

Current Percutaneous Treatment Approaches

Tim Amrhein, MD

Associate Professor of Neuroradiology

Director of Spine Intervention

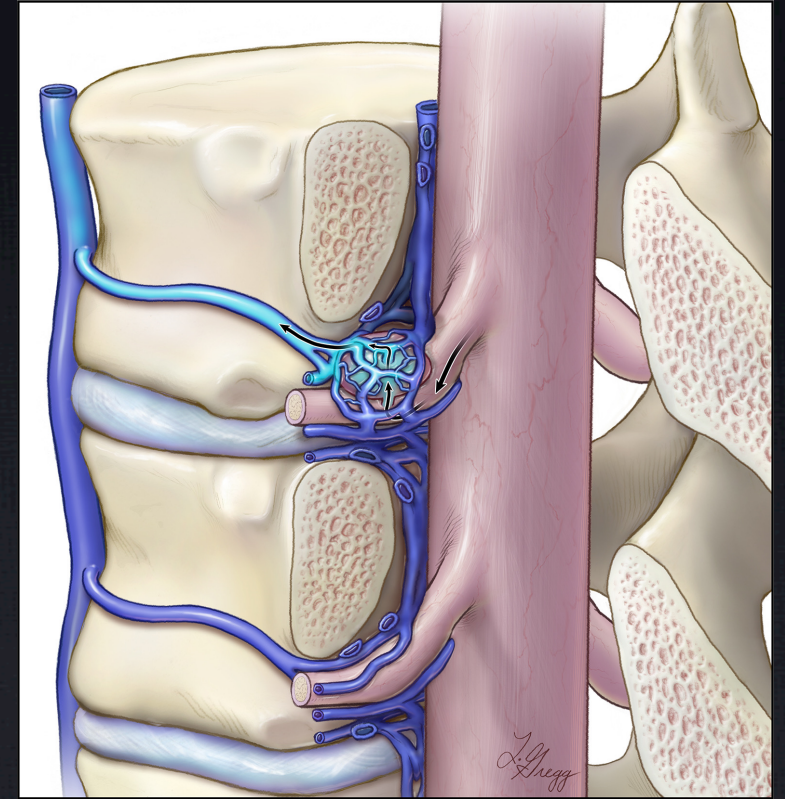
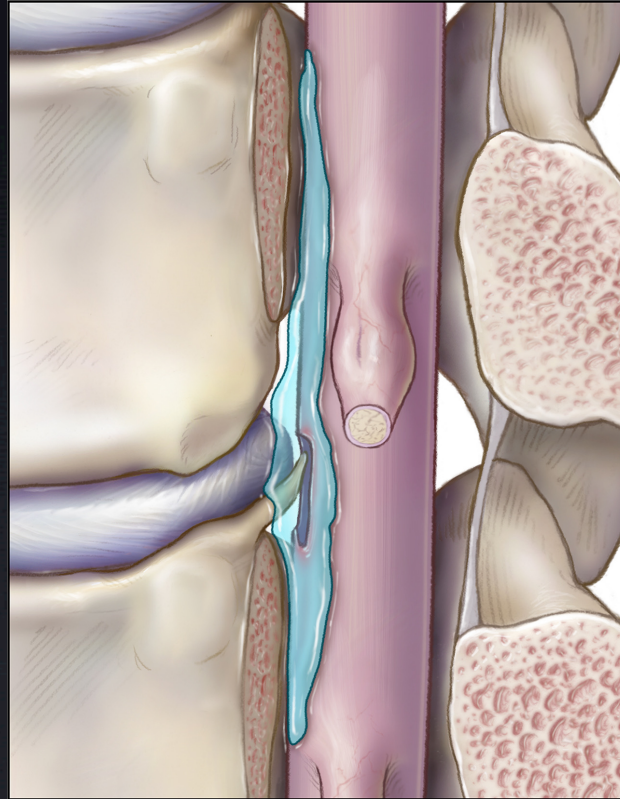
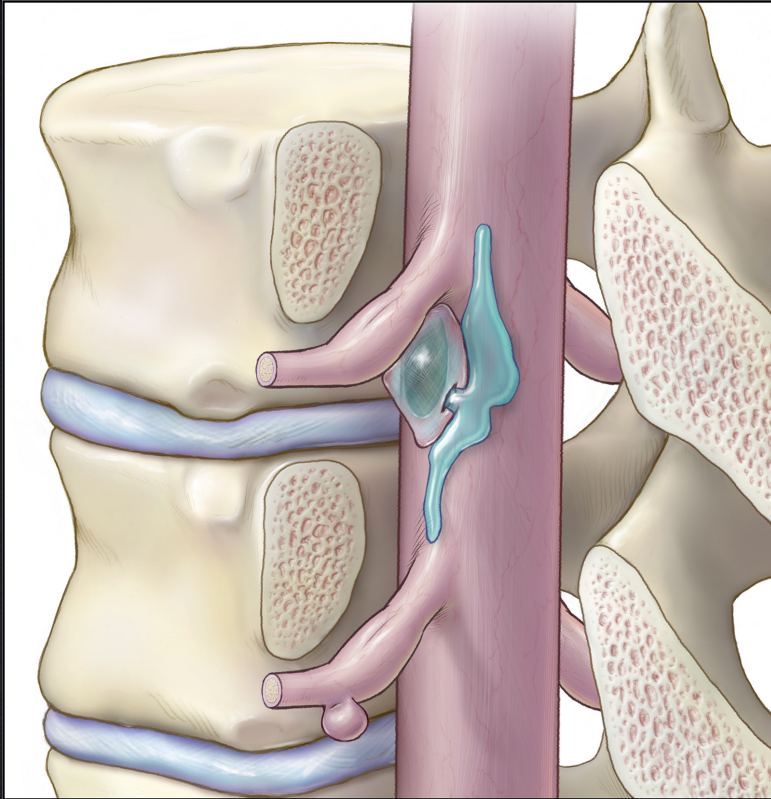
Duke University Medical Center

 @TimAmrheinMD



No Relevant Disclosures

Spinal CSF Leaks → SIH



SIH: Treatment

Conservative



bed rest

hydration

caffeine

abdominal binder

Patching



Surgery



SIH: Treatment

Patching



Surgery

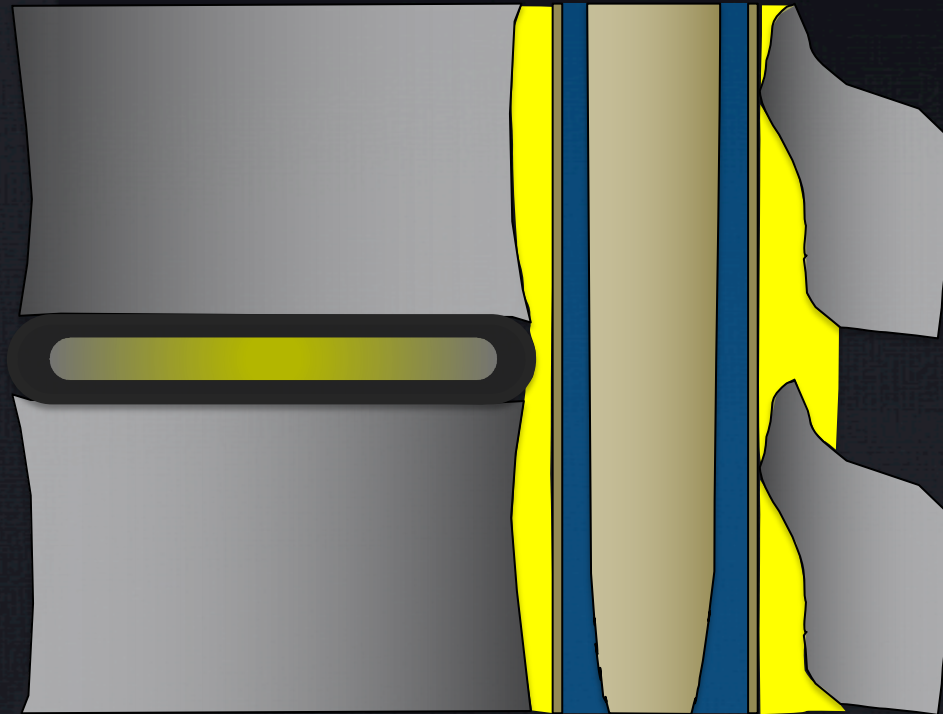


SIH: Treatment

Patching



Epidural Blood Patch: *Anatomy*



***Vertebral
Column***

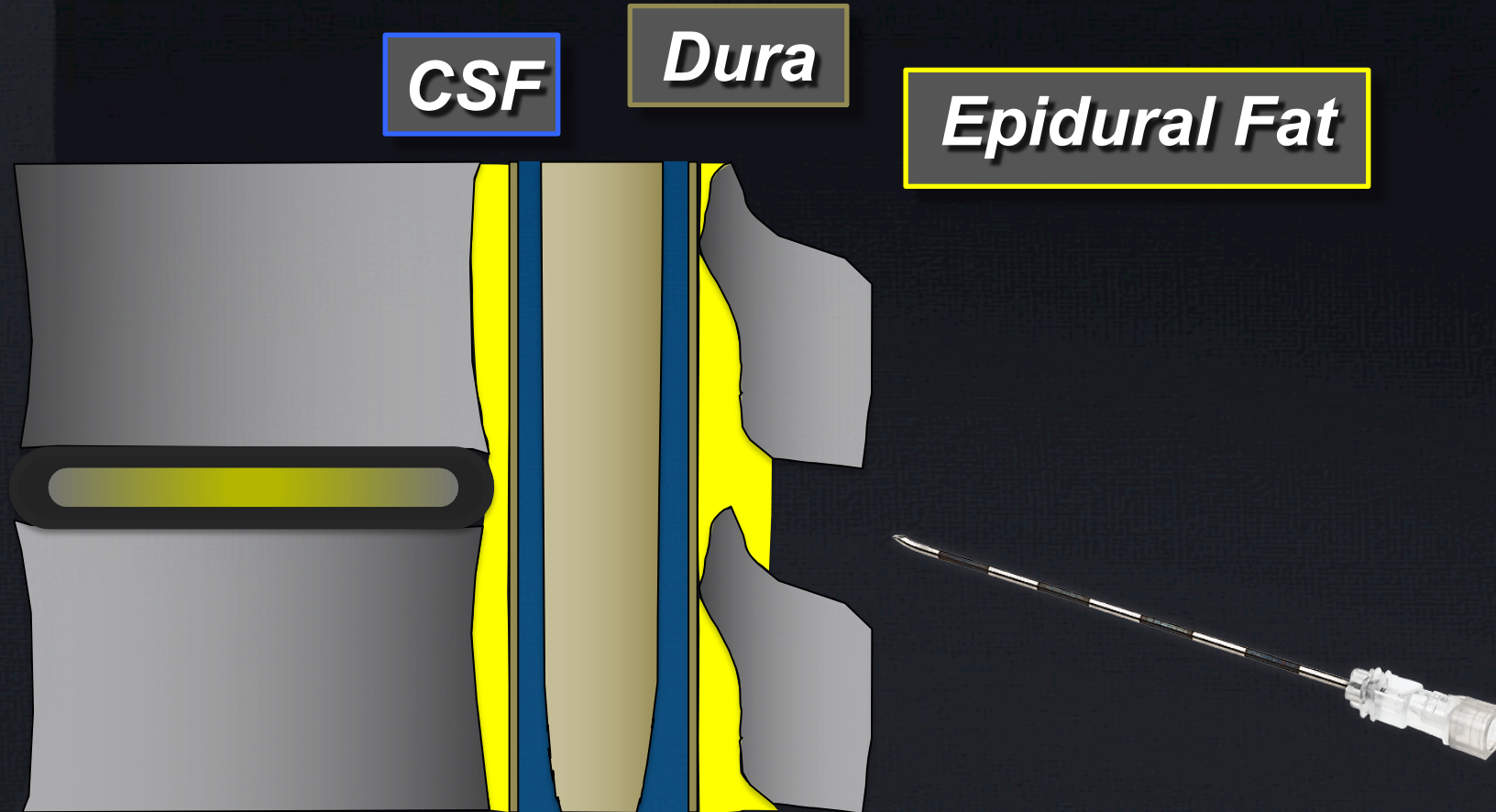
Epidural Fat

Dura

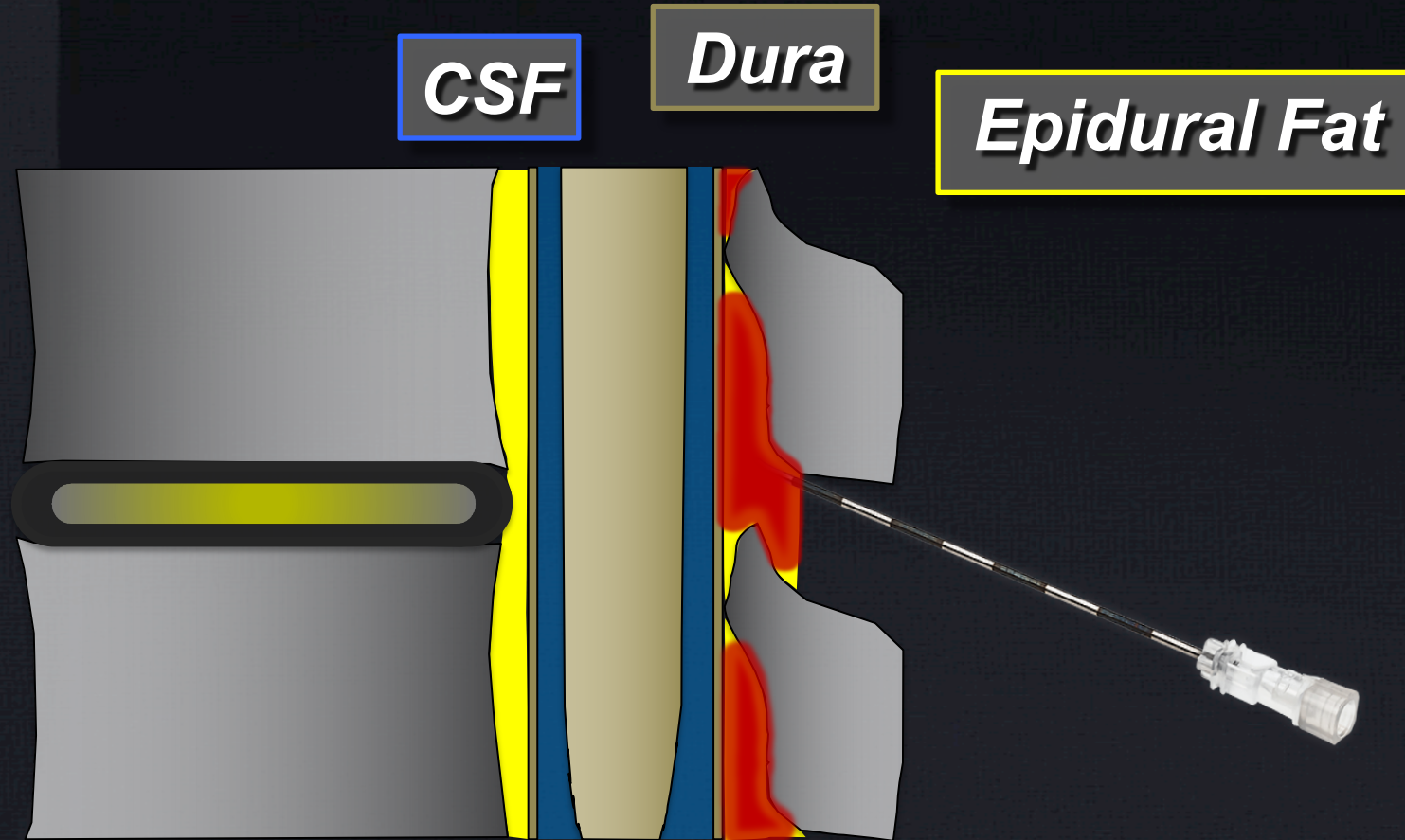
CSF

Cord

Epidural Blood Patch: *Anatomy*



Epidural Blood Patch: *Anatomy*



ANESTHESIA AND ANALGESIA . . . *Current Researches* Vol. 49, No. 2, MARCH-APRIL, 1970

Epidural Injections of Autologous Blood for Postlumbar-Puncture Headache

ANTHONY J. DIGIOVANNI, COLONEL, USAF, MC
BURDETT S. DUNBAR, CAPTAIN, USAF, MC
Lackland Air Force Base, Texas*

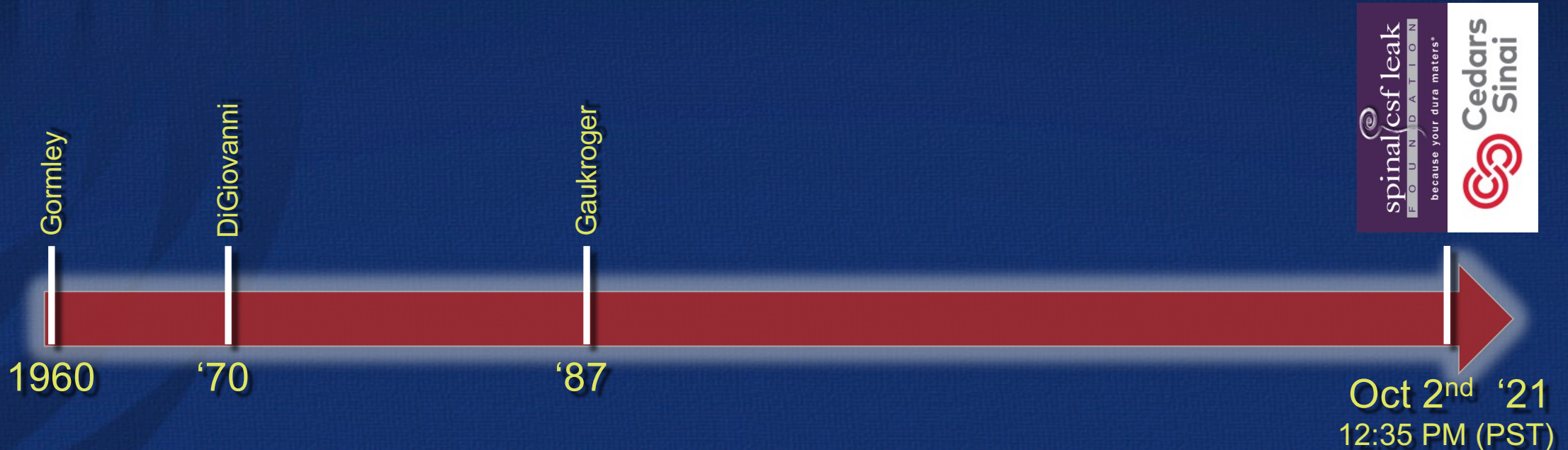
EBP treatment of post lumbar puncture headache: case series

Clinical Note *Pain*, 29 (1987) 119–122

Epidural blood patch in the treatment of spontaneous low CSF pressure headache

Phillip B. Gaukroger and Peter Brownridge

1st reported successful treatment of SIH with epidural blood patch



Epidural Blood Patch: *Technical Considerations*

Blind



***Imaging
Guided***



Epidural Blood Patch: *Technical Considerations*

Blind



AJNR Am J Neuroradiol 26:502-505, March 2005

Technical Note

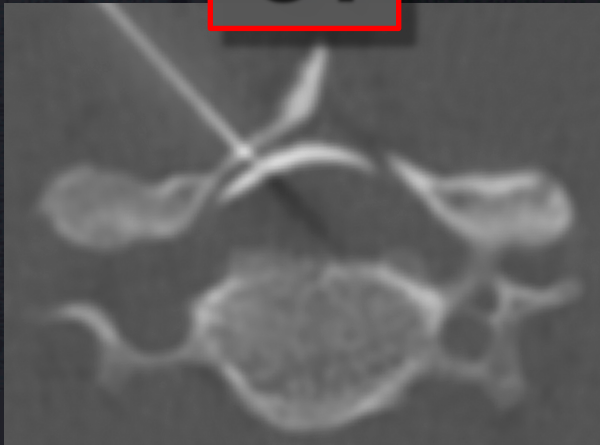
Incorrect Needle Position during Lumbar Epidural Steroid Administration: Inaccuracy of Loss of Air Pressure Resistance and Requirement of Fluoroscopy and Epidurography during Needle Insertion

Walter S. Bartynski, Stephen Z. Grahovac, and William E. Rothfus

25+%

Epidural Blood Patch: *Technical Considerations*

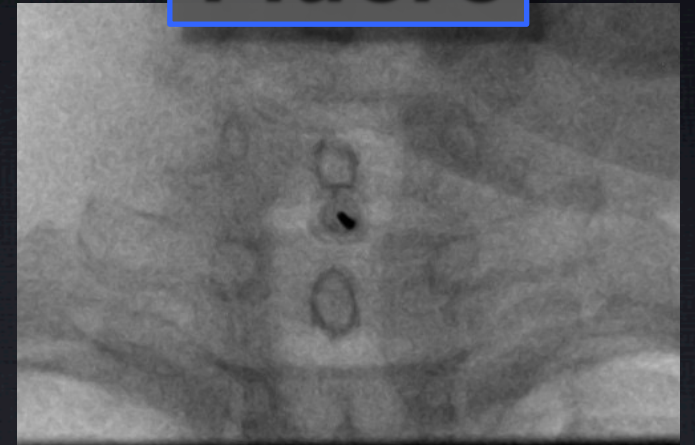
CT



**Imaging
Guided**



Fluoro



Epidural Blood Patch: *Technical Considerations*

Non-Targeted



Targeted



Epidural Blood Patch: *Technical Considerations*

Blood

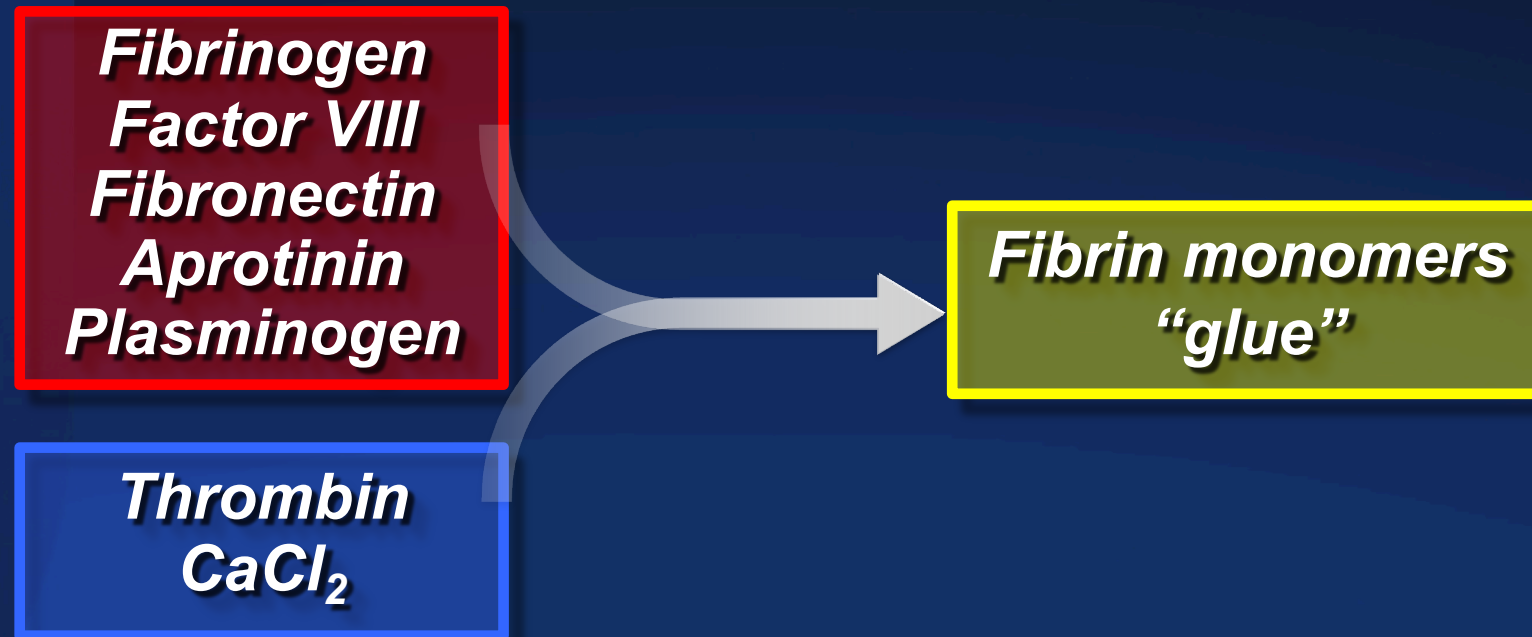


Fibrin Glue



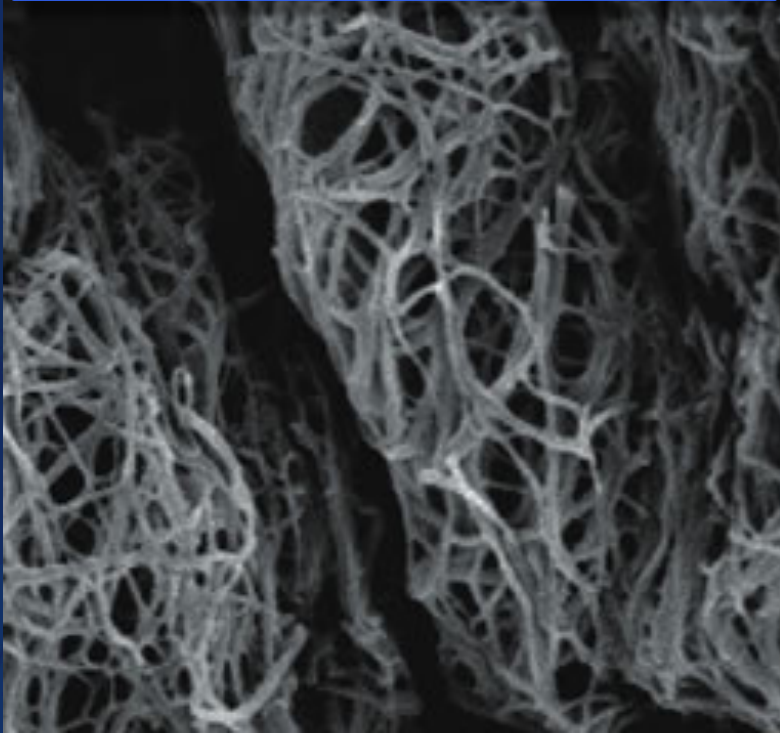
Epidural Blood Patch: *Fibrin Glue*

- Fibrin glue patch:

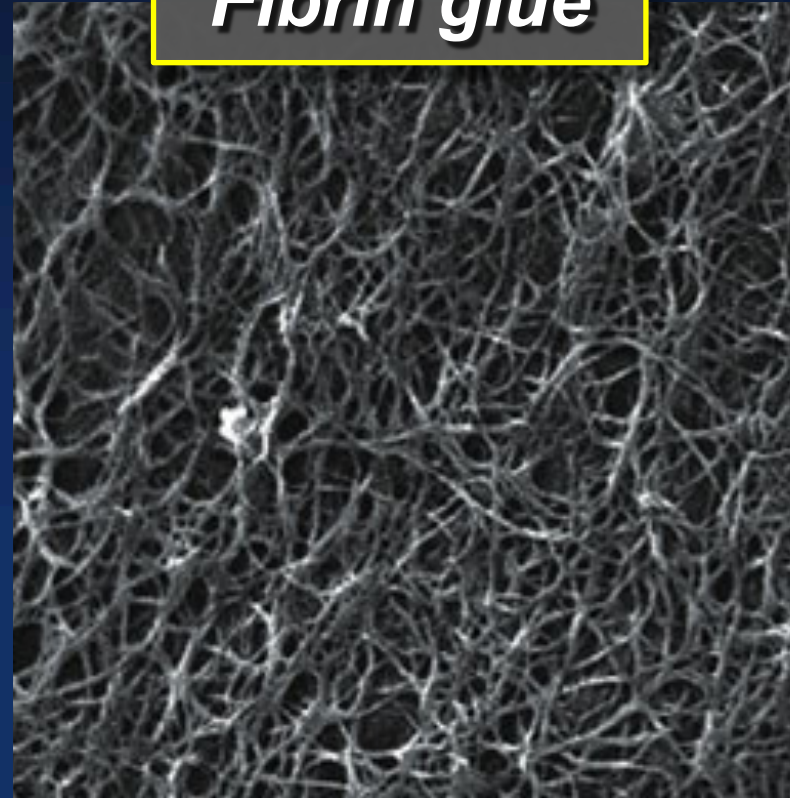


Epidural Blood Patch: *Fibrin Glue*

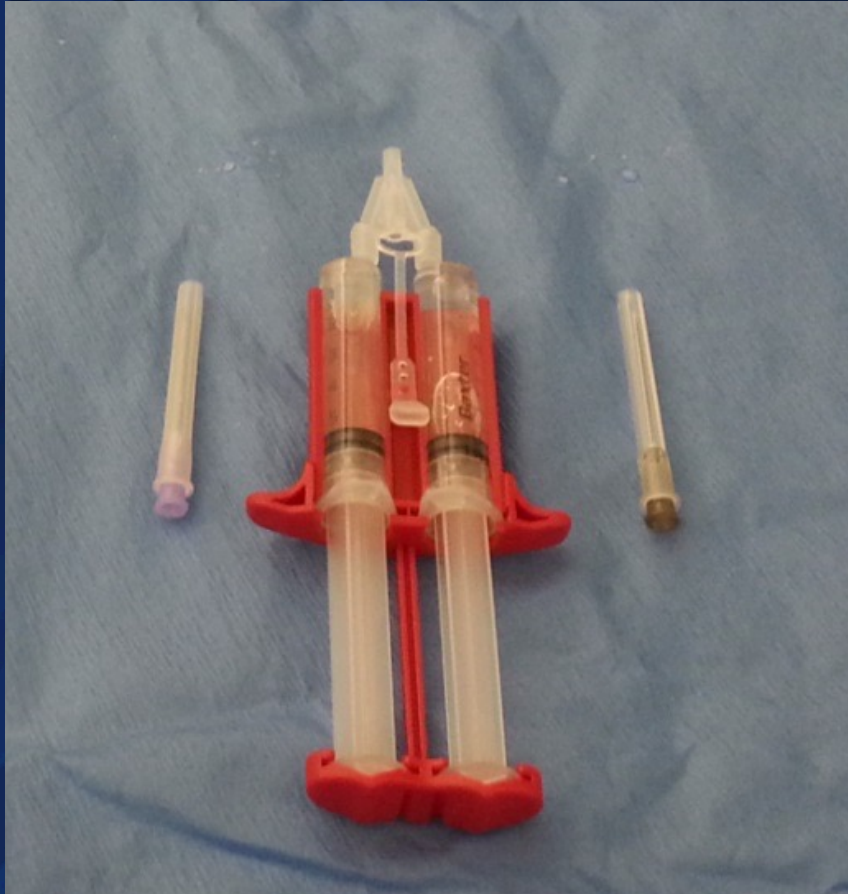
Physiologic fibrin



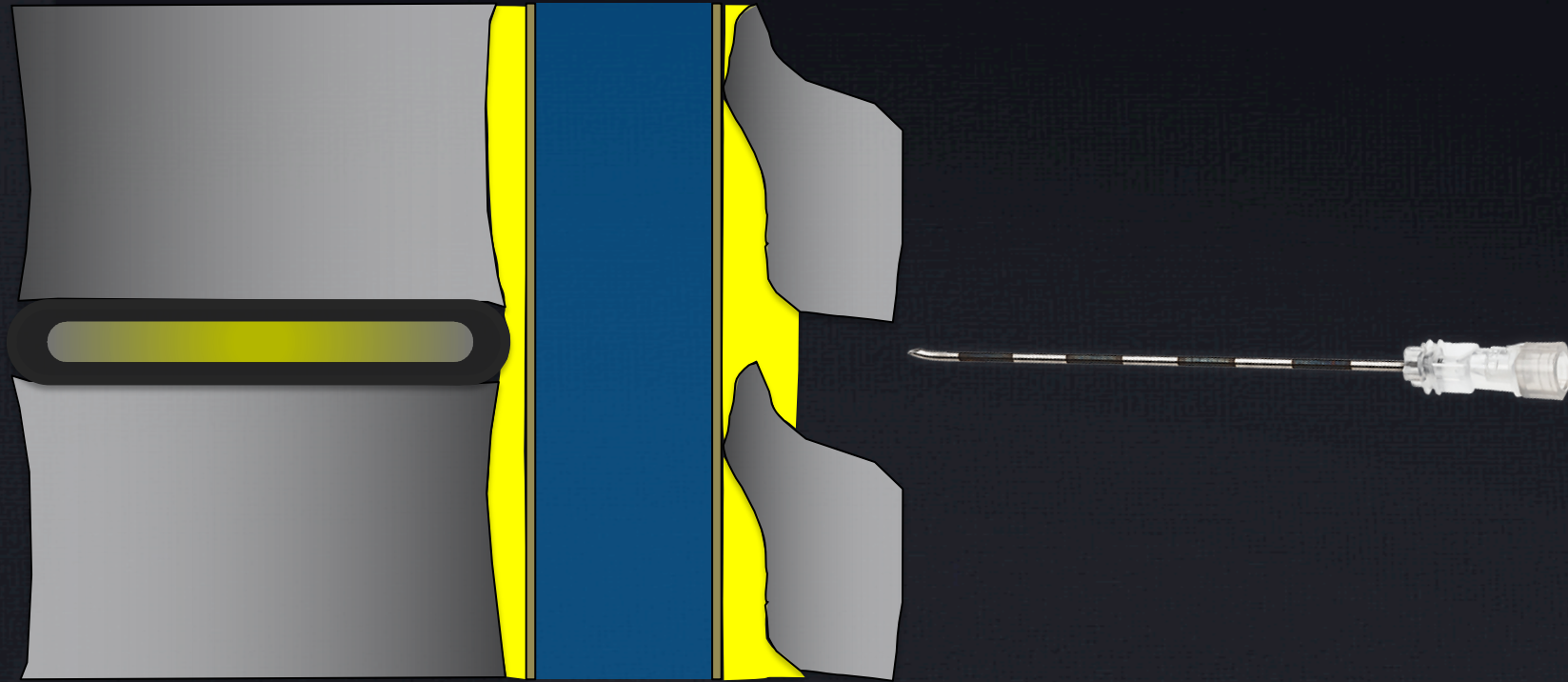
Fibrin glue



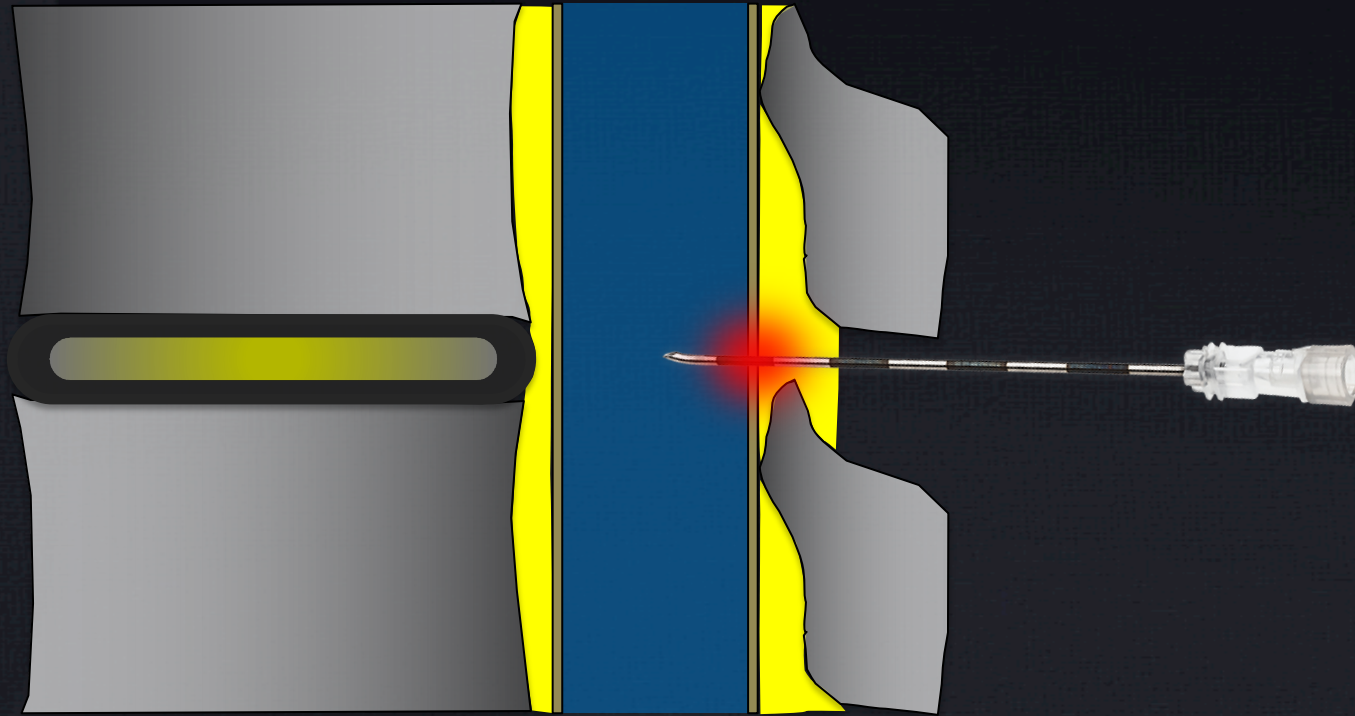
Epidural Blood Patch: *Fibrin Glue*



Epidural Blood Patch: *Post Lumbar Puncture*



Epidural Blood Patch: *Post Lumbar Puncture*

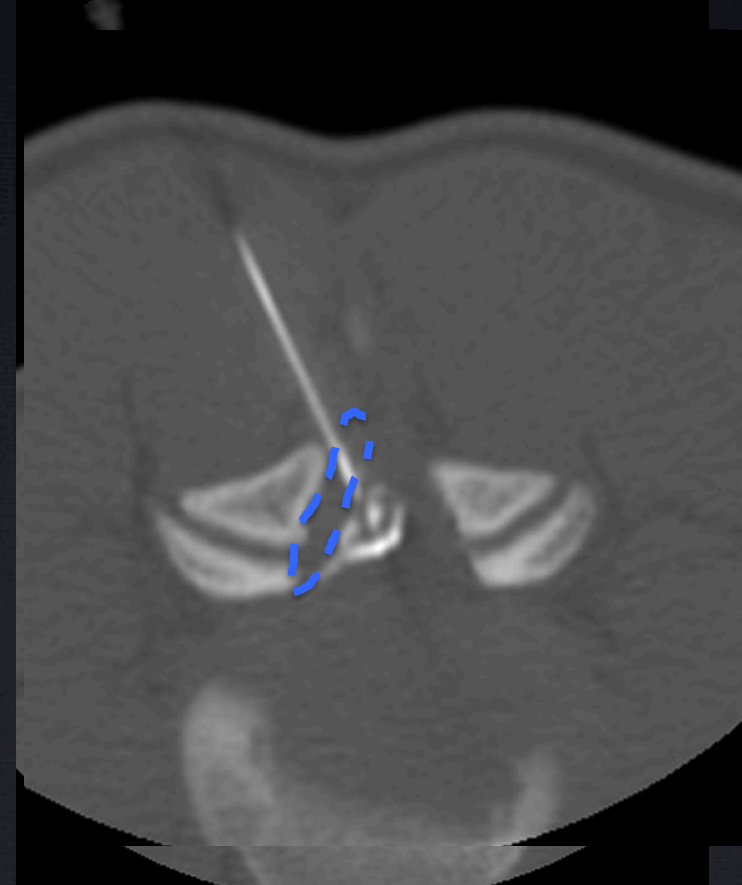
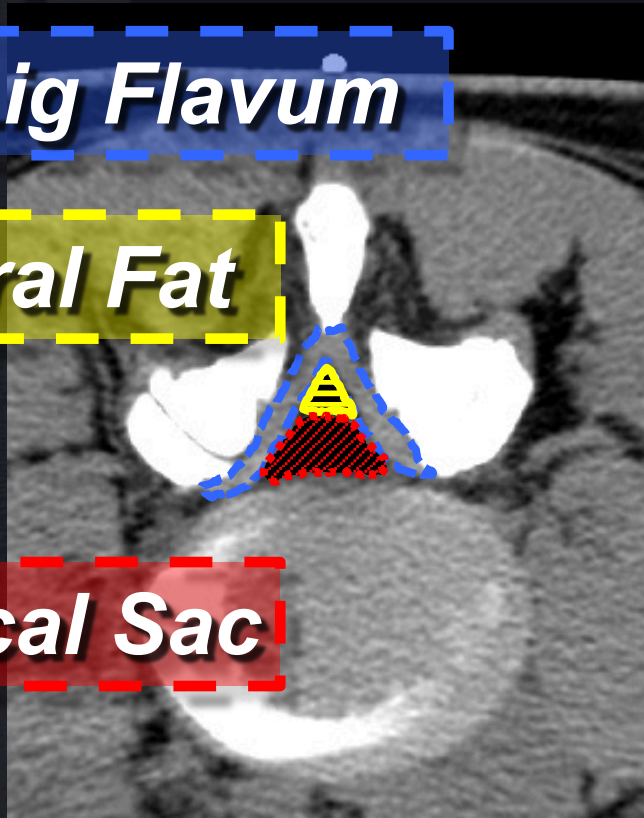


Epidural Blood Patch: *Post Lumbar Puncture*

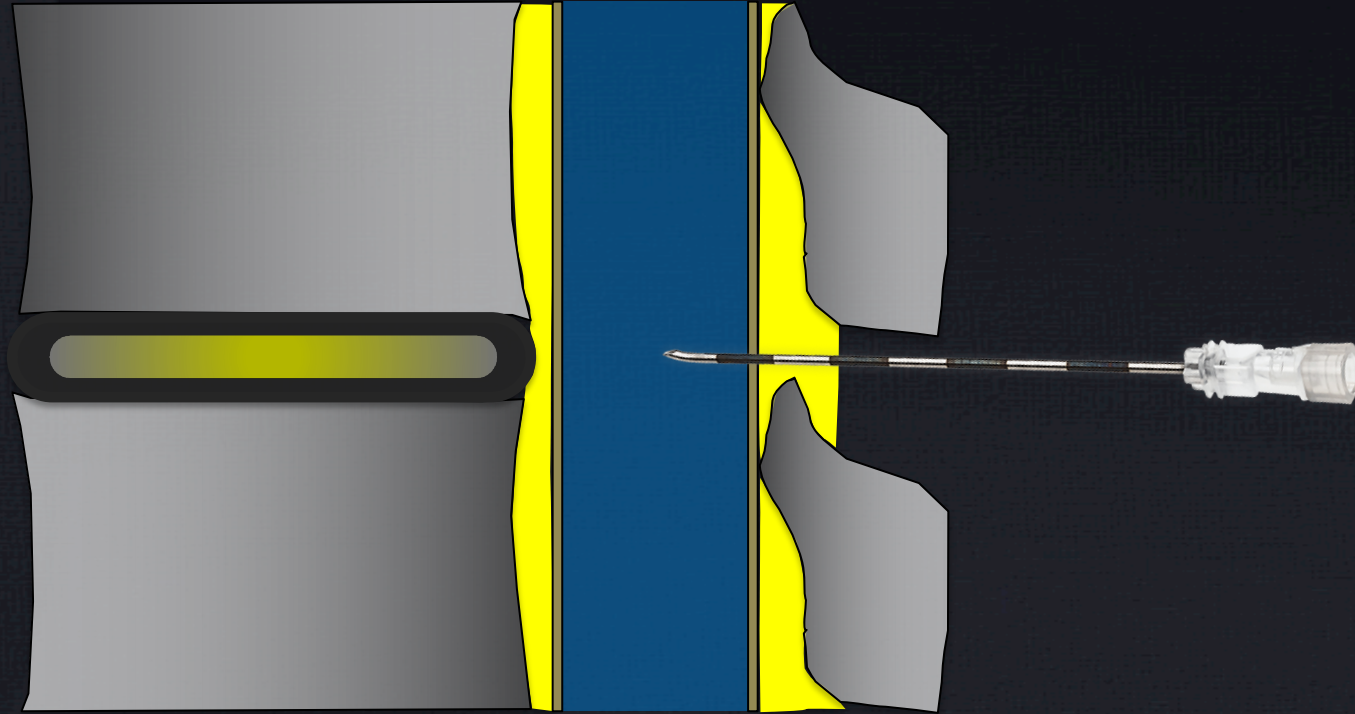
Lig Flavum

Epidural Fat

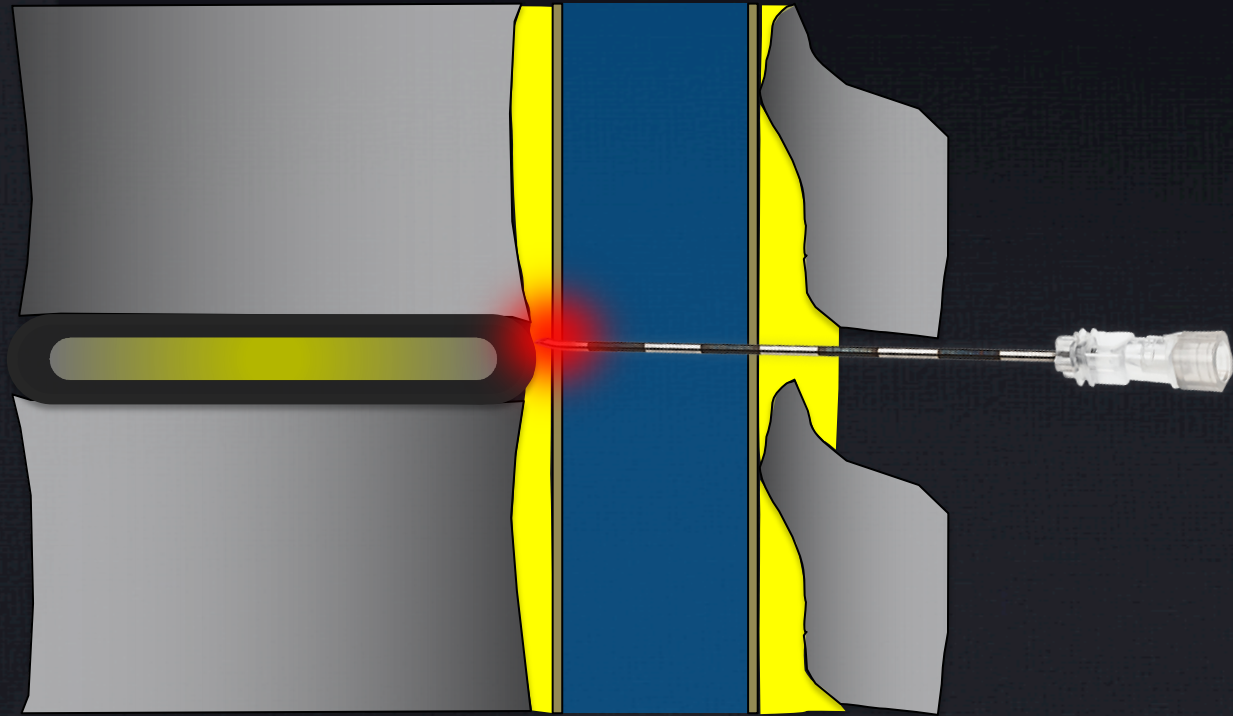
Thecal Sac



Epidural Blood Patch: *Post Lumbar Puncture*



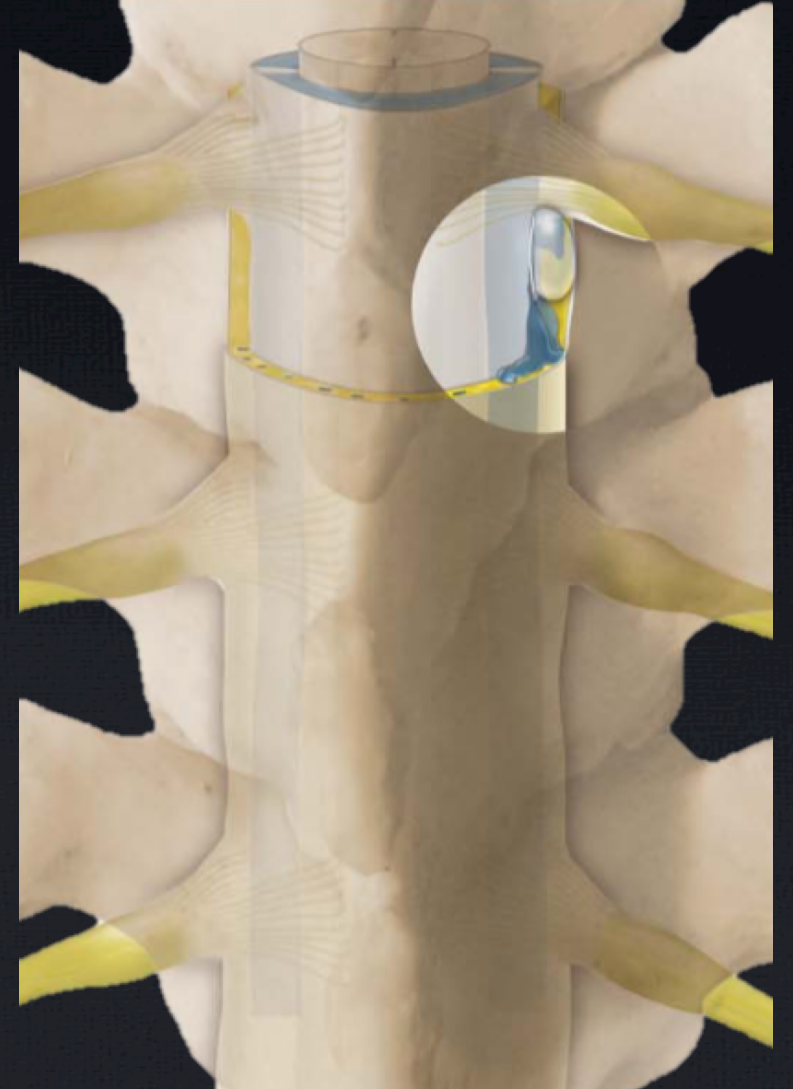
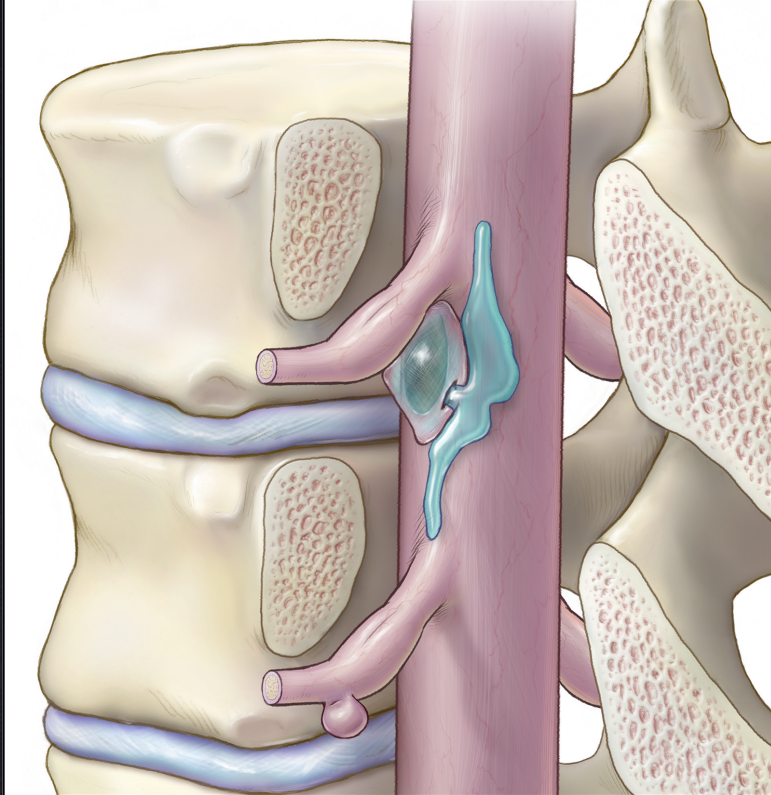
Epidural Blood Patch: *Post LP Ventral*



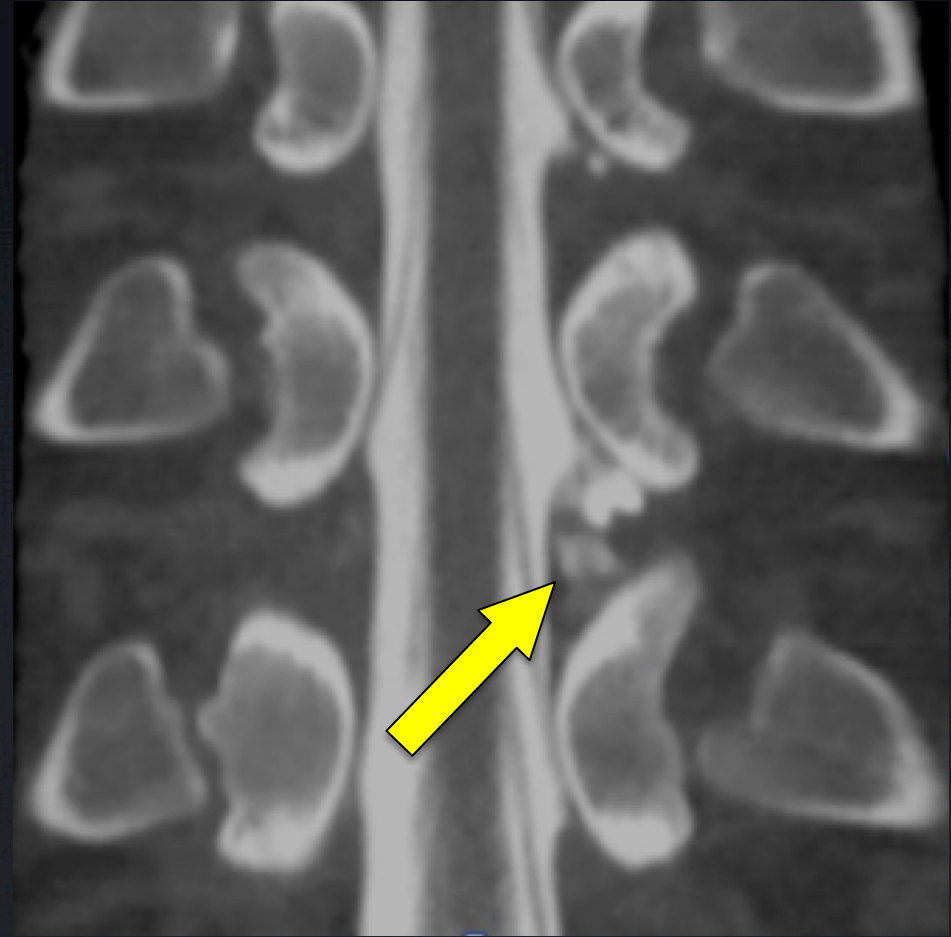
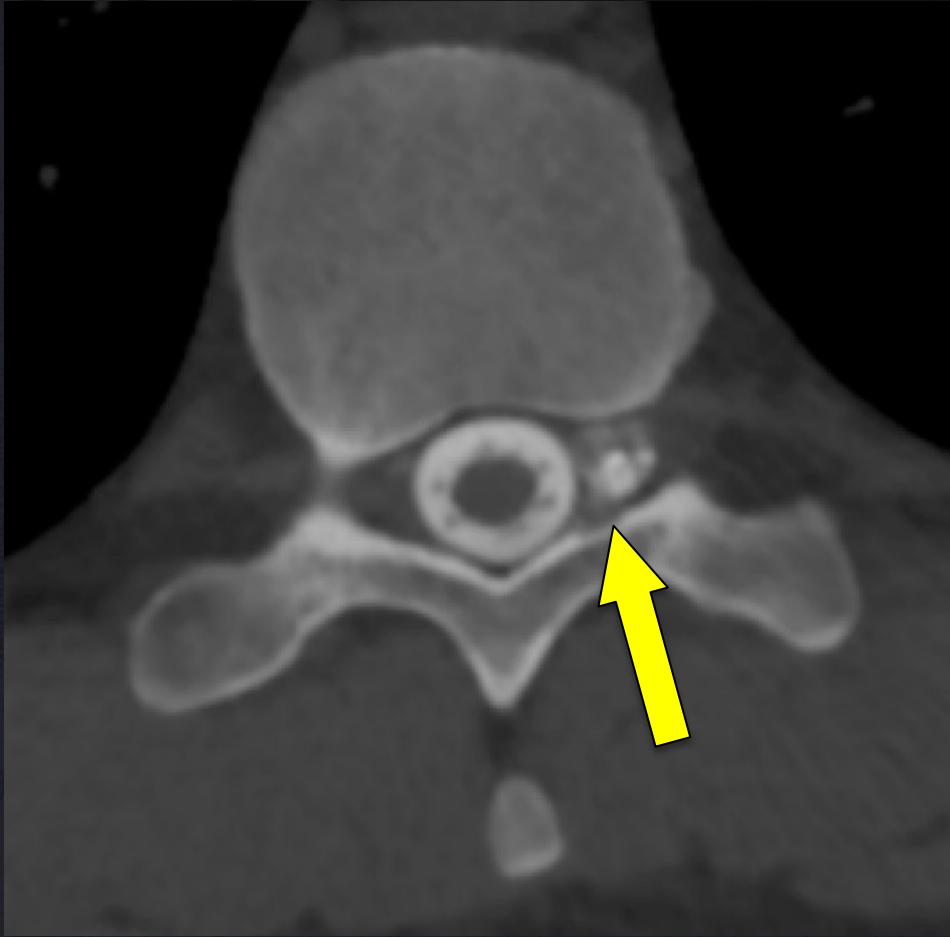
Epidural Blood Patch: *Post LP Ventral*



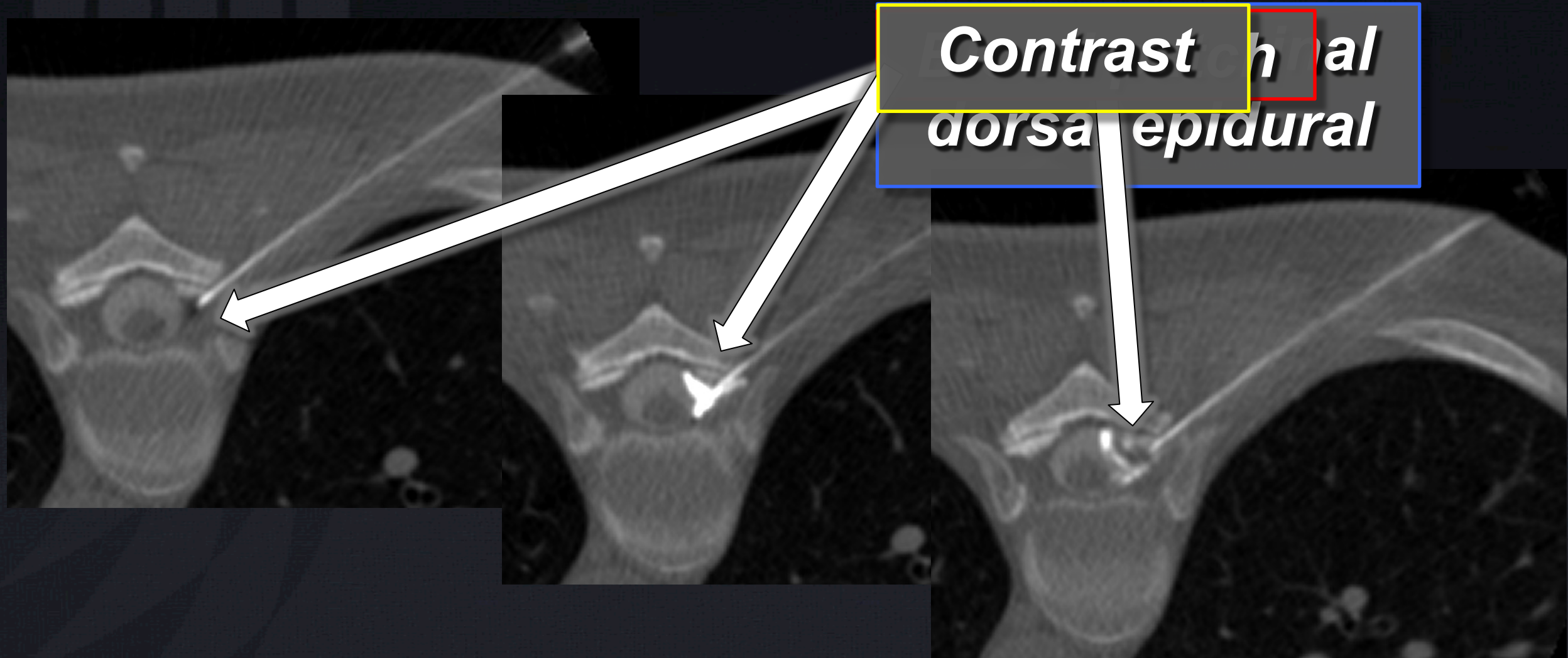
Type 1: Diverticula



Type 1: Diverticula



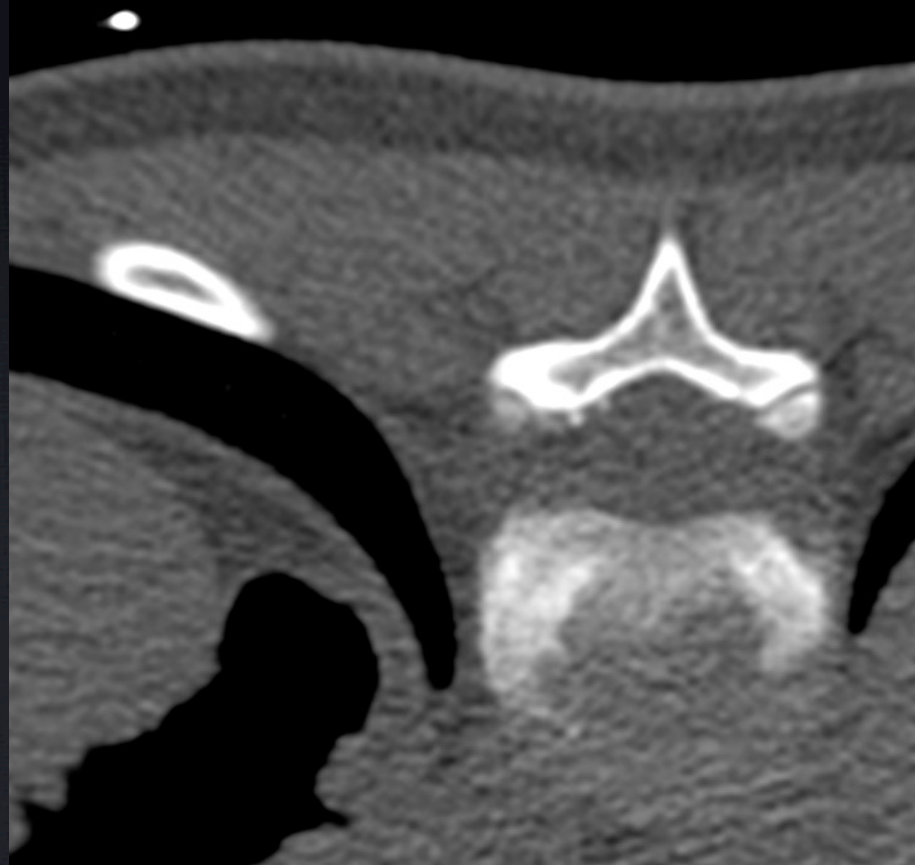
NRS: EBP Treatment

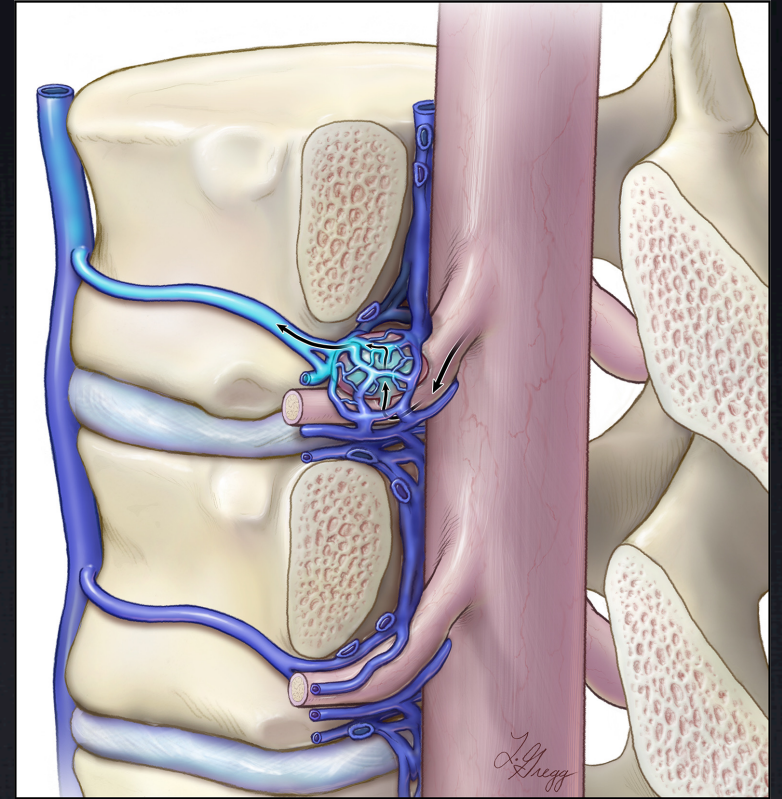
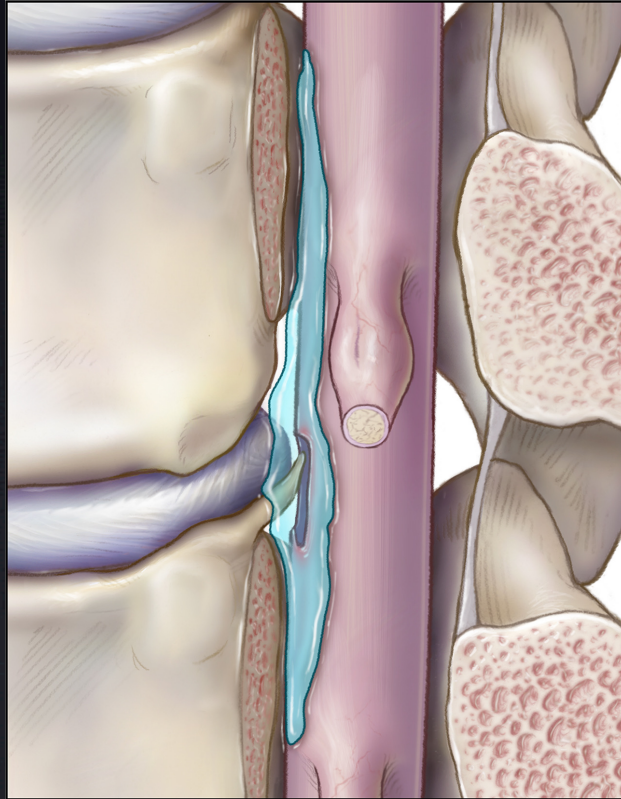
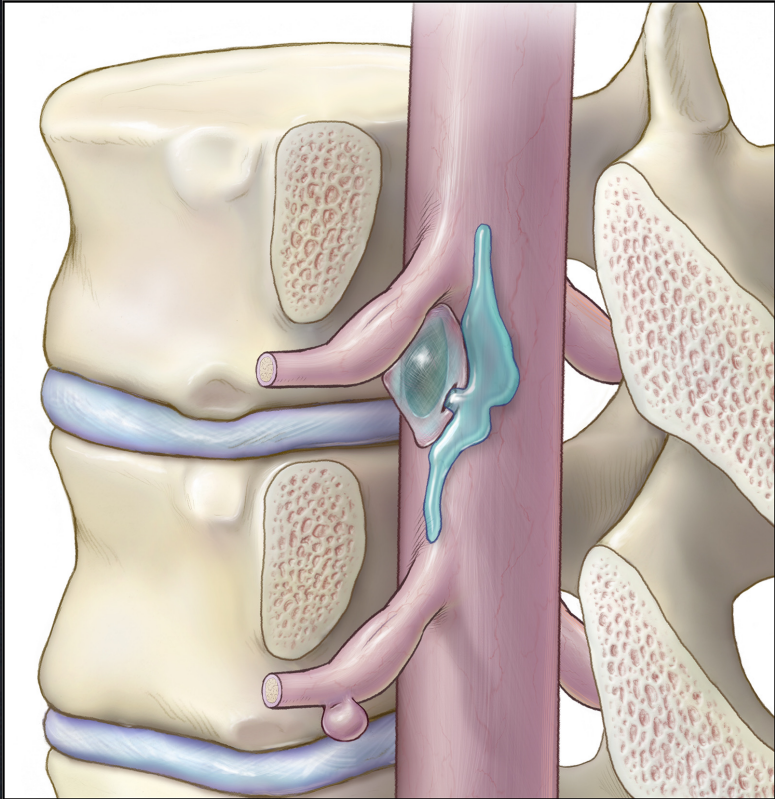


Epidural Blood Patch: *NRS Diverticular*

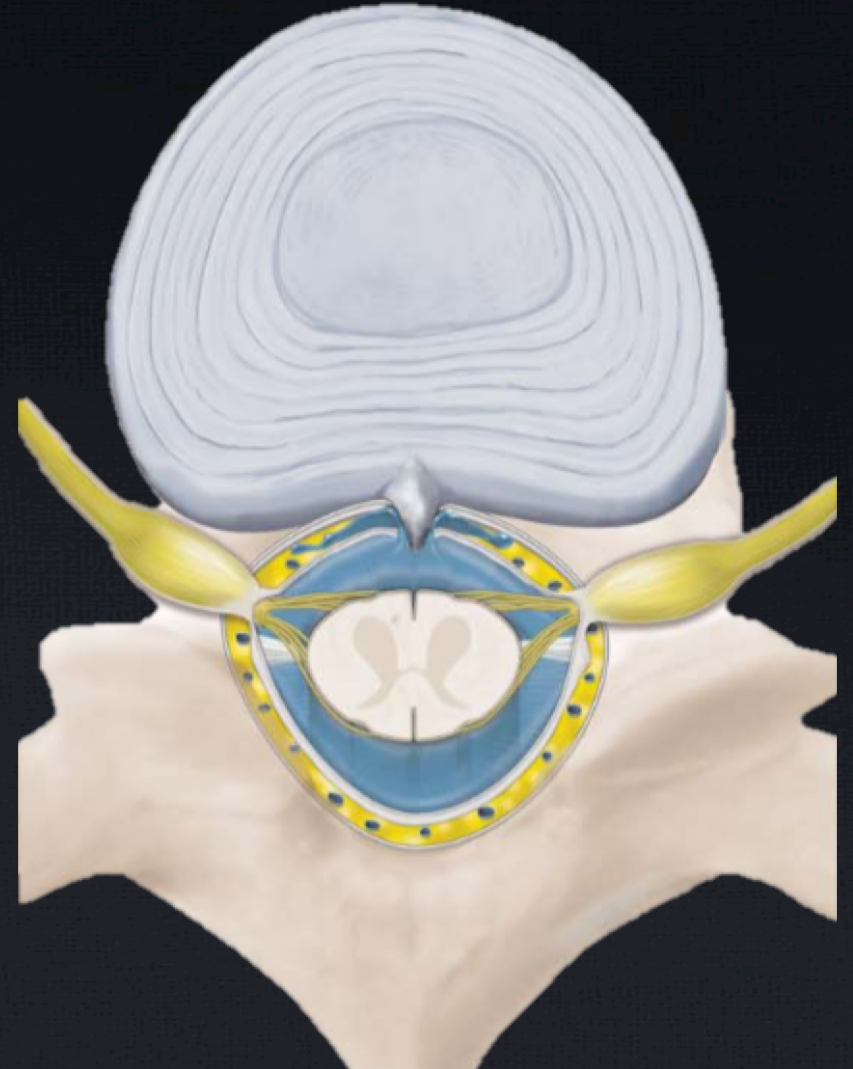
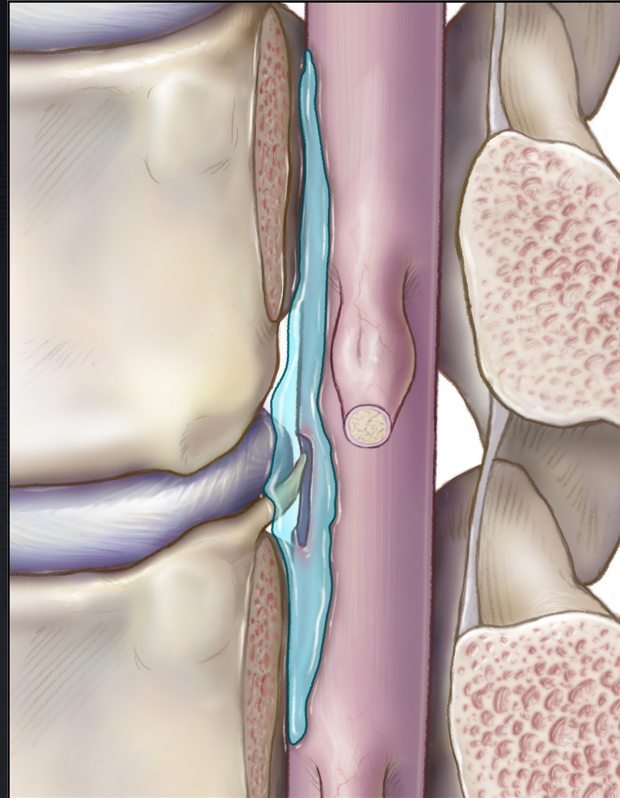


Epidural Blood Patch: *NRS Diverticular*

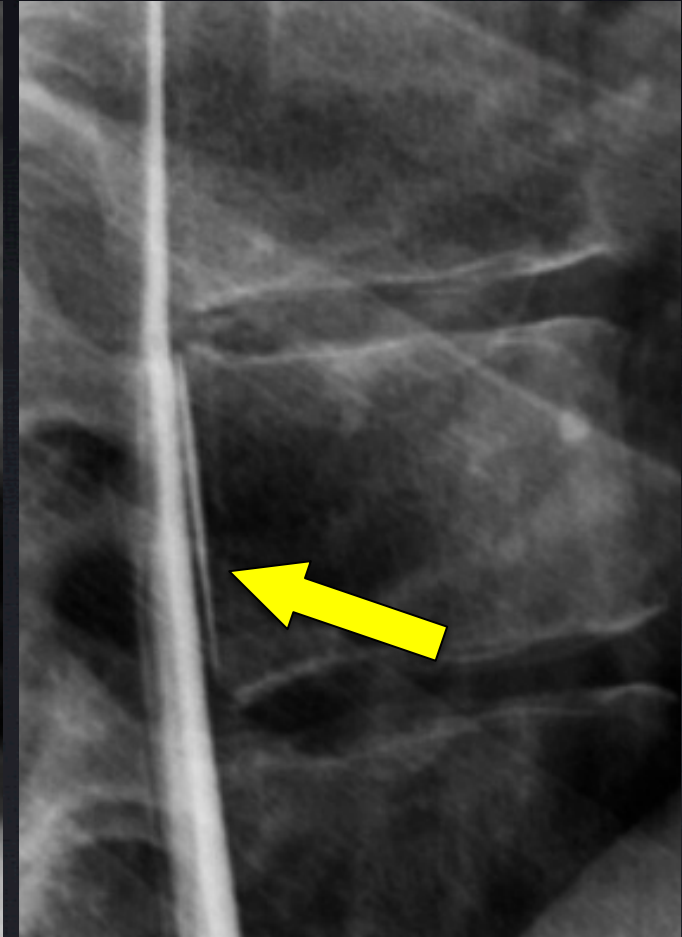
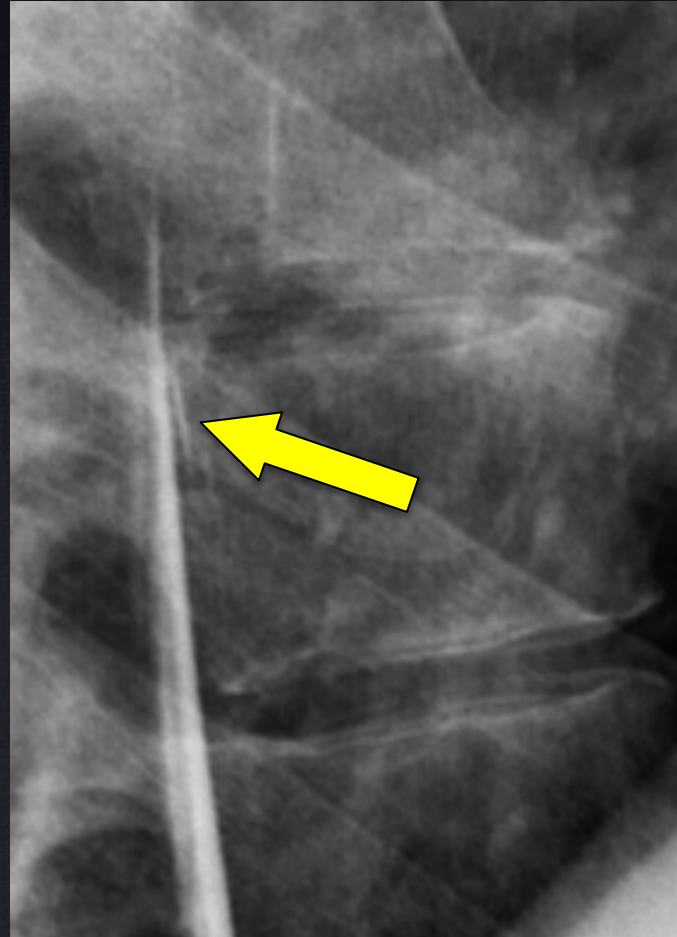
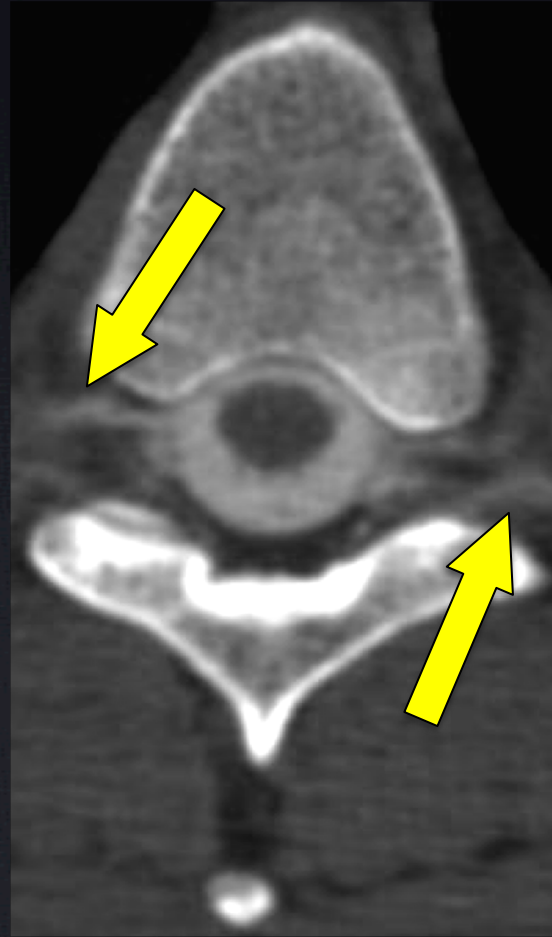
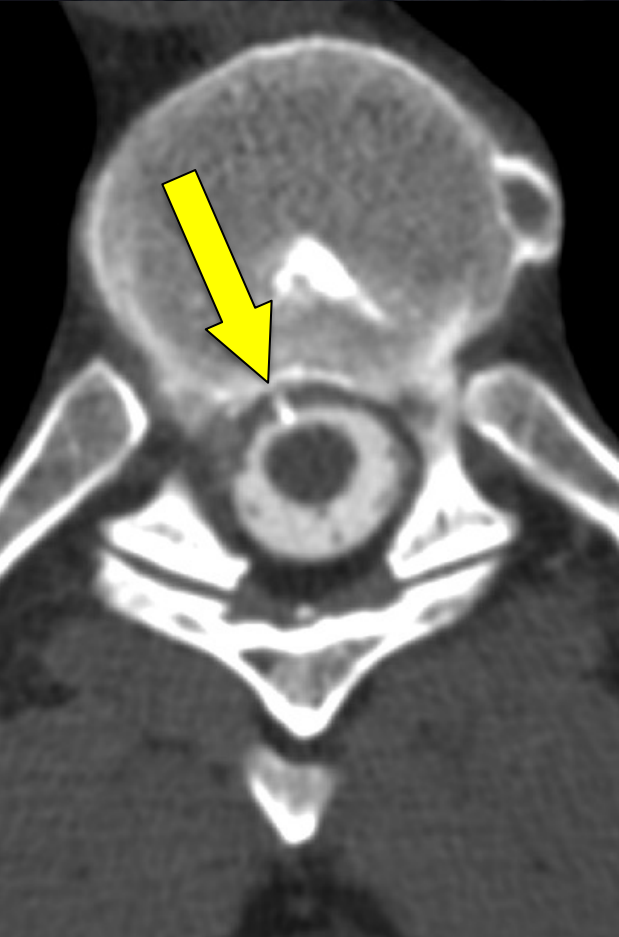




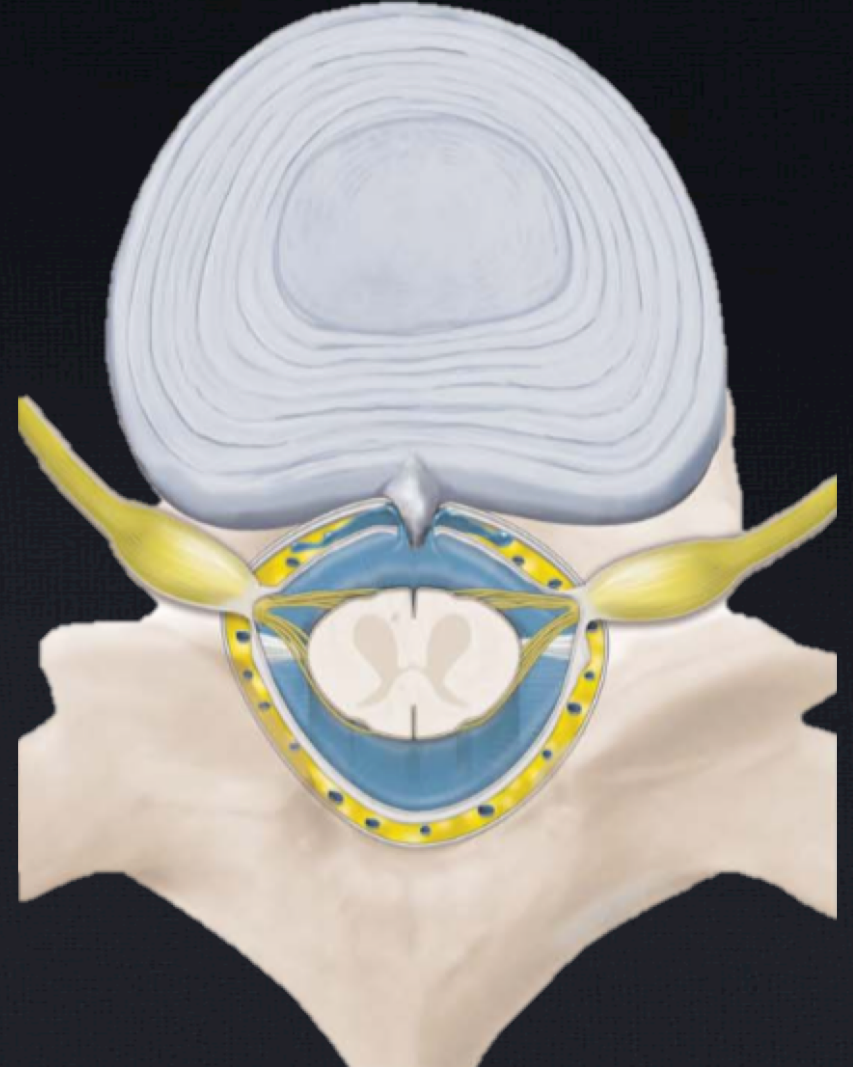
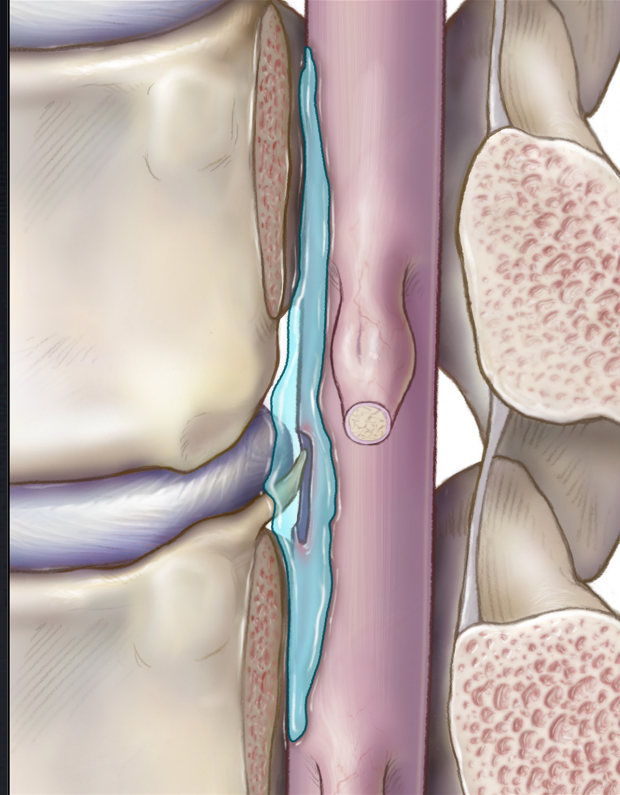
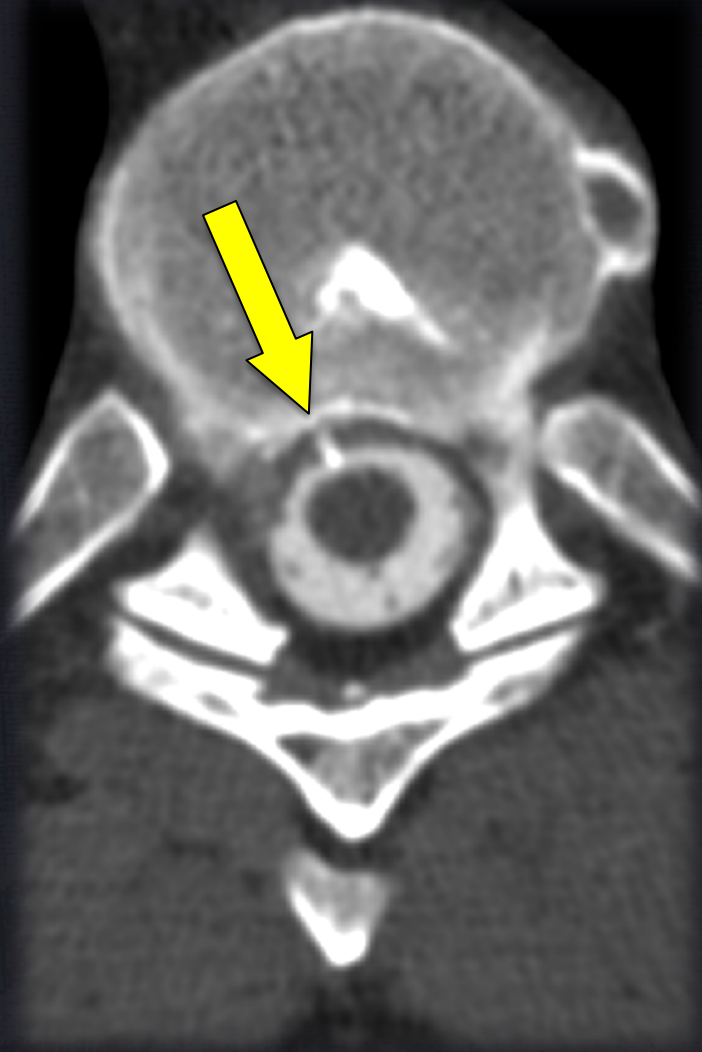
Type 2: Osteophyte Spur



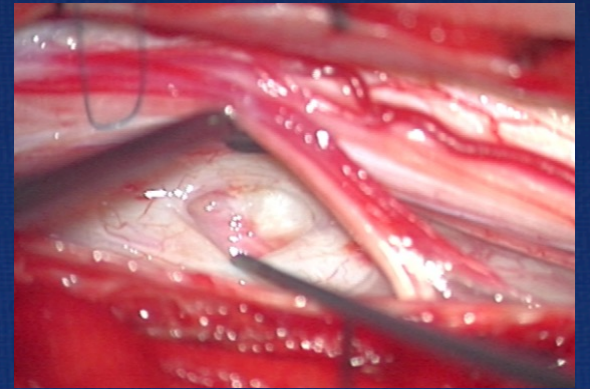
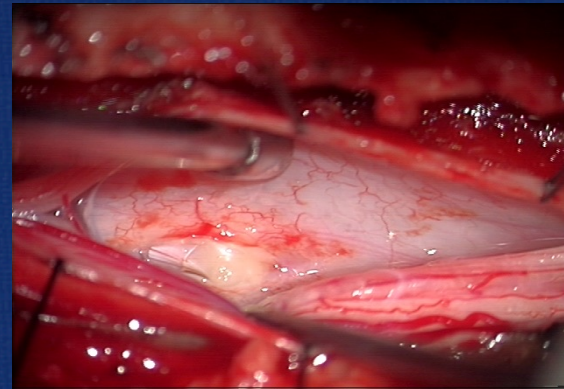
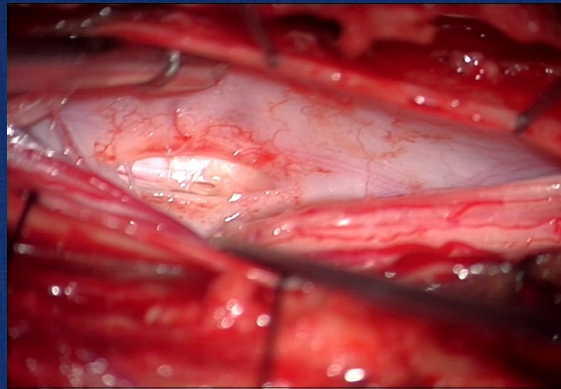
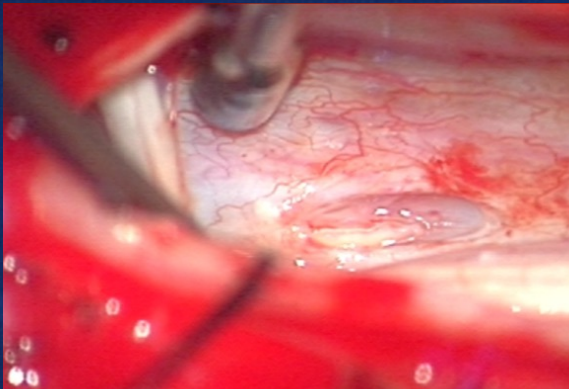
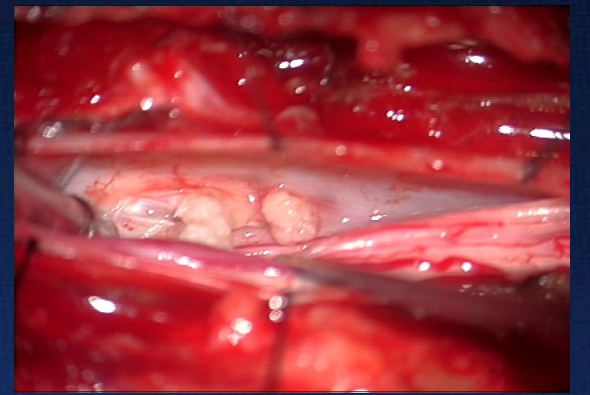
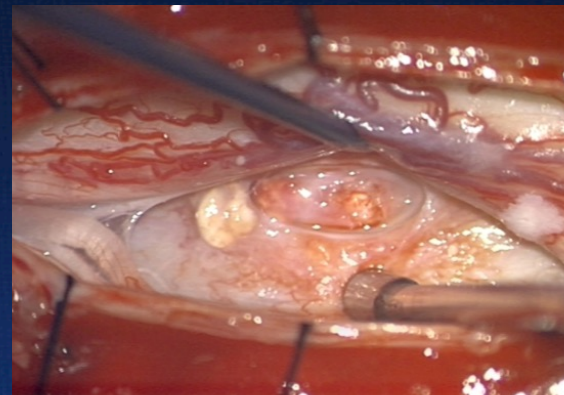
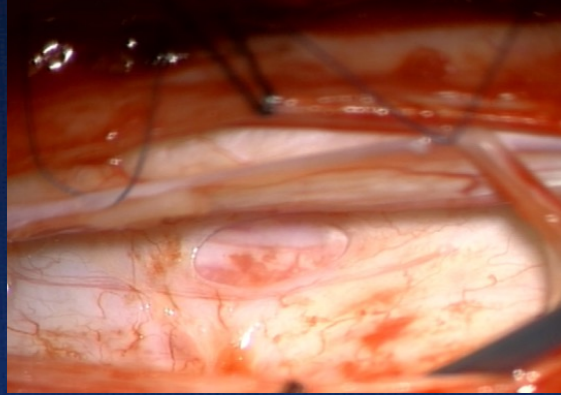
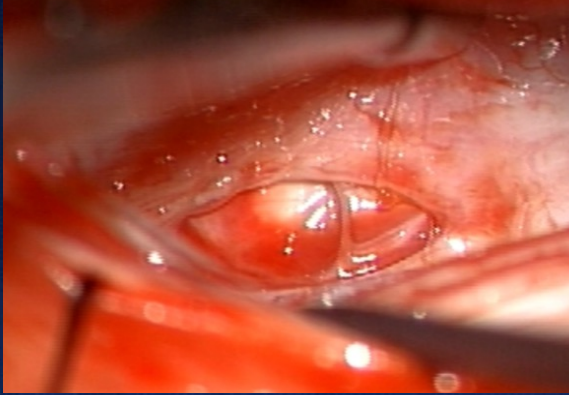
Type 2: Osteophyte Spur



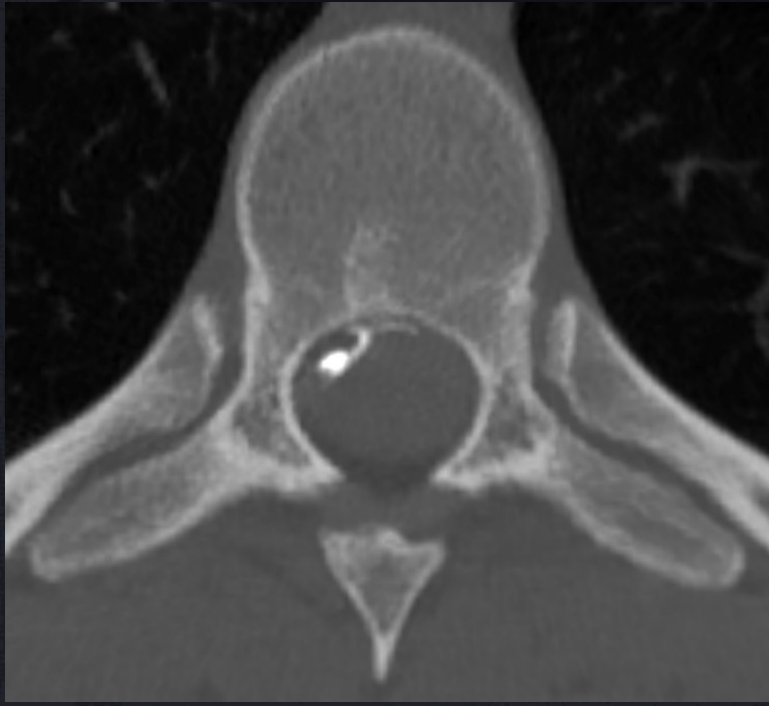
Type 2: Osteophyte Spur



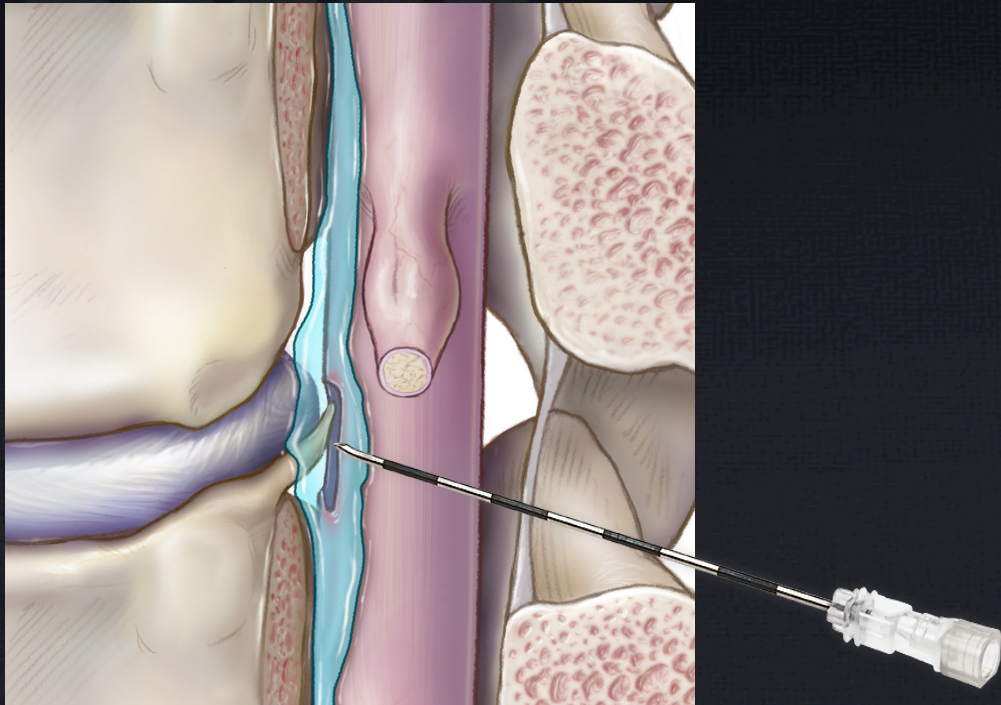
Osteophyte Spur



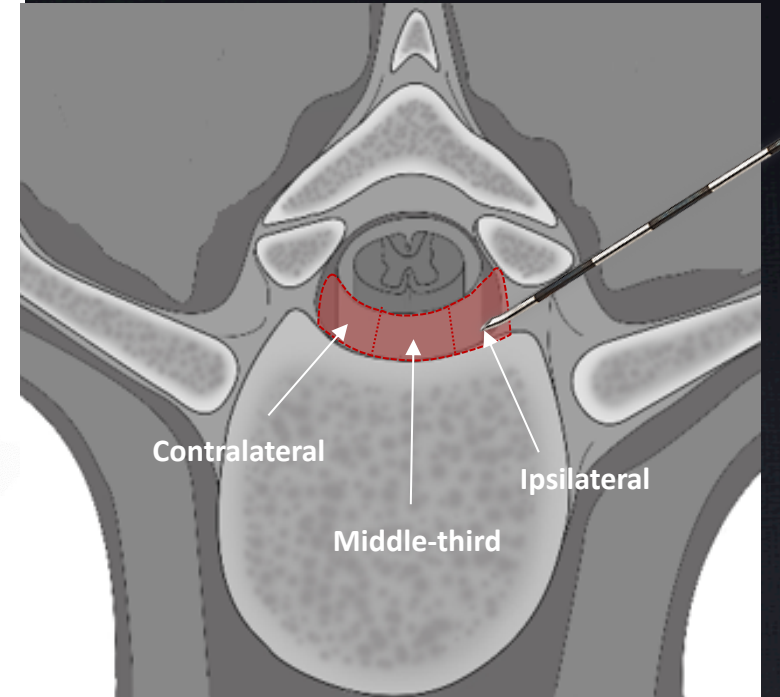
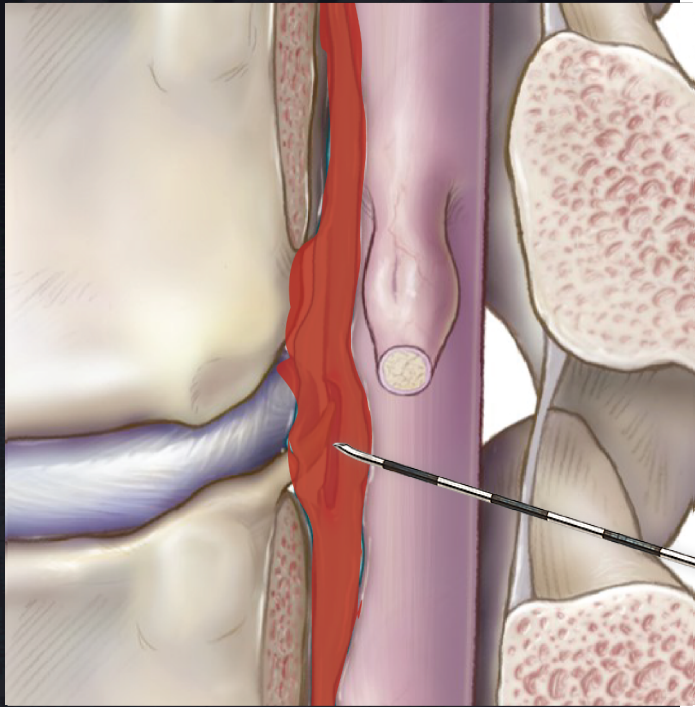
Epidural Blood Patch: *Ventral CSF Leak*



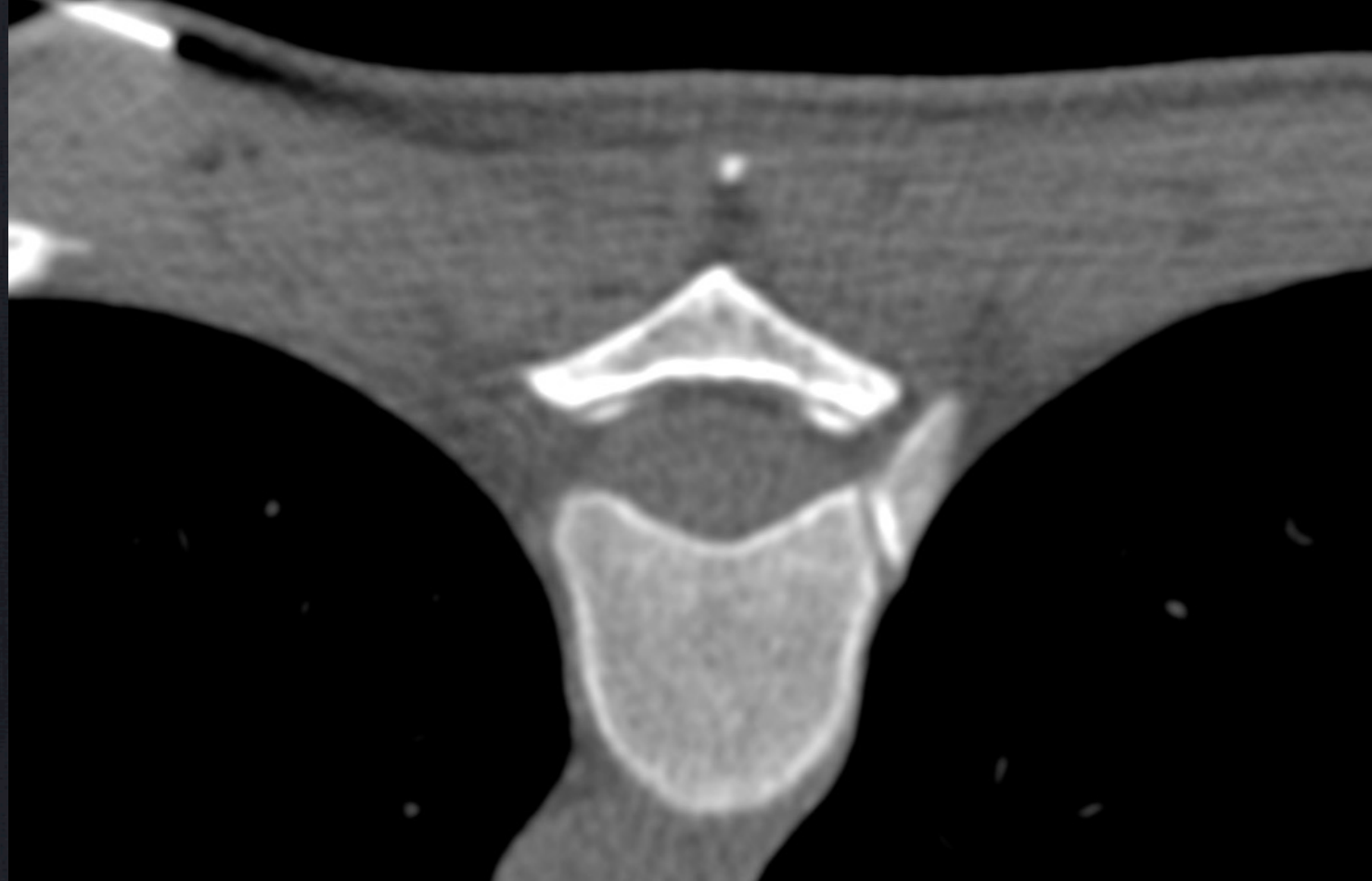
Epidural Blood Patch: *Ventral CSF Leak*



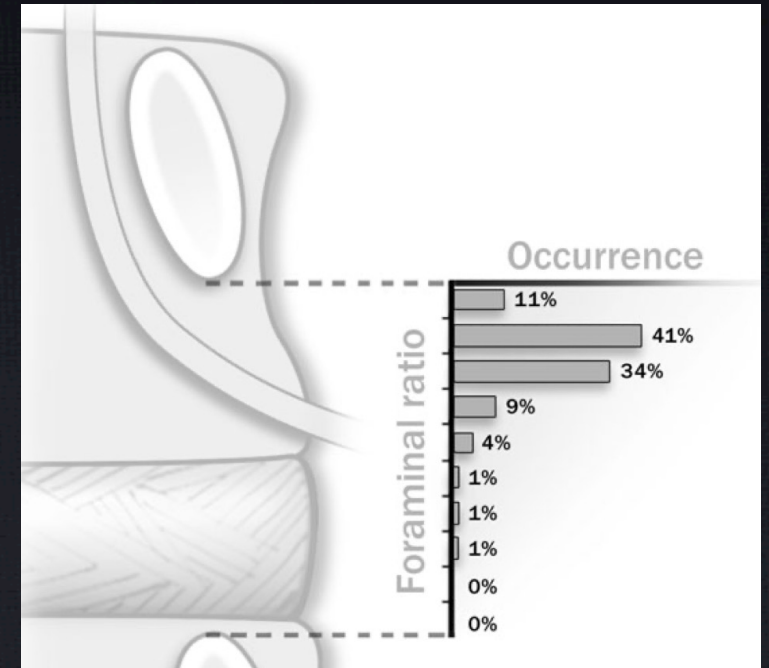
Epidural Blood Patch: *Ventral CSF Leak*

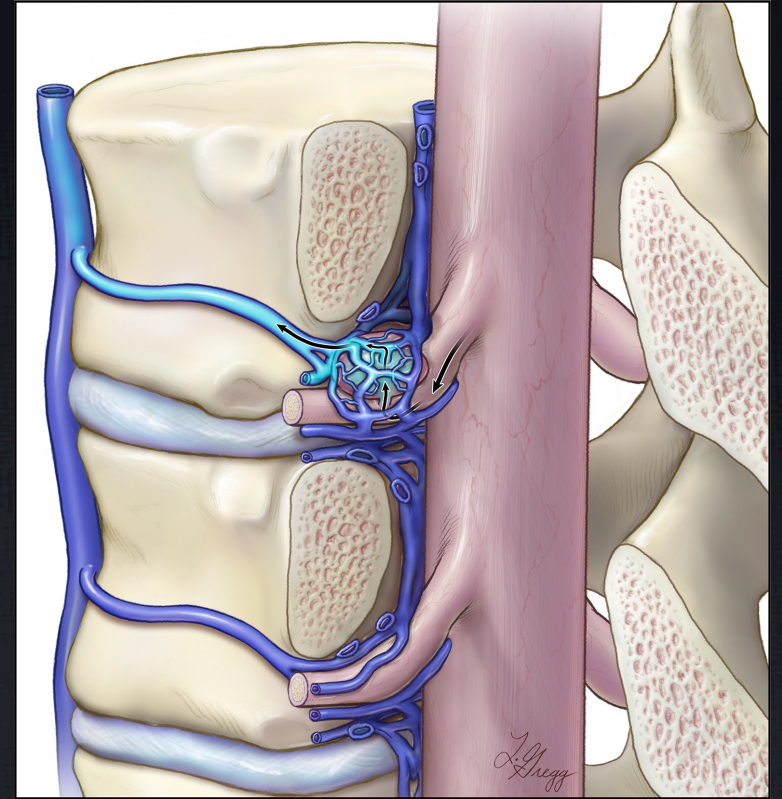
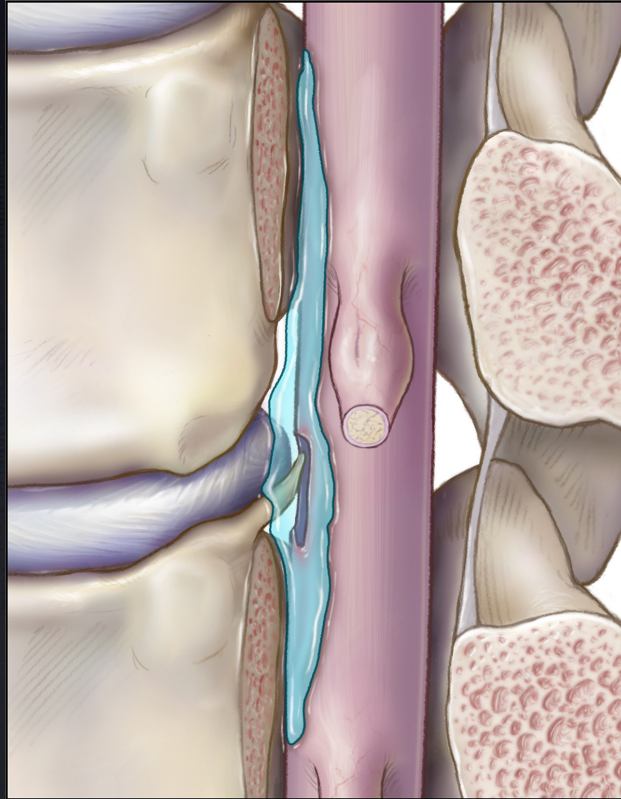
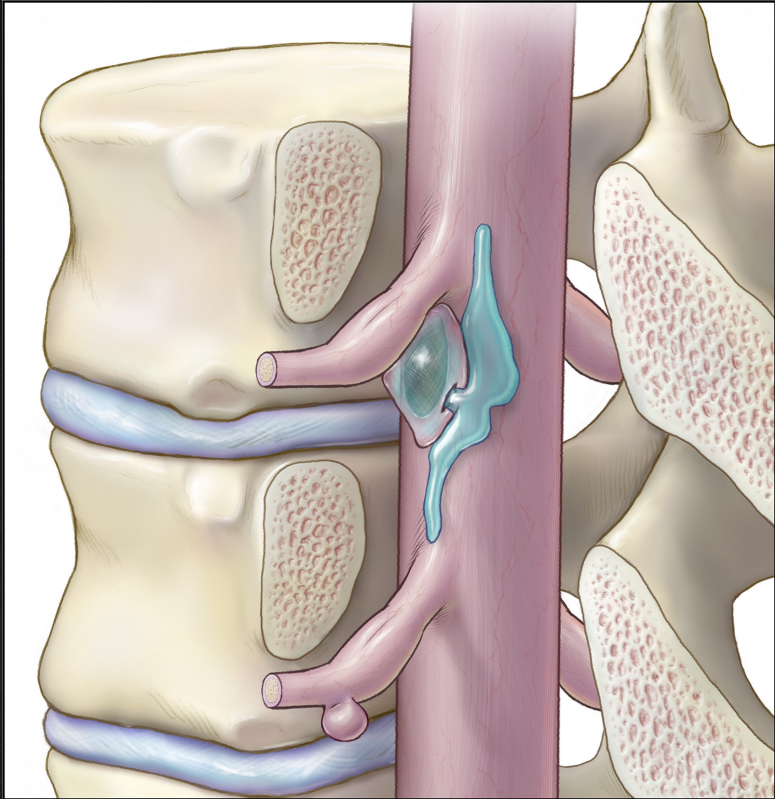


Epidural Blood Patch: *Ventral CSF Leak*

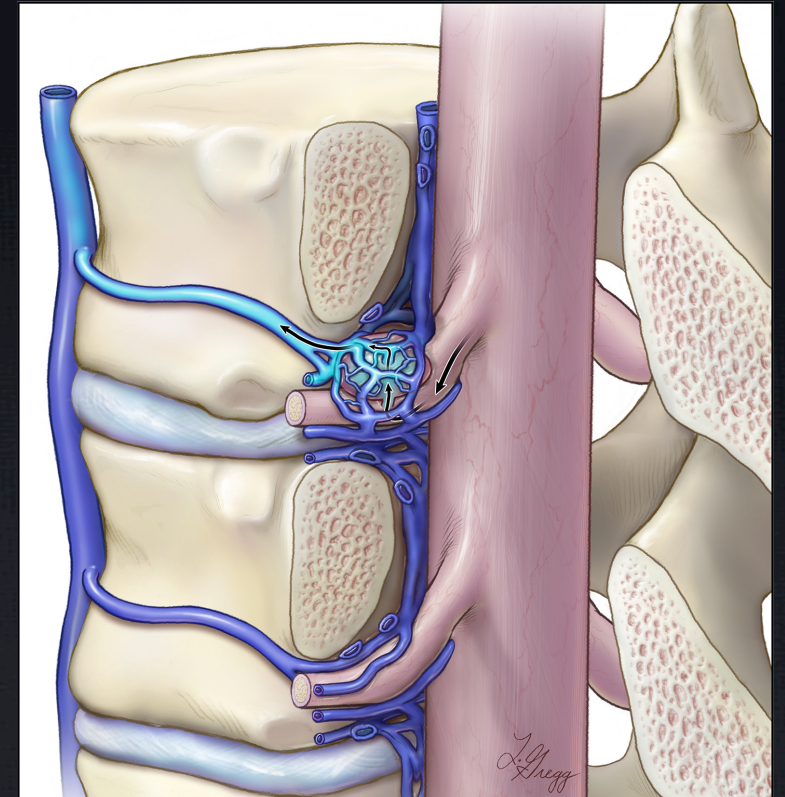
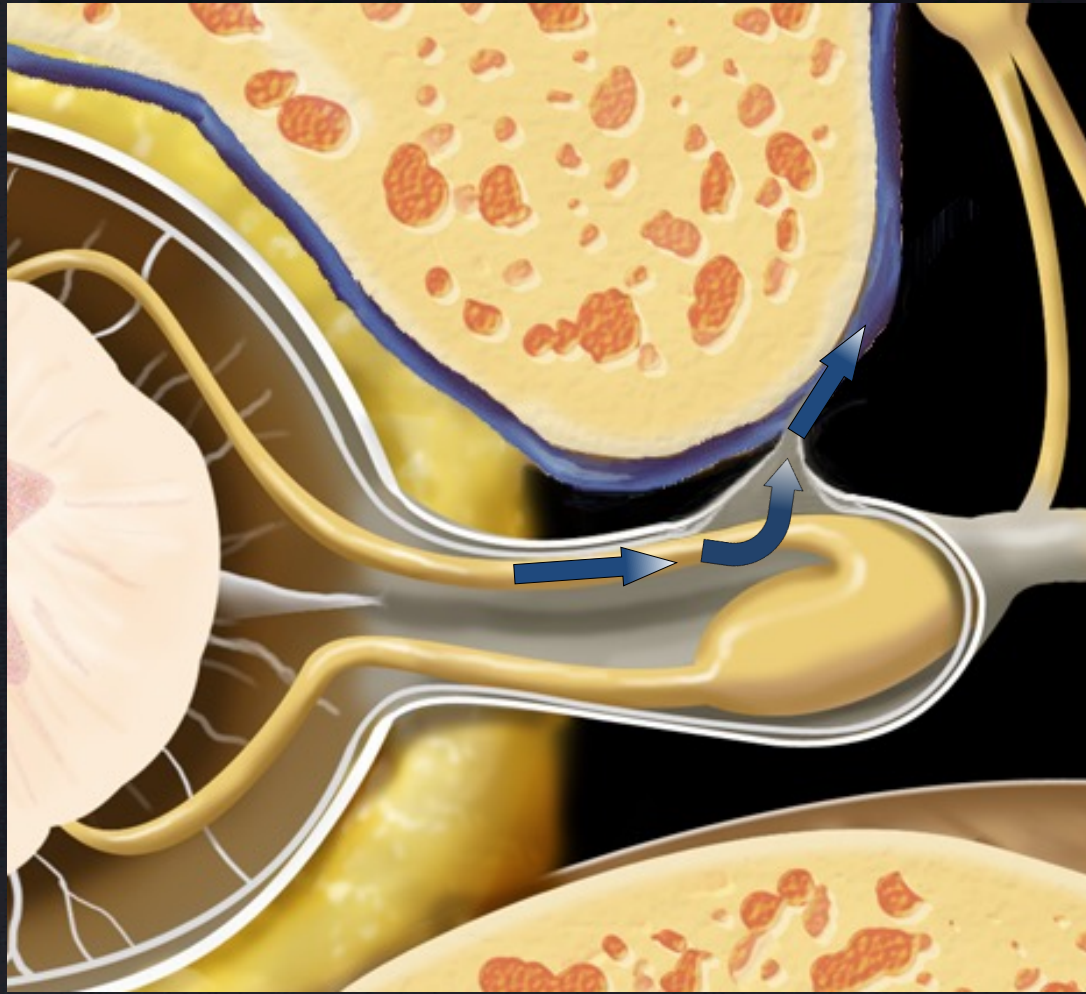


Epidural Blood Patch: *Ventral CSF Leak*





Type 3: Fistula

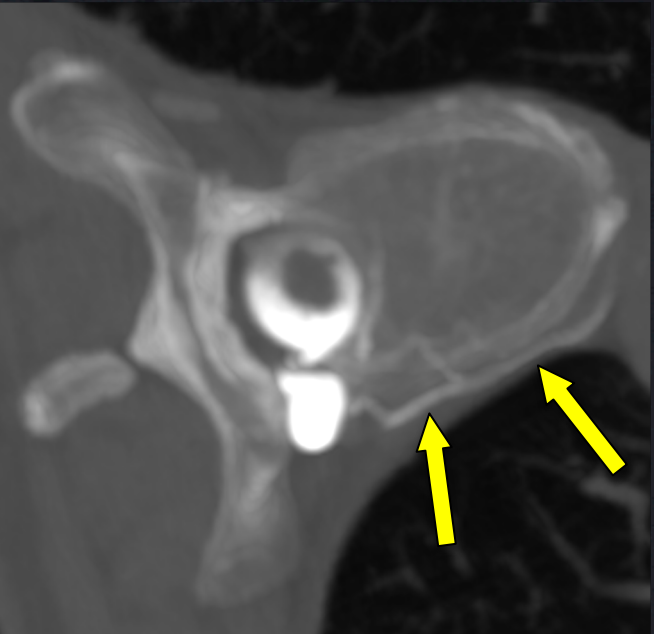




BRIEF/TECHNICAL REPORT
SPINE

Decubitus CT Myelography for Detecting Subtle CSF Leaks in Spontaneous Intracranial Hypotension

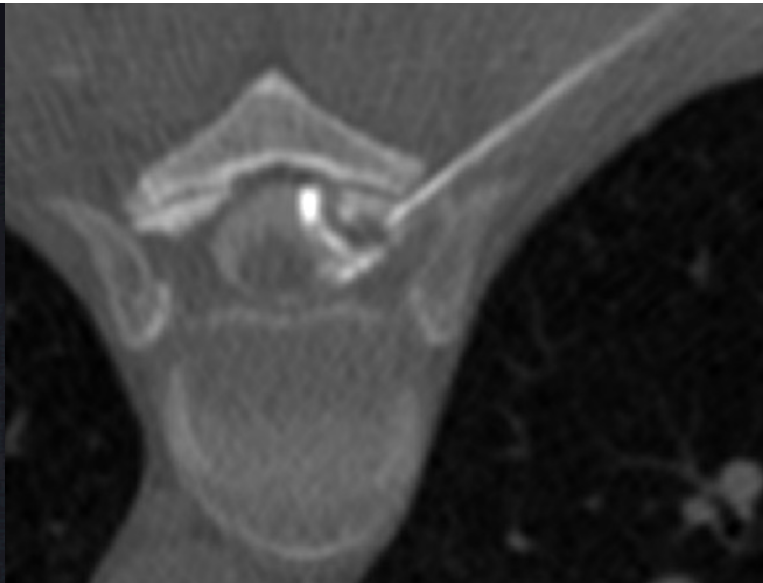
 P.G. Kranz,  L. Gray, and  T.J. Amrhein



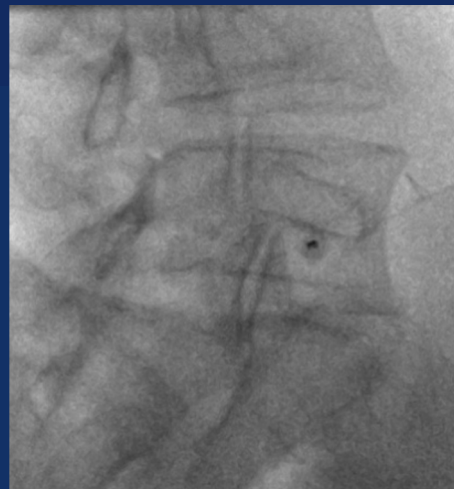
SIH: Treatment: CT Approaches

CT Fluoroscopy–Guided Blood Patching of Ventral CSF Leaks by Direct Needle Placement in the Ventral Epidural Space Using a Transforaminal Approach

T.J. Amrhein, N.T. Befera, L. Gray, and P.G. Kranz



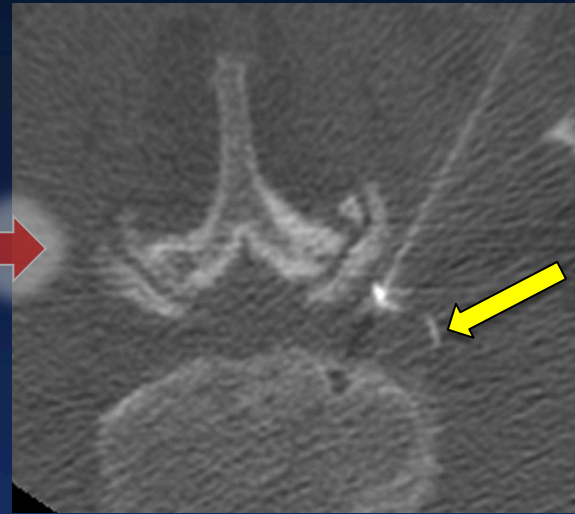
SIH: Treatment: Fluoro Approaches



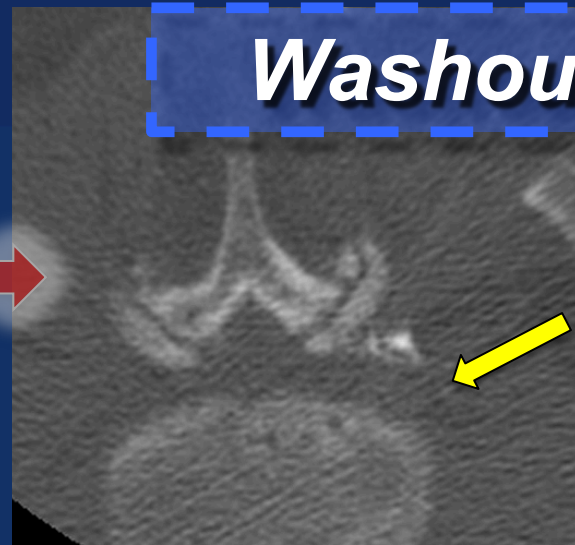
Intravascular Injection (CT)



Immediate



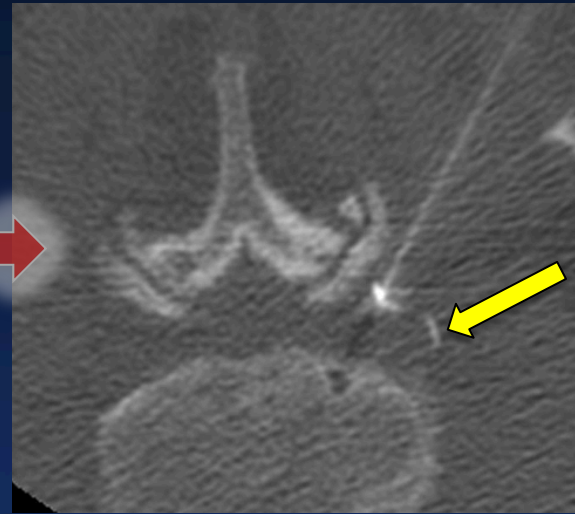
1-2 seconds



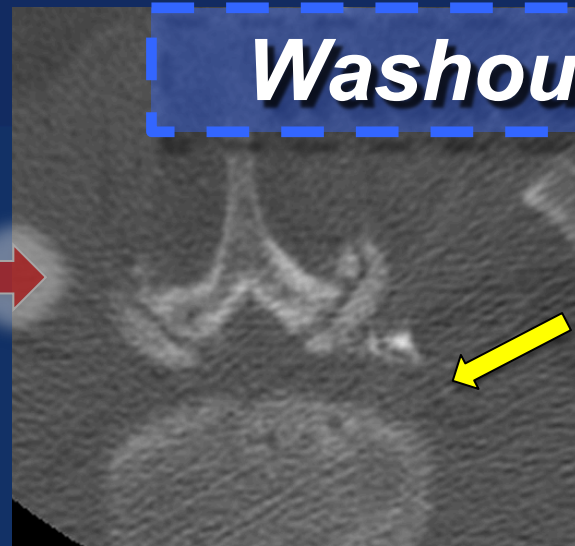
Intravascular Injection (CT)



Immediate



1-2 seconds

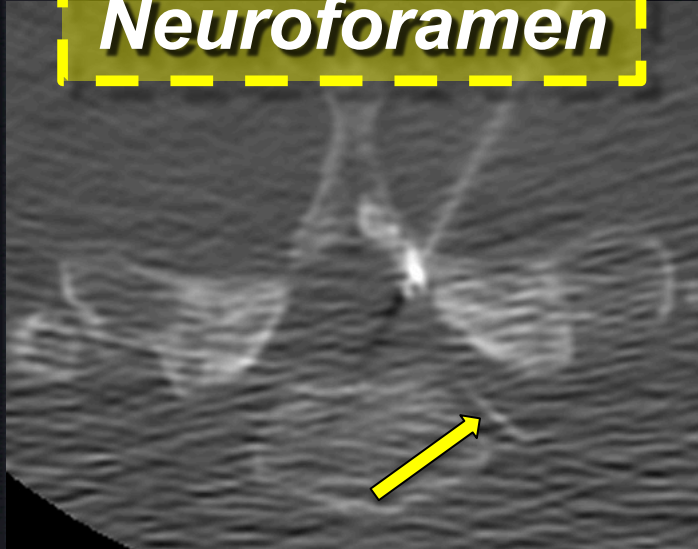


Washout

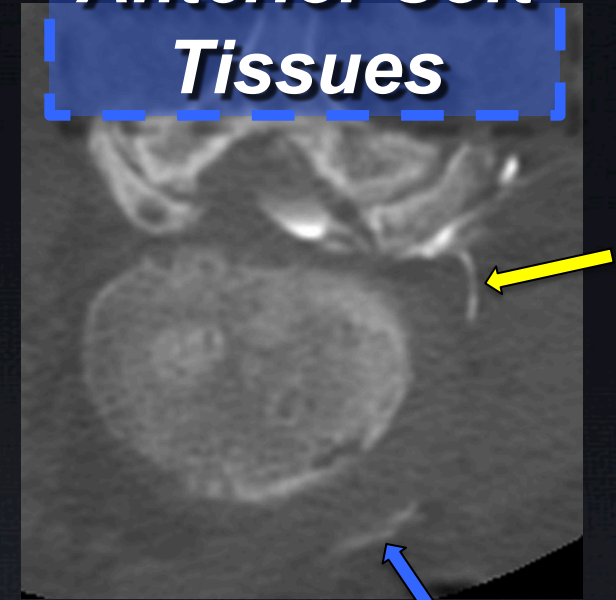


Intravascular Injection (CT): Locations

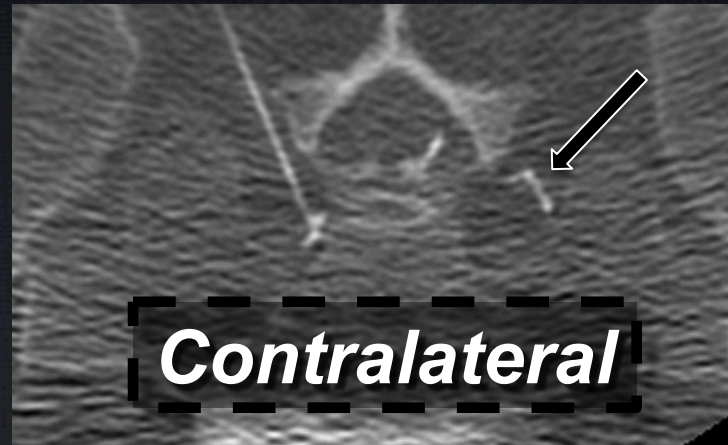
Neuroforamen



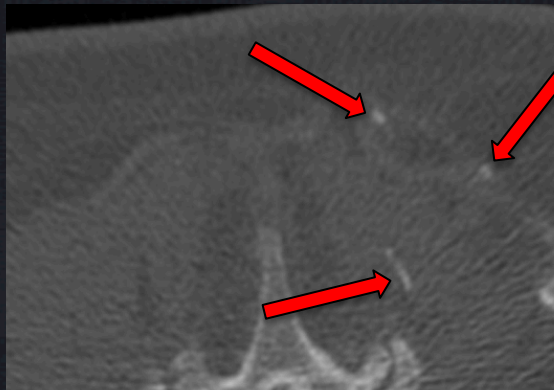
Anterior Soft Tissues



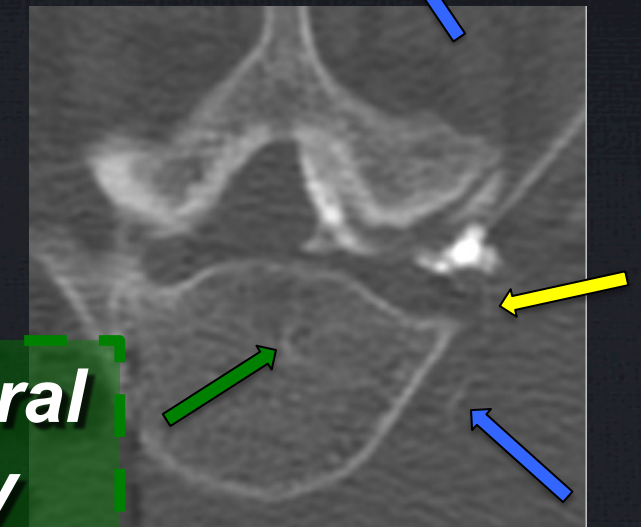
Contralateral



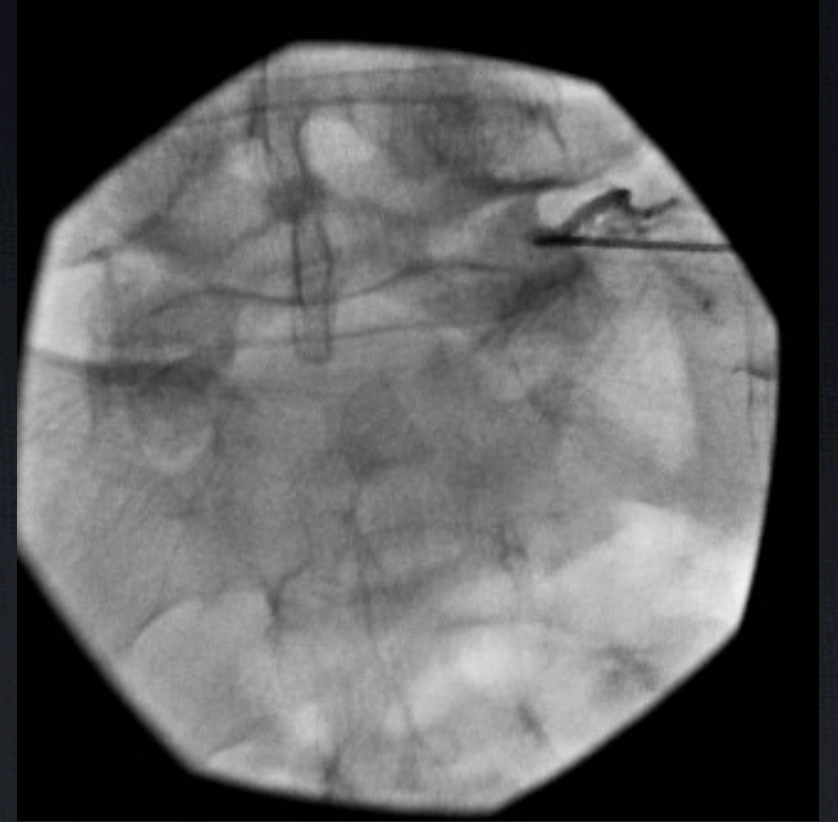
Posterior Paraspinal Musculature



Vertebral Body



Intravascular Injection (CF)



Epidural Blood Patch: *When To Stop?*

Leak Coverage

Pain / Deficits



Volume

Mass Effect

Epidural Blood Patch: *When To Stop?*



Current Percutaneous Treatment Approaches

- EBP: 1st treatment and standard of care
 - Imaging-guided vs. Blind
 - Targeted vs. Non-targeted
 - Fibrin glue
- Treatment based on leak subtype
 - Iatrogenic
 - Ventral disc osteophyte spur
 - CVF and NRS diverticulum

Thank You!

Tim Amrhein, MD

Associate Professor of Neuroradiology

Director of Spine Intervention

Duke University Medical Center

 @TimAmrheinMD