

**Spinal cerebrospinal fluid (CSF) leak** is an important and underdiagnosed cause of new onset headache that is treatable and often curable. CSF bathes and supports the brain and spinal cord. When the connective tissue known as dura that holds CSF in around the spinal cord has a hole or tear, the result is a loss of CSF volume, known as **intracranial hypotension**.

## ***Treatment***

Treatments for spinal CSF leaks vary from conservative to surgical procedures. The specific clinical situation will dictate the course of action. Symptom severity and complications influence intervention. Some serious complications such as stupor/coma or a large subdural hematoma will often necessitate emergent and more aggressive intervention. Some patients have symptoms that resolve spontaneously in a matter of hours, days or weeks without ever seeking or requiring medical care. A substantial percentage of patients respond favorably to one or more epidural blood patch procedures.

When epidural blood patching is unsuccessful or if symptoms recur, spinal imaging findings help to guide further treatment. Note that false localizing signs on imaging at C1-2 and the cervicothoracic junction are common and may lead to misdirected treatment. Epidural patching with fibrin sealant (alone or with blood) may be directed at a known or suspected leak location. Surgical repairs of spinal CSF leaks have good success rates in the hands of experienced neurosurgeons. A small subset of patients suffers with persistent symptoms and associated disability.

## ***Conservative treatment + symptom management***

### General:

- bedrest / horizontal positioning
- oral and IV hydration (temporary symptomatic benefit)
- oral and IV caffeine (temporary symptomatic benefit)
- oral theophylline (questionable benefit)
- steroids (questionable benefit + risks significant = rarely recommended)
- use of abdominal binder

### Nausea:

- ginger products and/or drugs such as ondansetron (Zofran)

### Pain:

- non-opiate analgesics (limited effectiveness)
- opiate analgesics (regular use not supported by pain management guidelines)
- complementary approaches: nutrition, supplements, mind-body techniques, acupuncture

### ***Epidural blood patch (EBP)***

The patient's blood is injected into the epidural space, the space just outside the dura within the spinal canal. This is most often done with imaging guidance and intravenous sedation by an anesthesiologist or a neuroradiologist. This can be directed (placed at location of leak) such as a post-lumbar puncture leak, OR non-directed (placed at lumbar or thoracolumbar locations) usually when a leak site has not been localized. Volumes range from small (10 mL) to large (60 mL). Patching remote from an actual leak location is often helpful. A favorable response supports the diagnosis of a leak. One or more EBPs may be curative but often lack durability. Post-procedure physical restrictions vary by clinician and individual patient. It is customary for physicians to recommend avoidance of bending, lifting, twisting, and straining for 4 to 6 weeks.

### ***Epidural patch with fibrin sealant***

Fibrin sealant is a pooled blood product which is often used "off-label". This procedure is most often performed by a neuroradiologist or anesthesiologist with imaging guidance and intravenous sedation to target specific known or suspected leak locations. It may be used in isolation or in combination with whole blood.

### ***Surgery***

The findings and interpretation of spinal imaging is of critical importance in surgical planning and outcomes. Surgical repairs are often less technically straightforward than might be anticipated, due to frequently noted abnormal dura and the variety of anatomic leak types and locations. See our summary document on the **Classification of Spontaneous Spinal CSF Leaks**. The specific approach is tailored to the type and location of the leak and to the individual patient.

When other measures have failed, some procedures have been used in carefully selected patients to reduce the severity of symptoms, such as epidural saline infusions via indwelling epidural catheters, or lumbar dural reduction surgery.

### ***Key points***

- an unknown percentage of patients will have their symptoms resolve without any treatment
- rarely, serious complications such as coma or a large subdural hematoma will dictate emergent intervention
- epidural patching is effective for many patients but may lack durability
- correct interpretation of spinal imaging findings is critical to targeted treatment approaches; false localizing signs on imaging can lead to misdirected treatment
- epidural patching procedures and surgical procedures may have better outcomes with clinicians that treat a larger volume of patients
- surgical repairs are often less technically straightforward than they may appear, due to the variety of anatomic leak types and locations as well as the frequently encountered attenuated dura associated with Heritable Disorders of Connective Tissue
- outcomes are generally favorable but a small subset of patients has persistent symptoms and associated disability