CSF Bilirubin in Subarachnoid Hemorrhage

Indications for Ordering

- Investigate possibility of subarachnoid hemorrhage (SAH) in individuals for whom computed tomography (CT) scan of head is unrevealing
- Obtain serum specimen for total bilirubin concurrently with cerebrospinal fluid (CSF) specimen for bilirubin

Test Description

Quantitative spectrophotometry

Tests to Consider

Primary test
Bilirubin, CSF 2005248

- Useful as an indicator of in vivo breakdown of hemoglobin to differentiate cerebral hemorrhage from a traumatic tap

Related test
Bilirubin, Total, Serum or Plasma 0020032

Disease Overview

Symptoms

- SAH occurs mostly due to rupture of intracranial aneurysms that release blood into CSF
  - Causes rapid increases in intracranial pressure
- Classic
  - Individuals report worst headache ever experienced
  - May be accompanied by loss of consciousness, emesis, nuchal rigidity
- Nonclassic
  - Symptoms vague – headache, neck pain
  - Diagnostic challenge for clinicians
    - ~50% of patients present with minor bleed
    - ~30% of SAH is not correctly diagnosed
  - Outcome poor in this group

Diagnostic issues

- CT is mainstay of diagnosis of SAH
  - Most sensitive if performed ≤12 hours after hemorrhage
    - Sensitivity rapidly decreases over time
  - May be negative in minor bleeds
- Spectrophotometric detection of bilirubin in CSF can be useful in patients with negative CT when SAH is still suspected

Physiology

- Red blood cells (RBCs) rapidly disseminate through the subarachnoid space following SAH
  - RBCs lyse and release intracellular oxyhemoglobin after dissemination
  - Oxyhemoglobin is metabolized to bilirubin in time-dependent fashion
  - Bilirubin imparts yellow tint (xanthochromia) to CSF
- Blood in CSF from traumatic tap will not result in increased bilirubin in CSF

Test Interpretation

Sensitivity/specificity

- Clinical sensitivity – ~80%
- Clinical specificity – 95%

Results

- Positive
  - Detection of bilirubin in CSF supports diagnosis of SAH if suspicion for SAH is present
- Negative
  - Absence of bilirubin in CSF in conjunction with negative CT scan is sufficient to rule out SAH

Limitations

- False negatives
  - CSF specimens should not be collected <12 hrs after suspected hemorrhage
    - Bilirubin may not yet be detectable
  - Exposure to light degrades bilirubin
  - Traumatic puncture may interfere with bilirubin measurements
    - Can increase hemoglobin sufficiently so that bilirubin may not be detectable in CSF