

Spinal cerebrospinal fluid (CSF) leak is an important and underdiagnosed cause of new onset headache that is treatable. Cerebrospinal fluid (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**.

Causes of spinal CSF leaks:

Iatrogenic – caused by a medical procedure intentionally or inadvertently.

- a. **Post lumbar puncture spinal CSF leak**, also known as Post Dural Puncture Headache (PDPH) is the most common cause of a spinal CSF leak. The lumbar dura is intentionally punctured for various diagnostic and therapeutic reasons. Most often these holes heal over quickly, but in some cases, they do not. We know that there is a lower risk of PDPH when the procedure is performed by more experienced clinicians, when smaller needles are used and when a less traumatic type of lumbar puncture (LP) needle (pencil-point vs sharp) is used.
- b. Dural tears may occur inadvertently at the time of **epidural injections or anesthesia** (epidural space is in the spinal canal outside of dura and spinal cord).
- c. They may occur at the time of **spinal or other surgery**.
- d. **CSF shunt over-drainage** may cause intracranial hypotension.
- e. **Chiropractic manipulation** has been a reported cause.

Traumatic – caused by an injury. Traumatic leaks have been reported in association with brachial plexus injuries, spinal injuries, sports injuries and roller coaster rides.

Spontaneous – usually occurring with minimal or no clear precipitant. Common reported events or mechanical factors associated with the onset of symptoms include lifting small or large items, straining, stretching, positional changes, etc.

Spontaneous spinal CSF leaks may be:

- a. **associated with spinal pathology** such as calcified discs or bone spurs. These leaks are usually ventral to (in front of) the spinal cord.
- b. **associated with preexisting dural weakness. Heritable Disorders of Connective Tissue** (HDCT) occur at a higher frequency in affected individuals; intracranial hypotension may be the first noted manifestation. Marfan syndrome, Ehlers-Danlos syndrome and Unspecified HDCT have been reported. Polycystic Kidney disease is another known association. Patients with spontaneous spinal CSF leaks have been shown to have higher risk of bicuspid aortic valve, thoracic aortic aneurysms and intracranial aneurysms and should be evaluated for HDCT.

Key points

- the use of pencil-point LP needles reduces the risk of post-dural puncture headache
- spontaneous spinal CSF leaks are recognized less readily than iatrogenic cases
- spontaneous spinal CSF leaks are often associated with an underlying Heritable Disorder of Connective Tissue; intracranial hypotension may be the first noted manifestation
- spontaneous spinal CSF leaks are also associated with preexisting spinal pathology