Subdural Hematoma secondary to CSF Leak

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RAD 4001

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Clinical History

- 22 yr old G1P1 w/ no significant history presenting with nausea, vomiting, and positional headaches.
- She had an epidural 10 days prior, and headaches started immediately following epidural placement. At the time that symptoms initiated she elected for conservative management for the past couple of days, fluids, caffeine, and laying flat.
- Patient presented to the hospital because the symptoms have gotten worse. Pt denied any sensory changes, seizures, weakness, or bowel/bladder incontinence.

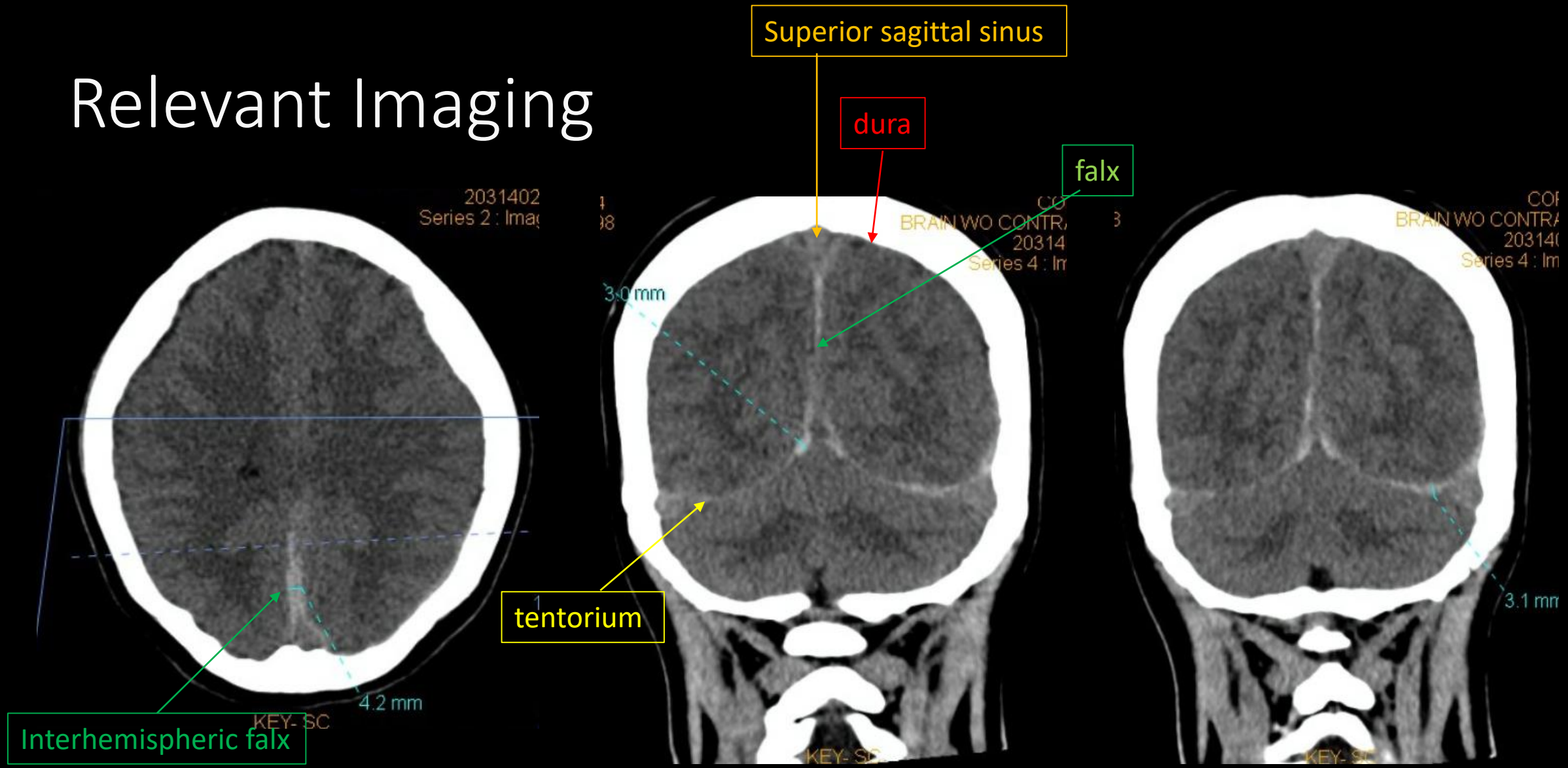
Clinical History Continued

- Vital signs wnl:
  - Temp: 96.7
  - HR: 78
  - BP: 116/70
  - RR: 16
  - Saturating above 96% on room air
- On PE:
  - GCS:15
  - patient was awake, alert, and oriented x3
  - pupils were equal and reactive
  - moving all 4 extremities fully with sensation intact
- Concerned for CSF leak, CT brain without contrast ordered

Initial Differential Diagnosis

- Post dural puncture headache
- Intracranial hypotension
- Arteriovenous malformation
- Hemorrhage
- Brain Tumor
- Coagulopathy
- Infection
- Metabolic derangement

Relevant Imaging



Summary of Imaging Findings

- A small subdural hematoma present along the mid to posterior portion of the interhemispheric falx, and mild subdural hemorrhage along the tentorial leaves bilaterally.
- Classification:
- SDH is classified via CT as acute, subacute and chronic.
  - **Acute subdural:** (0-2 days) Blood in acute stage appears **hyperdense** in a pre-contrast CT scan.
  - **Subacute subdural**: In the subacute phase (between 3-14 days) it is **isodense** with brain and can be missed.
  - **Chronic subdural**: Chronic hematoma appears **hypodense** (lucent) as the cellular elements dissolve. Blood products are absorbed with time (after two weeks) and change to clear liquid. It now appears as dark or hypodense in a pre-contrast CT scan.

Differential Diagnosis based on imaging

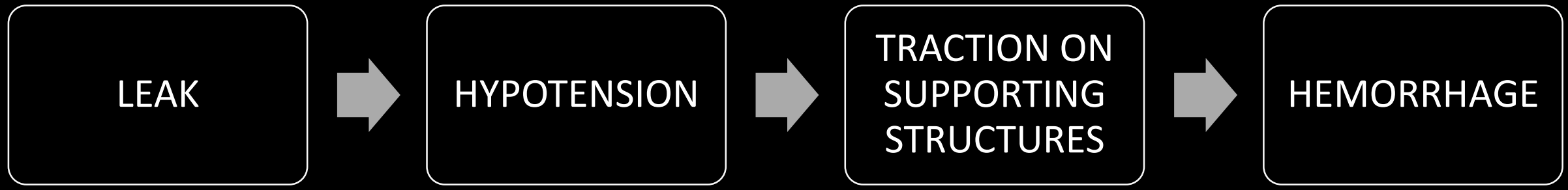
- Subdural hemorrhage
- Subdural hygroma
- Subdural empyema
- Infarct
- Artifact

Common Etiologies of Subdural Hemorrhage

- **Trauma** — Head trauma is the most common cause of SDH
- **Antithrombotic therapy** — The use of antithrombotic agents increases the risk of SDH
- **Cerebral atrophy** — Patients with significant cerebral atrophy are at high risk for SDH, seen in older adults, in individuals with history of chronic alcohol abuse, and those with previous traumatic brain injury
- **Cerebral vascular malformations**
- **Brain tumors** -SDH associated with dural metastasis
- **Vasculopathy** – Cocaine abuse with associated hypertension and vasospasm has been proposed as a rare cause of spontaneous SDH
- **Coagulopathy** – The risk of SDH may be increased in patients with thrombocytopenia and with and without liver disease
- **Child abuse**
- **Spontaneous** – Nontraumatic SDH in the absence of provoking factors
- **Intracranial hypotension**

How does a CSF leak cause subdural hemorrhage?

- Low cerebrospinal fluid pressure (intracranial hypotension), typically caused by a spontaneous or iatrogenic cerebrospinal fluid leak, may occur following lumbar puncture or epidural.
- As the CSF pressure decreases, there is a reduction in the buoyancy of the brain, causing traction on the anchoring and supporting structures. This traction on bridging veins can lead to the tearing and rupture of these vessels.
- Additionally, intracranial hypotension itself leads to engorgement of cerebral veins and subsequent leakage of fluid into the subdural space.


LEAK
HYPOTENSION
TRACTION ON SUPPORTING STRUCTURES
HEMORRHAGE

Continued discussion

- Unintentional dural puncture during epidural anesthesia is not uncommon, occurring ~ 3.6%.
- Intentional dural puncture occurs with spinal anesthesia, where anesthetic is injected into the subarachnoid space.
- Spinal anesthesia offers the same advantages as epidural anesthesia, with a shorter time of onset.
- Approximately one third of patients who have had dural puncture will develop a post dural puncture headache (PDPH).
- Intracranial subdural hematoma is rare, having been reported fewer than 100 times (according to a lit review in 2018).

Treatment

- Patient required IR guided blood patch, due to failure of conservative management of CSF leakage. She reported decrease intensity of headaches after blood patch.

Final Diagnosis

- Subdural hematoma secondary to intracranial hypotension due to an iatrogenic CSF leak from an antepartum epidural

ACR appropriateness Criteria

Summary of Recommendations

- **Variant 1**: Imaging is usually not appropriate for the initial imaging of patients with acute head trauma that is mild (GCS 13–15) when imaging is not indicated by clinical decision rule (eg, 2008 ACEP Clinical Policy).
- **Variant 2**: Noncontrast head CT is usually appropriate for the initial imaging of patients with acute head trauma that is mild (GCS 13–15) when imaging is indicated by clinical decision rule (eg, 2008 ACEP Clinical Policy).
- **Variant 3**: Noncontrast head CT is usually appropriate for the initial imaging of patients with acute head trauma that is moderate (GCS 9–12) or severe (GCS 3–8) or penetrating. Please refer to Variants 8 and 9 for suspected intracranial arterial or venous injury due to clinical risk factors.
- **Variant 4**: Noncontrast brain MRI or noncontrast head CT may be appropriate for the short-term follow-up imaging of patients with acute head trauma who have unchanged neurologic examination and unremarkable initial imaging, especially when the neurologic examination is abnormal (GCS < 15).
- **Variant 5**: Noncontrast head CT is usually appropriate for the short-term follow-up imaging of patients with acute head trauma who have unchanged neurologic examination and positive finding(s) on initial imaging (eg, subdural hematoma). Some of these patients (eg, neurologic examination is normal and intracranial hemorrhage <10 mL) may not require routine repeat imaging.
- **Variant 6**: Noncontrast head CT is usually appropriate for the short-term follow-up imaging of patients with acute head trauma who have new or progressive neurologic deficit(s).
- **Variant 7**: Noncontrast brain MRI or noncontrast head CT is usually appropriate for the initial imaging of patients with subacute or chronic head trauma and unexplained cognitive or neurologic deficit(s). These procedures are equivalent alternatives (ie, only one initial procedure will be ordered to provide the clinical information to effectively manage the patient's care).
- **Variant 8**: Head and neck CTA is usually appropriate for patients with head trauma and suspected intracranial arterial injury due to clinical risk factors or positive findings on prior imaging.
- **Variant 9**: Head CTV is usually appropriate for patients with head trauma and suspected intracranial venous injury due to clinical risk factors or positive findings on prior imaging.
- **Variant 10:** Noncontrast head CT, noncontrast maxillofacial CT, and noncontrast temporal bone CT are usually appropriate for the initial imaging of patients with head trauma and suspected CSF leak. These procedures can be complementary or concurrent depending on the clinical setting (eg, maxillofacial CT for CSF rhinorrhea and/or temporal bone CT for CSF otorrhea).

Variant 2: **Acute head trauma, mild (GCS 13–15), imaging indicated by clinical decision rule. Initial imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
CT head without IV contrast	Usually Appropriate	☢☢☢
Radiography skull	Usually Not Appropriate	☢

Variant 6: **Acute head trauma with new or progressive neurologic deficit(s). Short-term follow-up imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
CT head without IV contrast	Usually Appropriate	☢☢☢
MRI head without IV contrast	May Be Appropriate	O
Radiography skull	Usually Not Appropriate	☢

Variant 10: **Head trauma with suspected cerebrospinal fluid (CSF) leak. Initial imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
CT maxillofacial without IV contrast	Usually Appropriate	☢☢
CT head without IV contrast	Usually Appropriate	☢☢☢
CT temporal bone without IV contrast	Usually Appropriate	☢☢☢
MRI head without IV contrast	May Be Appropriate	O
CT head cisternography	May Be Appropriate	☢☢☢
DTPA cisternography	May Be Appropriate	☢☢☢
Radiography skull	Usually Not Appropriate	☢
MR spectroscopy head without IV contrast	Usually Not Appropriate	O

ACR appropriateness Criteria

- Non-contrast CT head is used as a primary examination to exclude treatable lesions like a mass or subdural hematoma
- It is in accordance with the ACR appropriateness guidelines
- The average head computed tomography scan costs around $1,200
- Imaging total of $2,400

https://www.healthimages.com/mri-vs-ct-scan/#:~:text=Cost%3A%20CT%20scans%20are%20almost,more%20time%20for%20the%20scan.

Take Home Points

- Headaches are relatively common in the postpartum period, often after receiving epidural or spinal anesthesia.
- While exceptionally rare, an intracranial subdural hematoma may occur as a complication of any procedure that results in dural puncture.
- The possibility of an intracranial subdural hemorrhage must be kept in mind when evaluating these patients.
- **Epidurals can have major complications.**

References

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Questions?