Low Pressure Headache, Intracranial Hypotension

Last updated: May 8, 2019

**ETIOPATHOPHYSIOLOGY**

Causes of CSF hypotension:

1. **Lumbar puncture** (CSF leakage through dural puncture site) - most common cause.

2. **Dural tear** or **avulsion of nerve root** (head or back trauma, craniotomy, spinal surgery, spontaneous dural tears, pituitary tumor*).  
   - craniotomy and trauma also decrease CSF formation.

3. **CSF shunts**

4. **Spontaneous intracranial hypotension:**
   - **CSF hyperabsorption** (no evidence of CSF leak) - radionuclide cisternogram shows rapid transport of isotope and rapid uptake in kidneys and bladder.
   - **decreased CSF production** - radionuclide cisternogram shows slow isotope flow; leads to brain sagging with compression of pituitary-hypothalamic axis and further reduction in CSF production.
   - **TARLOV cysts** - arachnoid perineural cyst found in proximal radicles of lower spinal cord; rupture of cysts can occur with minor trauma and cause occult CSF leak.

5. **Hypertonic solution** infusion.

6. **Systemic illness** (severe dehydration, hyperpnea, meningoencephalitis, uremia, severe systemic infection).
   - patient in **erect position** → downward movement of brain → stretching of pain-sensitive structures (meninges and vessels) → **TRACTION HEADACHE**.
   - patient in **recumbent position** → brain is shifted cephalad → headache relief.

**CLINICAL FEATURES**

- **ORTHOSTATIC HEADACHE:**
  - accentuated by erect position and relieved with recumbency.
  - longer patient is upright, longer it takes headache to subside with recumbency.
  - mild to incapacitating, dull, or throbbing.
  - **location** - frontal, occipital, cervical; may involve shoulders and entire cranium.
  - **not relieved** with analgesics.
  - **aggravated** by head-shaking, Valsalva (coughing, straining, sneezing), jugular compression.
  - **associated** with nausea & vomiting, dizziness, tinnitus.

Physical examination is usually normal; except **mild neck stiffness** and **slow pulse rate** (so-called VAGUS PULSE).
**DIAGNOSIS**

Diagnosis = **orthostatic headache** + **obvious etiology**.

If no obvious cause is apparent:

1) **neuroimaging - diffuse meningeal enhancement** (reflects Monro-Kellie rule - intracranial venous engorgement results from reduced CSF volume).
   - **signs of “sagging” brain** - optic chiasm flattening, pons displacement against clivus, cerebellar tonsils below foramen magnum (simulating Chiari malformation).

2) **lumbar puncture** (at time of cisternography) – **low opening pressure** (0-70 mmH₂O).
   - after period of recumbency opening pressure may be in normal range.
   - CSF composition is normal (± slight protein elevation, few RBCs).

3) **intrathecal injections (cisternography)** - radioisotope, ionic, fluorescein - to identify **CSF leaks**.

**TREATMENT**

1. **Bedrest** with head in horizontal position + **fluid** intake.

2. **CAFFEINE** sodium benzoate - 500 mg in 2 mL saline by IV push (± second injection 1-2 hours later); alternative - 500 mg in 1 L of saline IVI over 1 hour.
   - alternative - **AMINOPHYLLINE** 5-6 mg/kg IVI over 20 minutes.

3. Brief trial of **steroids** with quick taper (e.g. **PREDNISONE** 60 mg tapered to zero over 10 days).

4. **Epidural blood patch** - forms gelatinous tamponade, stopping CSF leak.
   - 10-20 mL of autologous blood is drawn aseptically into syringe and slowly injected (1-2 mL every 10 seconds) into epidural space at site of prior lumbar dural puncture.
   - if back pain or paresthesias develop → slow or stop injection.
   - remain supine for 1 hour while receiving IV hydration.
   - relief occurs within 20-30 minutes of procedure.
   - in patch failures (15-20%), second patch is often successful.

5. **Continuous intrathecal saline infusion** - epidural catheter in L₂-₃, rate 20 ml saline/hour for as long as 72 hours.

6. **Surgical closure** of fistula.

**Prophylaxis** of post-lumbar puncture headache – see p. Op3 >>

**BIBLIOGRAPHY** see p. S50 >>