Low Pressure Headache, Intracranial Hypotension

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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\*). \*can cause CSF rhinorrhea
   * craniotomy and trauma also decrease CSF formation.
3. **CSF shunts**
4. **Spontaneous intracranial hypotension**:
   * 1. ***CSF hyperabsorption*** (no evidence of CSF leak) - radionuclide cisternogram shows *rapid transport of isotope* and rapid uptake in kidneys and bladder.
     2. ***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.
     3. **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).

1. **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).

1. **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 >>](../../Op.%20Operative%20Techniques/001-020.%20CSF-related%20procedures/Op3.%20Lumbar%20Puncture.pdf#PostLP_headache)

Bibliography see [p. S50 >>](S50.%20GENERAL%20-%20Intracranial%20Hypertension.pdf#Bibliography)

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