Point of Care Optic Nerve Sheath Ultrasound to Evaluate Intracranial Pressure

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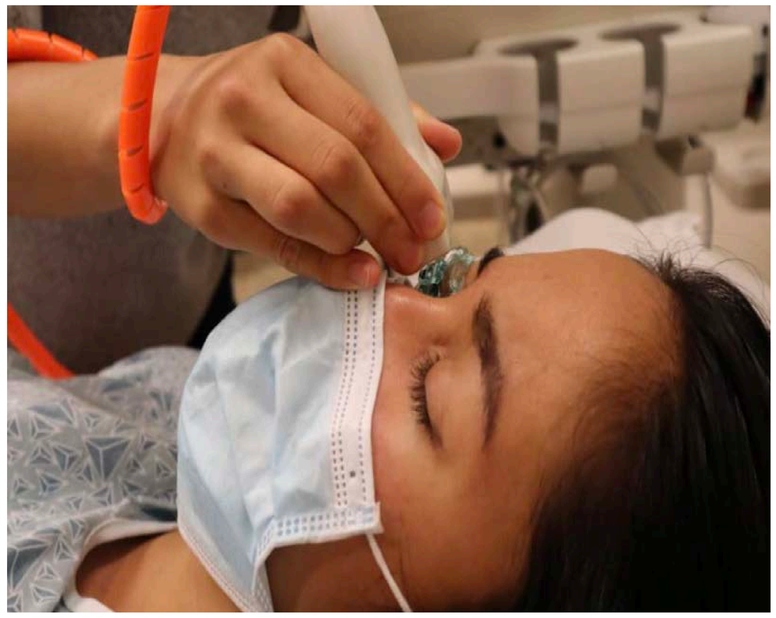
Benefits of Optic Nerve Sheath U.S.

- The gold standard for non-invasive estimation of intracranial pressure (ICP)
- ONSUS can be completed in less than five minutes
- Guides ICP medical therapy in real-time
- Reduces ICU inter-hospital transports for CT scans
- Lower risk of infection & hemorrhage vs. EVD
- Reduced exposure to ionizing radiation vs. CT Scan
- Reduced cost vs. neuroimaging
- Large range of clinical & non-clinical applicability

Optic Nerve Sheath Ultrasound

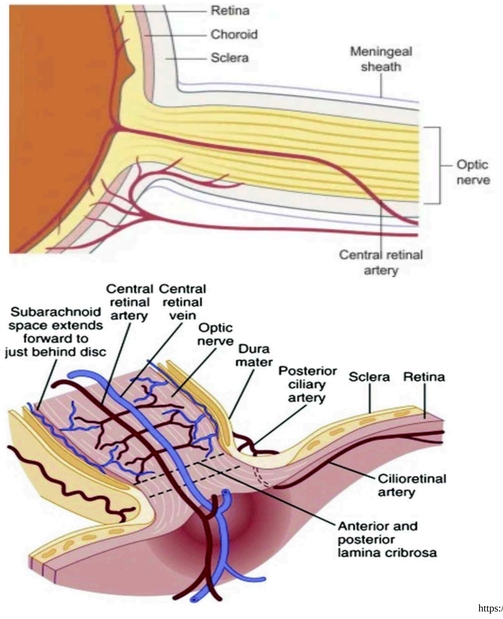


https://www.pocus101.com/ocular-ultrasound-made-easy-step-by-step-guide/

How to Measure ONSD

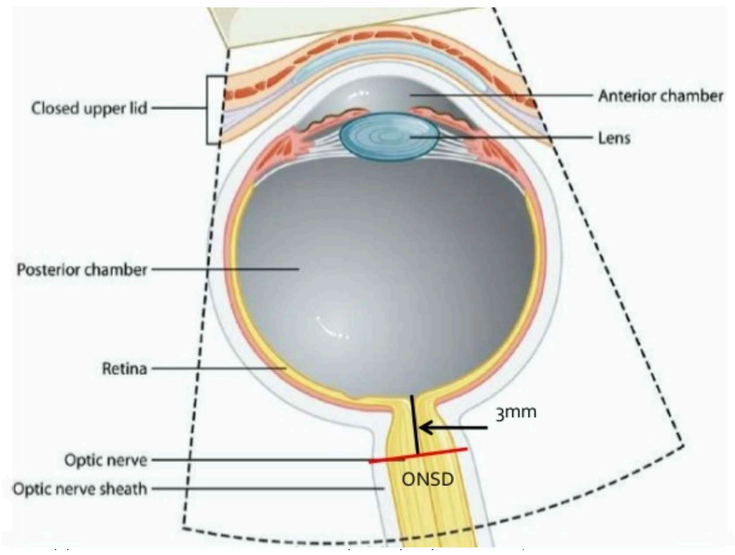
- **Step 1: Gather Supplies & Equipment**
  - Ultrasound (US), HFLP in B-mode, & Depth 4 mm
  - Large Tegaderm, copious amounts of US gel
- **Step 2: Prepare to Scan**
  - Stand on the right side of the patient
  - Apply Tegaderm and plenty of jelly
  - Anchor on the bridge of the nose (right eye)
  - Anchor on the zygomatic arch (left eye)
  - Start scanning
- **Step 3: Image Optimization & Measurement**
  - Locate the optic nerve by scanning, rocking, or tilting the ultrasound probe.
  - Freeze the image and use the caliper function to measure the ONSD.

The Optic Nerve & Sheath



https://entokey.com/optic-nerve-9/

Structures Under Ultrasound



https://pbrainmd.wordpress.com/2015/10/23/optic-nerve-sheath-diameter/

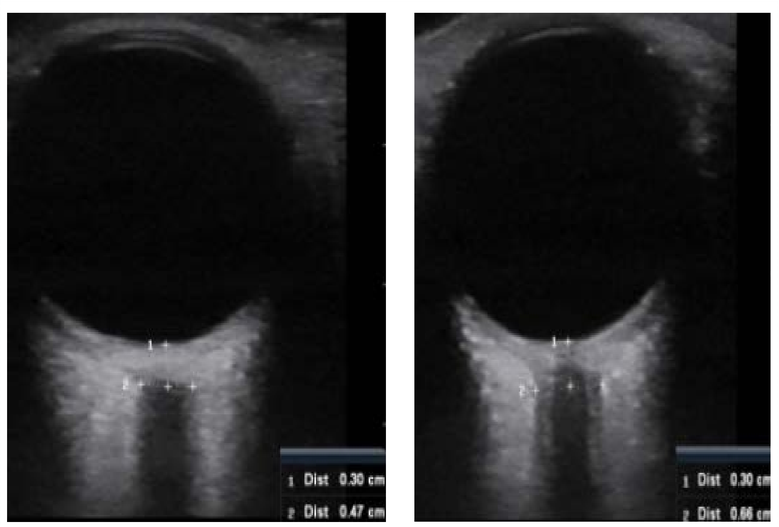
Measurements

- **Use the Calipers to Capture Two Measurements**
  - 1st: From the optic disk, measure 3 mm
  - 2nd: Measure laterally to find optic nerve sheath diameter (ONSD)
- **What to do with your numbers?**
  - Normal ONSD
    - Adults & Children = 5 mm
  - Elevated ONSD
    - ONSD > 5.7 mm = ICP > 20 mmhg
      - SN: 93%; SP 96%
- **ICP Formula**
  - 5.00 x ONSD - 13.92 = ICP

Indications & Settings

- **Settings:**
  - EMS, emergency room, ICU, peri-operative setting, critical access hospitals, neuraxial anesthesia.
- **Indications:**
  - Intracranial hypertension, encephalopathy, neurosurgery, unstable ICU patients, shunt evaluation, TBI, ischemic strokes, hemorrhagic strokes, neuraxial anesthesia in patients with a history of increased ICP.
- **Contraindications:**
  - Open globe injury

Normal ICP | Increased ICP



https://www.sonomojo.org/keeping-an-eye-on-intracranial-pressure-detecting-elevated-icp-using-ocular-ultrasound/

References