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Opinion Article

Pain Management Strategies for Postdural Puncture Headache

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DESCRIPTION

Conservative measures

Conservative measures for the first 24-48 hours are considered the first management strategy, as more than 85% of Post-Dural Puncture Headache (PDPH) is resolved with conservative treatment. These measures include rest, intravenous hydration, caffeine supplementation, and analgesic medication. Obviously, bed rest in supine position can improve the symptoms of PDPH, but there is no evidence of prevention or faster recovery. The prone position may relieve PDPH because increased intra-abdominal pressure leads to increased CSF pressure. Oral hydration therapy is a common treatment for PDPH, but there is no evidence that aggressive hydration is beneficial to patients with normal fluid intake. However, dehydration should be avoided to limit the aggravating effects on the severity of PDPH.

Since caffeine was first used as a treatment for PDPH in 1949, many researchers have recommended caffeine as a therapeutic option. Caffeine increases cerebral vasoconstriction by blocking adenosine receptors and increases CSF production by stimulating the sodium-potassium pump. Matthew and Wilson have shown a decrease in cerebral blood flow after intravenous administration of caffeine benzoate to treat PDPH. Caffeine was superior to placebo to relieve the pain of PDPH. However, it resulted in temporary, non-persistent headache relief and did not reduce the need for epidural blood patch.

Another methyl-xanthine, theophylline, is also a cerebral vasoconstrictor, and randomized trials improve pain severity over placebo acetaminophen. Gabapentinoid shares a structure similar to the endogenous neurotransmitter gamma-aminobutyric acid, but the exact mechanism for treating PDPH is unknown. Some of these activities can regulate the release of excitatory neurotransmitters through their interaction with voltage- dependent calcium channels. Gabapentin was effective in lowering the pain score associated with PDPH compared to placebo or ergotamine in combination with caffeine. In a randomized study of oral gabapentin (300 mg), oral pregabalin (100 mg), and oral acetaminophen (500 mg), three times daily for 3 days, both gabapentin and pregabalin significantly reduced the severity of PDPH but pregabalin was more effective.

Sumatriptan is a serotonin receptor antagonist used to treat migraine as a cerebral vasoconstrictor. Several case reports describe the reduction of PDPH by sumatriptan.

Invasive measures

Patients who do not respond to conservative treatment within 48 hours require more aggressive intervention. Epidural blood patches are considered the best treatment for moderate to severe PDPH, with success rates ranging from 61% to 98%. Based on the success rate, epidural blood patches appear to be less effective for the obstetric population. Stride and Cooper reported a complete 64% relief from PDPH after the first blood patch. This low success rate may be associated with large-diameter needle puncture of the dura during epidural analgesia.

The possible mechanism of action for epidural blood patches is to seal the dural puncture site. Magnetic resonance imaging studies have shown that epidural blood attaches to the spinal cavity and forms a clot within 18-24 hours. The volume of CSF does not restore immediately, but pain relief often occurs immediately after applying a blood patch. Therefore, sudden relief cannot be explained by the closure of the puncture site. Carrie hypothesized that epidural blood injection increased lumbar CSF pressure, followed by restoration of intracranial CSF pressure and reflexes of cerebral vasoconstriction.

Observational studies have reported that the epidural blood patch is less effective within 24-48 hours after dural puncture. Early-onset PDPH can be more severe. Therefore, selection bias is possible. Alternatively, if the therapeutic benefit of the epidural blood patch relies on clot formation at the site of dural puncture, factors that inhibit clot formation have adverse effects. First, a high CSF flow may first remove the blood clot. Second,

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if the epidural blood patch is executed too quickly, it can break the blood clot and prevent the hole from closing.

The optimal blood volume required for a successful epidural blood patch is unknown, but blood volumes in the 5 mL-30 mL range have been reported. Paech randomized 121 patients to receive 15 mL, 20 mL, or 30 mL of autologous blood during an epidural blood patch. The efficacy of epidural blood patches was similar in all three groups, with a success rate of 70%. However, the authors found that 19% and 46% of those randomized to receive 20 mL and 30 mL volumes did not receive the assigned volume due to injection pain. Due to the varying volume and compliance of the epidural space, patients experienced pain during the injection before administering 30 mL. Similarly, a recent retrospective review by Booth reduced the need to repeat epidural blood patches when increasing blood volume to 30 mL, but the final volume was primarily determined by low back pain during injection.

Epidural injection of colloids is a viable alternative to blood if epidural blood patches are contraindicated. Dextran 40 or hydroxyethyl starch has been reported with varying success rates. Colloids are thought to result in increased epidural pressure and reduced CSF leakage. Complications include transient discomfort and a burning sensation. Although the evidence is limited, colloidal solutions may be suggested in patients who refuse epidural blood patches or when an epidural blood patch is ineffective.

The greater occipital nerve, which originates from the dorsal root of second cervical nerve, is the major sensory nerve in the occipital region. Greater occipital nerve blocks have been used to treat different types of headaches. Although evidence is limited, studies that block the large occipital nerve to treat PDPH have shown beneficial effects in reducing the severity of pain. Some authors have suggested using it as an alternative to epidural blood patch because it is less invasive and provides immediate symptom relief.