

Current & Evolving Percutaneous Treatment Approaches: Cedars-Sinai

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Interventional Options

- Blood Patch
 - Single level
 - Bilevel
 - Targeted
- Fibrin Glue



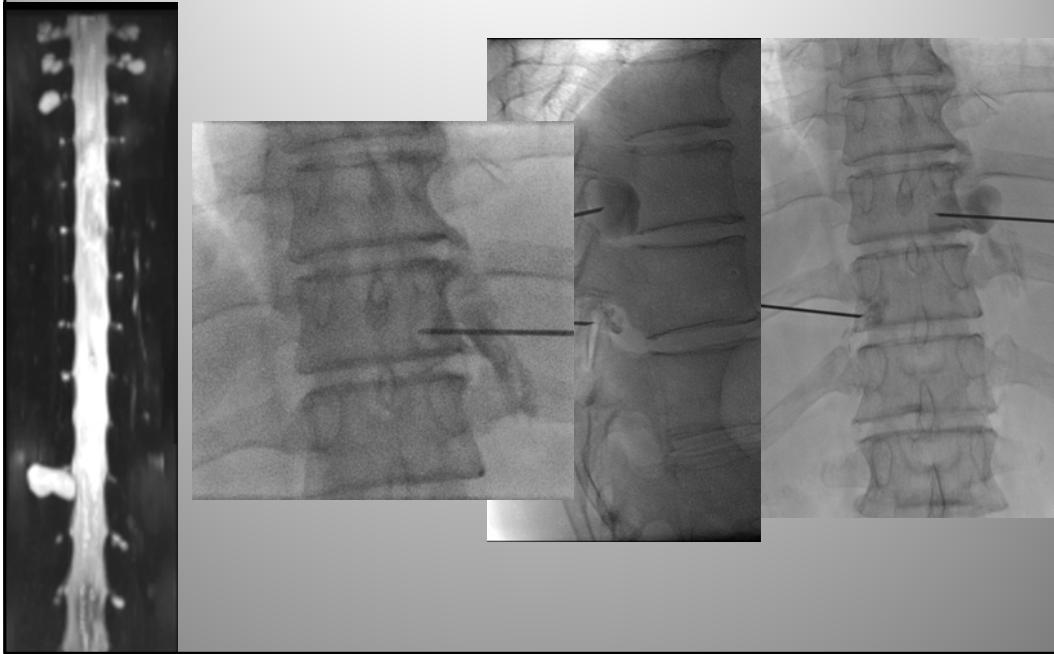
Quadris Order#:	Location:	Date of Birth:
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NERVE ROOT LOCALIZATION AND FIBRIN GLUE DEPOSITION	DATE OF STUDY: 01/30/2003
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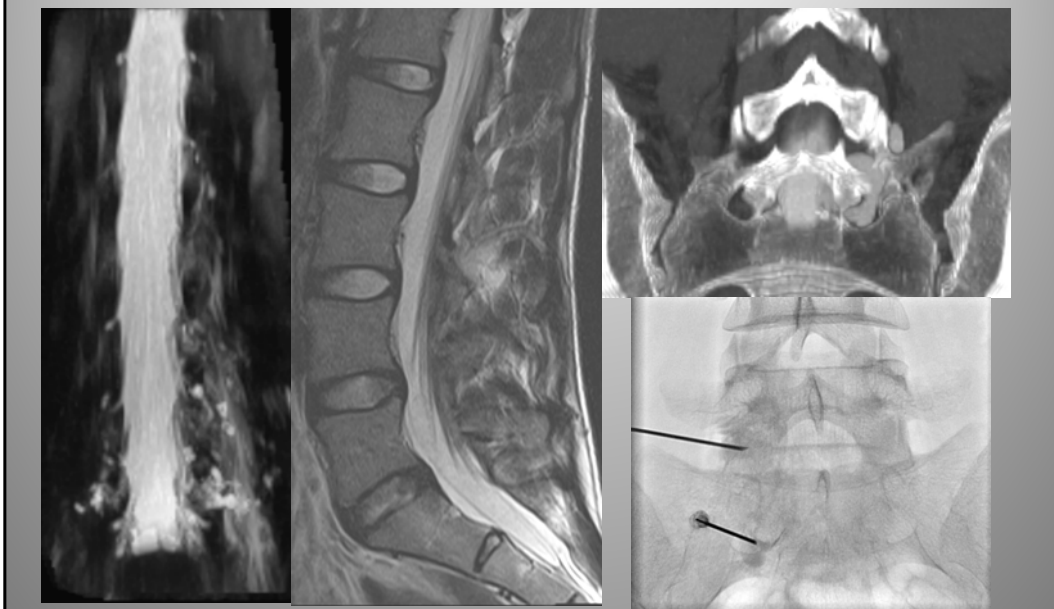
CLINICAL INDICATION: CSF leak.

Year	Blood Patch	Fibrin Glue
2013	138	46
2014	160	34
2015	169	40
2016	209	51

Fibrin Glue



Sacral cysts



Meningeal diverticulum



Results

Epidural blood patch

95% initial response

80% cure rate

Percutaneous glue

40% cure rate

High Volume Epidural blood patches

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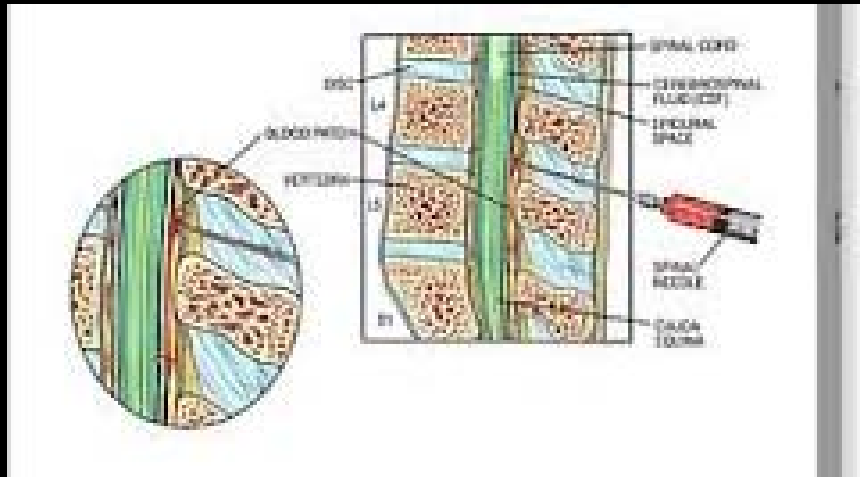
Continuous Heimlich Maneuver



Other Test to Diagnose Intracranial Hypotension



Epidural Blood Patch



Two-level epidural blood patching



Two-level epidural blood patching



EBP: Mechanisms of Action

- Early mechanism is probably the increase in CSF pressure caused by the volume of blood added to a closed space.
- Delayed benefit is probably due to the plug created by the clotted blood of the area that was leaking CSF before the EBP.

History

- Historical loose consensus: 10-20 ml of blood
- Epidural blood patches with predetermined volume of blood
- Given variability in spinal canal elastance and epidural volume, some authors have advocated the use of large-volume EBPs (>20 ml) in which the volume of injected blood is limited by the development of back or radicular pain symptoms (Safa-Tisseront V et al, Anesthesiology 2001; 95: 334-339)

Rationale for two-level blood patches

- Started with low thoracic epidural blood patches
- In a significant percentage of patients the symptoms of SIH reappeared within days
- A significant percentage of these returning patients responded to an additional blood patch in the lumbar area
- Hence, we started doing simultaneous thoracic and lumbar epidural blood patches

Limitation of Activity Level for 8 wks

- Avoid activities that require sudden contraction of the abdominal muscles:
- Minimize coughing, sneezing
- **NO** sudden bending forward, or twisting of the trunk; no running, jumping, bumpy rides
- Sexual intercourse restricted to woman-on-top-man-on-bottom-position (regardless of who is the CSF leaker)

Limitation of Activity Level (2)

- Prevention of constipation with prophylactic polyethylene glycol +/- mineral oil
- Avoid laxatives that cause cramping, e.g. bisacodyl, senna, enemas
- Avoid opiates (constipation, secondary headaches)
- Unless contraindicated, avoid anticoagulants, including ASA, ibuprofen, naproxen, etc.

Data from 2/2001 to 9/2010

- 163 EBPs (94 patients with SIH)
- Mean total blood volume per EBP: 43.2 ± 21.7 ml (range 4-124 ml)
- Responder rate: 28.7% after the first EBP, 41.5% and 46.8% after a second or third EBP
- Higher prevalence of subdural fluid collections on MRI in the responder group (48% vs 18%, $p=0.003$)

Comparison with Published Data

- Outcome data with published results is difficult to compare because many of our patients have failed EBPs elsewhere
- Duration of symptoms is an important variable
- Average duration of symptoms prior to the EBP 1.9 ± 4.2 years
- Sencakova et al (Neurology 2001; 57: 1921-1923) showed that patients who respond to the first EBP have significantly shorter durations of symptoms

SIH Symptoms

- Most patients in our series had an orthostatic headache as a main complaint, but in none of the patients was that the only complaint and it is possible that these other symptoms may be less responsive to EBP

Data from 13-Apr-16 to 15-Sep-17

- 106 EBPs
- Mean total blood volume per EBP: 31.5 ± 19.3 ml (range 4-99 ml)
- Outcome data not compiled yet

Fixed vs Variable Volume Patching

- Studies comparing different preset volumes of blood without creating symptoms did not show a difference in outcome
- Taivainen T, et al. Efficacy of epidural blood patch for postdural puncture headache. Acta Anaesthesiol Scand 1993; 37: 702-705

Reports of Large Volume Patches

- Griauzde et al developed a catheter-based protocol for patients with SIH that resulted in an average volume of 54.1 ml per EBP; improvement or resolution of symptoms was seen in eight out of nine patients and no complications were reported
- (AJNR 2014; 35: 1841-1846)

More Recent Report of Large Volume Epidural Blood Patches

- Wu JW, Hseu SS, Fuh LJ, Lirng JF, Wang YF, Chen WT, Wen SP, Wang SJ.
- Factors predicting response to the first epidural blood patch in spontaneous intracranial hypotension.
- Brain 2017; 140: 344-352
- One of the factors predicting response to EBP: volume of blood injected (>22.5 ml, up to 55 ml)

Ultra High Volume Epidural Blood Patches

- Multilevel, ultra-large-volume epidural blood patch for the treatment of neurocognitive decline associated with spontaneous intracranial hypotension: case report.
- Staudt MD, et al. J Neurosurg. 2017:
- Transient responses to multiple small-volume (SV) single-site EBP (SV-EBP) injections
- Resolution of the cognitive dysfunction after ultra high volume (60-120 ml) multilevel blood patches with catheter

My Complications (combined data)

- Unintended dural punctures (2.6%)
- Radicular pain (2 pts, 2wks, 4wks)
- Transient bilateral paraplegia (20 minutes)
- Cauda equina syndrome from arachnoiditis (2005; urinary incontinence x 4 yrs)

Safety Protocol

- Radiographic confirmation with a contrast injection of epidural placement prior to injecting blood.
- Reconfirm epidural placement with another contrast injection, if after injecting 20 ml of blood, the patient does not report symptoms, or there is no increase in the pressure needed to inject blood at the same rate.
- Minimum time between consecutive high-volume EBPs for the same patient: 5 days

Conclusions

- High volume epidural blood patches can be done, as supported by our data and by the literature BUT
- Fluoroscopic assistance highly recommended

Safety Measures

- Most important complications to avoid:
 - 1) unintended intrathecal injection of blood;
 - 2) radiculitis (continuous feedback from pt during blood injection)
- Given significant variability in intrathecal elastance, injecting even a small preset volume of blood (4 ml) may not be safe

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