55-year-old male presenting with C/O headaches starting 2012, blurry and double vision, short-term memory loss, swallowing problems and disequilibrium causing falls, sleeping 18 hours per day, he would fall asleep driving, unable to add 2+2
From 2012-2016 worsening herniation

CT and MR Myelography

Small Disc no obvious leak
s/p 1st Surgery: Disc increased in size, more mass effect on spinal cord

Oct 2017 MRI: s/p 2nd surgery on disc, repeat MRI 6 mos later; improved downward herniation
Treatment for CSF Leaks

- Bedrest, caffeine, fluids
- Blood and/or Fibrin glue patching:
  - nontargeted
  - targeted to site of leak
- Surgery

Headache: ? Pressure Problem

Brain MRI + Contrast
(normal imaging & pressure do not exclude leak)

- Leak
  - ? Leak
  - Spinal MRI
  - LP & pressure / CT Myelo

Further Eval
- Dynamic Myelo
delayed Gado
Myelo CT

Treatment
- Target with Blood and/or
  Fibrin Glue x 2
  Failed patch x2 surgery
- Nontargeted patch
  Targeted to most likely potential site
What can we take away from this??

- Headache: could this be a pressure related problem?
- Evaluation: MRI brain with and if leak suspected, consider MRI of spine
- Suspicion for leak: consider CT myelo for 1st evaluation
- Further evaluation: may require matching speed of leak with the best imaging strategy
- No leak seen: consider most likely potential site
- Treatment: nontargeted vs targeting most likely site with blood and/or fibrin glue

40 yo: HA suddenly in a frontal location and then extended to the occipital area, now with face and jaw pain; may have been related to working out in the gym and yoga
Leak originated from upper smaller disc which was adherent to the dura