Percutaneous Treatment of PDPH

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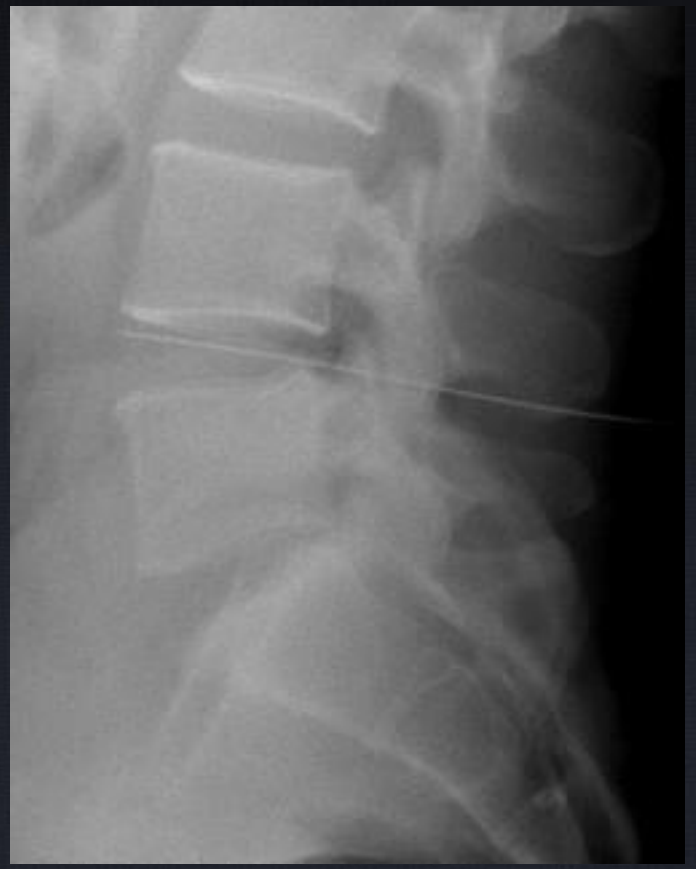
Duke Radiology

Disclosures

- No relevant disclosures
- Fibrin glue: off label
- Medical Advisory Board: Spinal CSF Leak Foundation
- Siemens: speaker, research support
- Contributions: Mike Malinzak, MD, PhD (Duke)

PDPH causes

- Epidural access: 1/3 of cases no known dural puncture[1]
  - Epidural anesthesia
  - Steroid injection
  - Spinal cord stimulator
- Intrathecal access
  - Spinal anesthesia
  - LP for labs or myelogram
  - Transdural catheters
  - Inadvertent ventral puncture[2]
- Reported incidence ~ 1-50%



1. Russell et al. Int J Obstet Anesth. 38, 104–118, 2019.
2. Schievink and Maya. J Neurosurg Ped. 11, 48-51.2013.

PDPH risk factors

Sex
- OB > Female > Male [1]
- OB wet tap → 80%
- Female risk 2x of male

Age
- Younger > Older than 50 [3]

Patient history
- Prior PDPH
- IIH → 30% [2]
- Case reports: Marfan, EDS, APCKD, NF1

Needle features [3,4]
- Bevel perpendicular > parallel
- Type: cutting > atraumatic
- Size:
  - 20G→30/50%
  - 22G→20/40%
  - 24G→5/20%

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PDPH treatment

Trial supportive care

- Most resolve spontaneously [1]
  - 50% at 3 days
  - 70% at 7 days

Self care

- Bedrest doesn't help [2]
- Comfortable position best
- Abdominal binder?

Pharmacologic care

- Caffeine [3]
  - reduces pain and EBP
  - up to 300mg q8h
- Theophylline, hydrocortisone, gabapentin reduce pain [3]
- IV fluids don't help [2]
- Triptans, ACTH lack evidence

EBP

- Success >70% 1st and 2nd alike [1]
- Efficacy maybe higher >48hrs

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EBP

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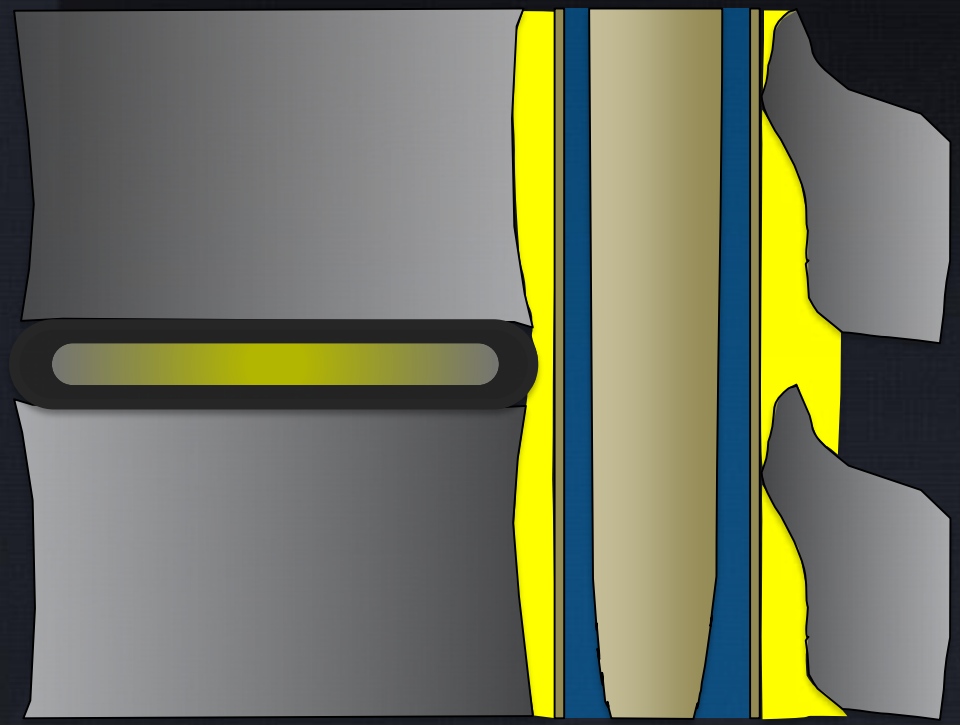
PDPH: EBP Treatment

Patching

Epidural Blood Patch: *Anatomy*



Vertebral Column

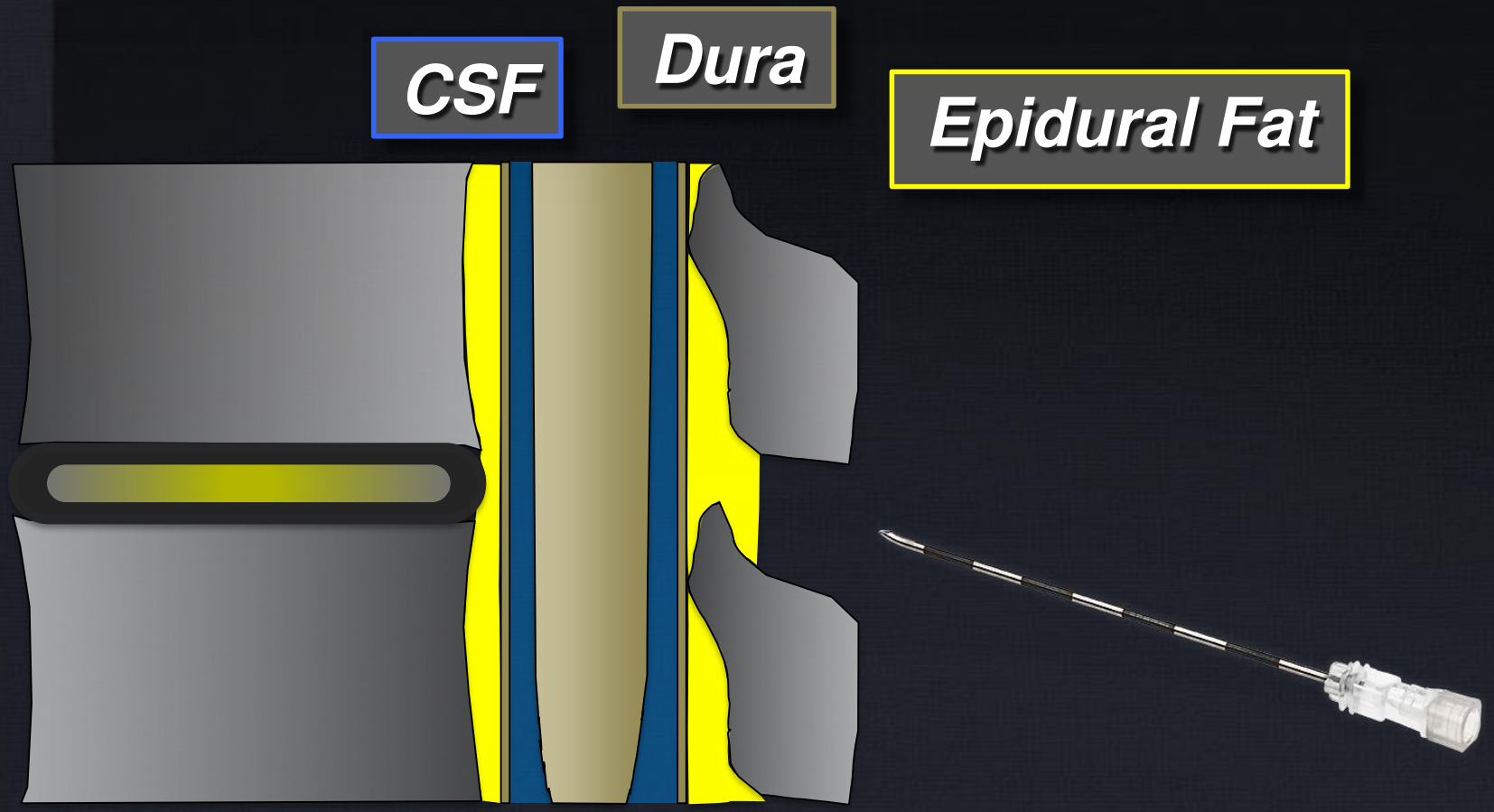
Epidural Fat

Dura

CSF

Cord

Epidural Blood Patch: *Anatomy*



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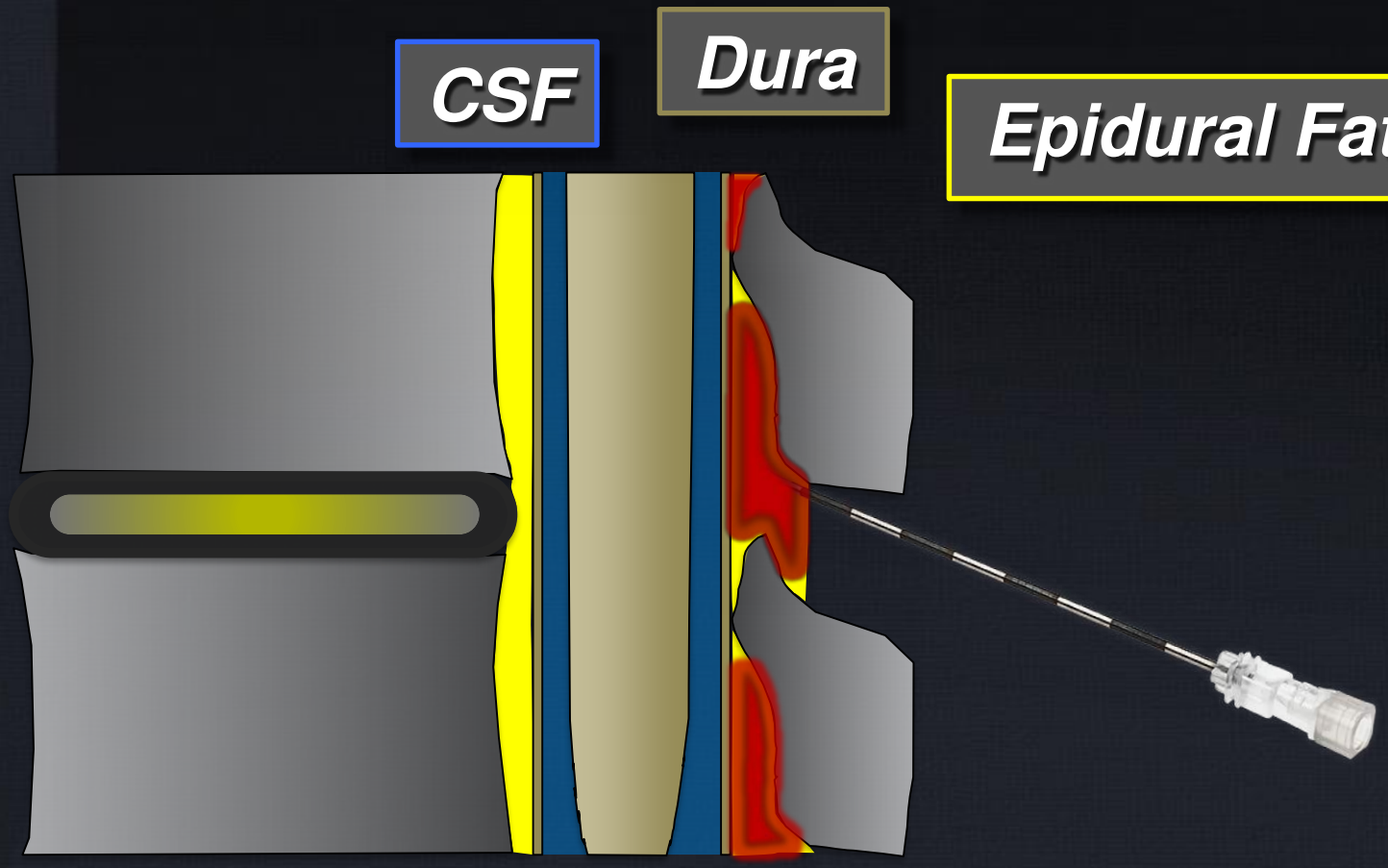


Anesthesiology
Sept.–Oct. 1960

Treatment of Postspinal Headache

James B. Gormley, M.D., of Berwick, Pennsylvania, has been interested in the cause and cure of postspinal anesthesia headache. It ot fresh patient's blood alone. One of these cases is a personal experience. Forty-eight hours after a spinal tap for myographic examination for possible herniated intervertebral disc and following an auto trip from hospital to home, Dr. Gormley experienced a severe headache relieved only by lying down. After recurrence of headache the following day on arising, a colleague injected 3 cc. of blood into the affected lumbar epidural space. Relief of back-

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: 5 patients

Gormley

DiGiovanni

1960

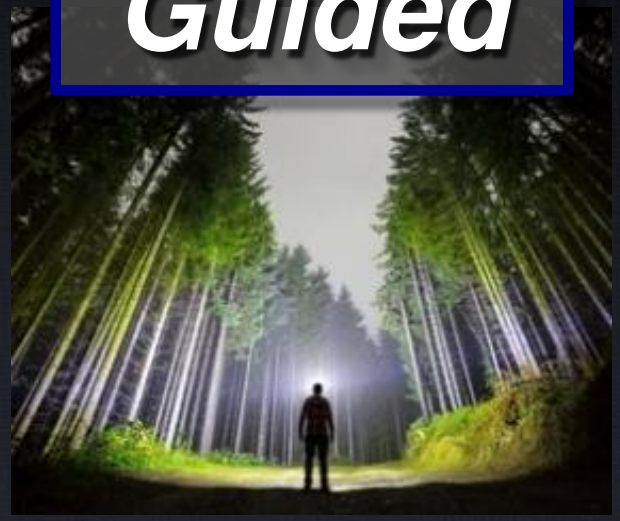
‘70

June 29th ‘25

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

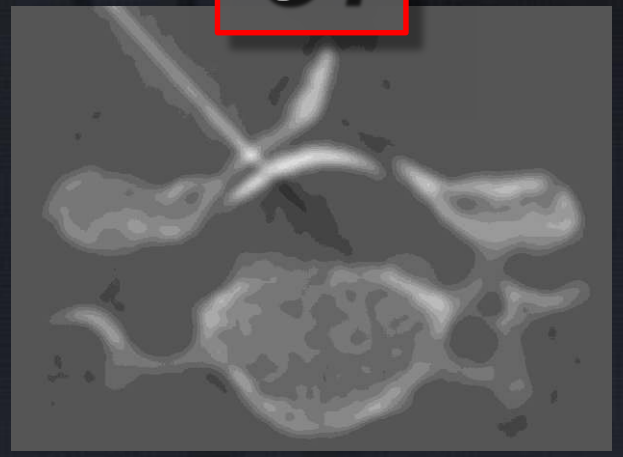
Incorrect Needle Position during Lumbar Epidural Steroid Administration: Inaccuracy of Loss of Air Pressure Resistance and Requirement of Fluoroscopy and Epidurography during Needle Insertion

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

25+%

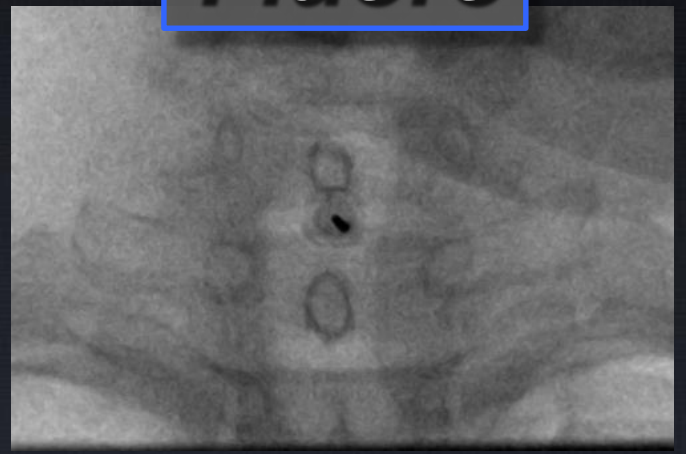
Epidural Blood Patch: *Technical Considerations*

CT



Imaging Guided

Fluoro



Epidural Blood Patch: *Technical Considerations*

Non-Targeted

Targeted

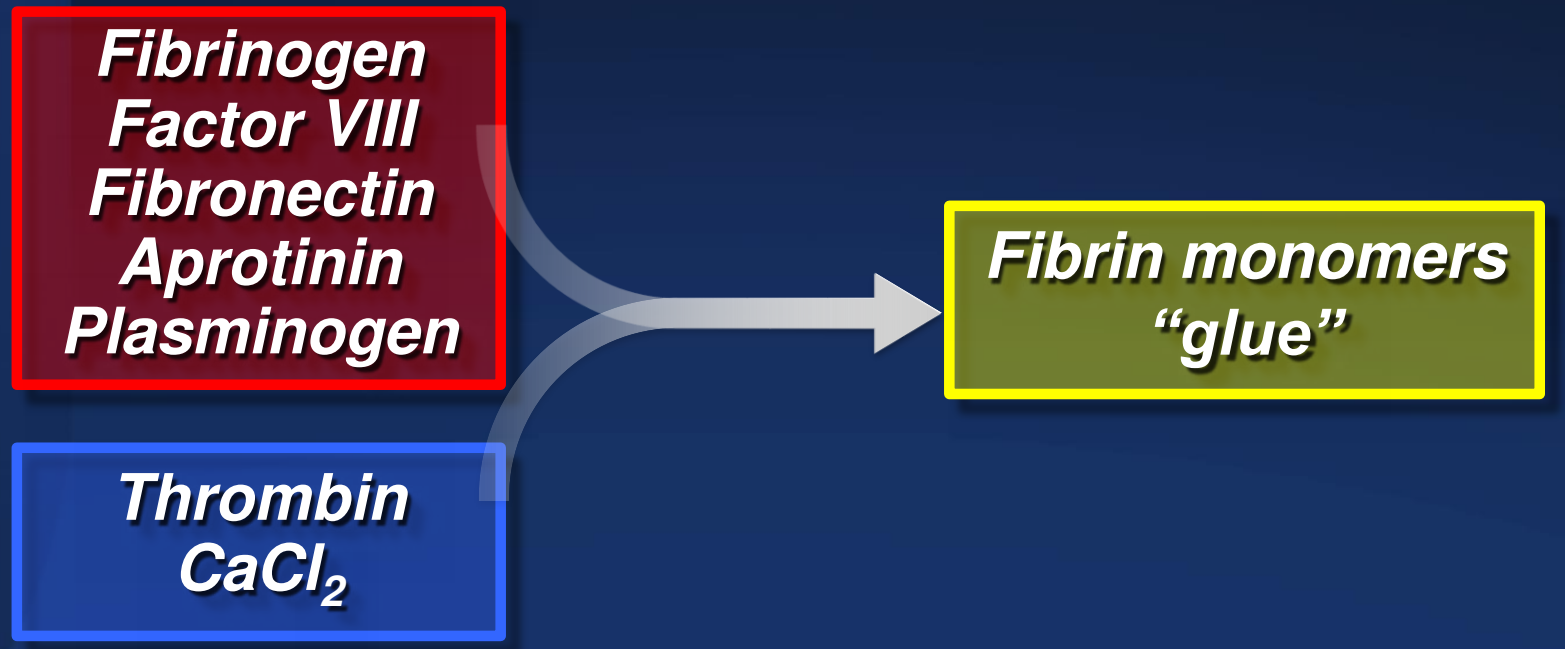
Epidural Blood Patch: *Technical Considerations*

Blood

Fibrin Glue

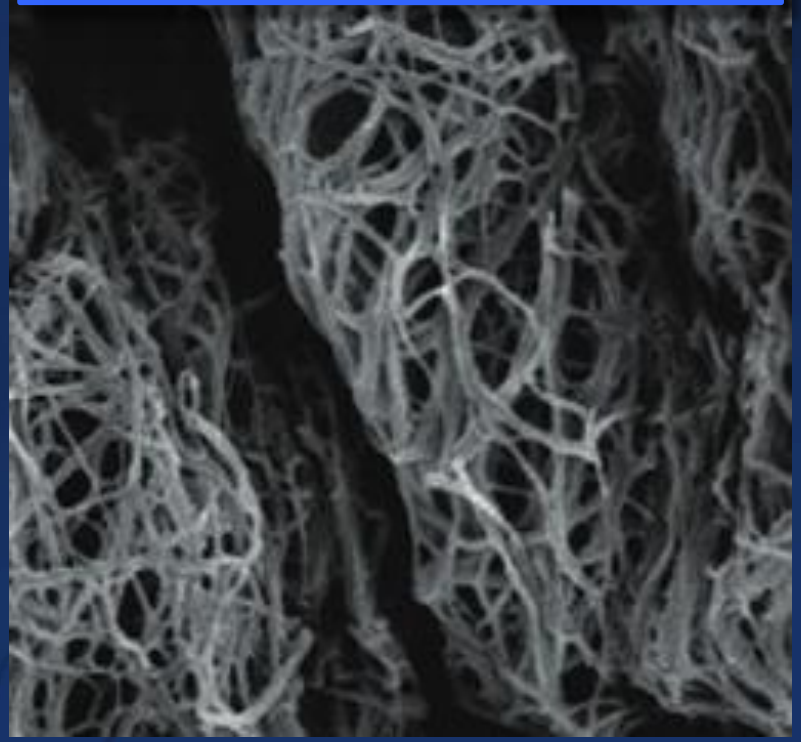
Epidural Blood Patch: *Fibrin Glue*

- Fibrin glue patch:

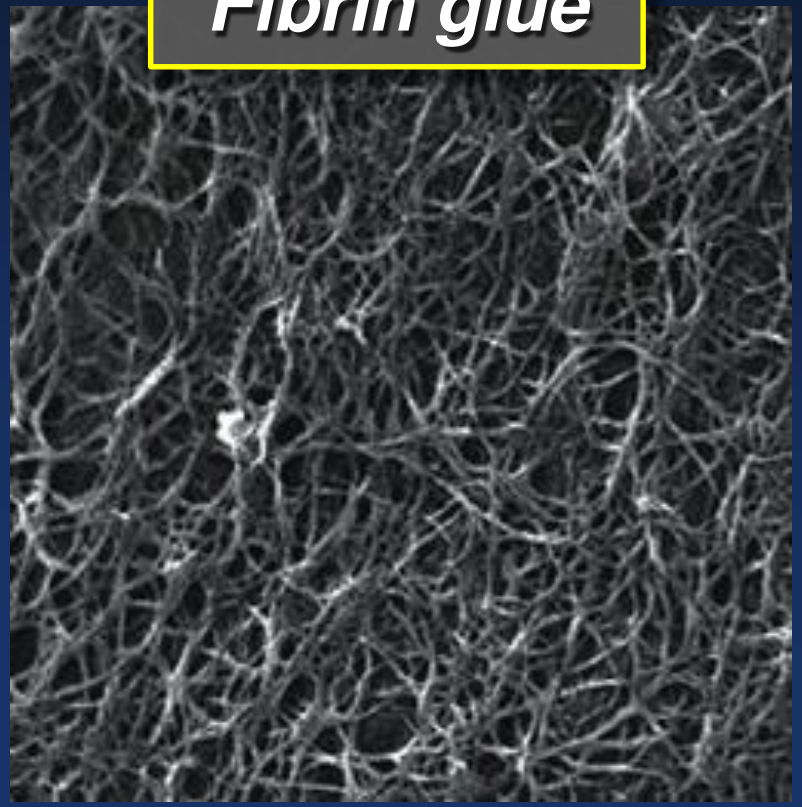


Epidural Blood Patch: *Fibrin Glue*

Physiologic fibrin



Fibrin glue



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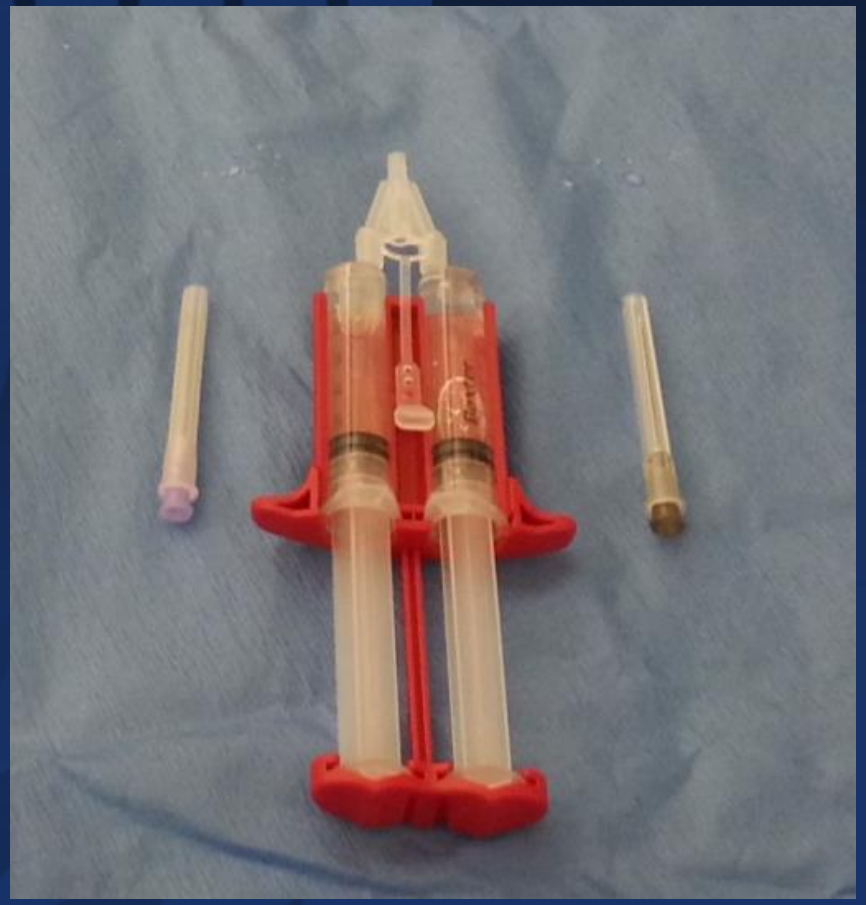
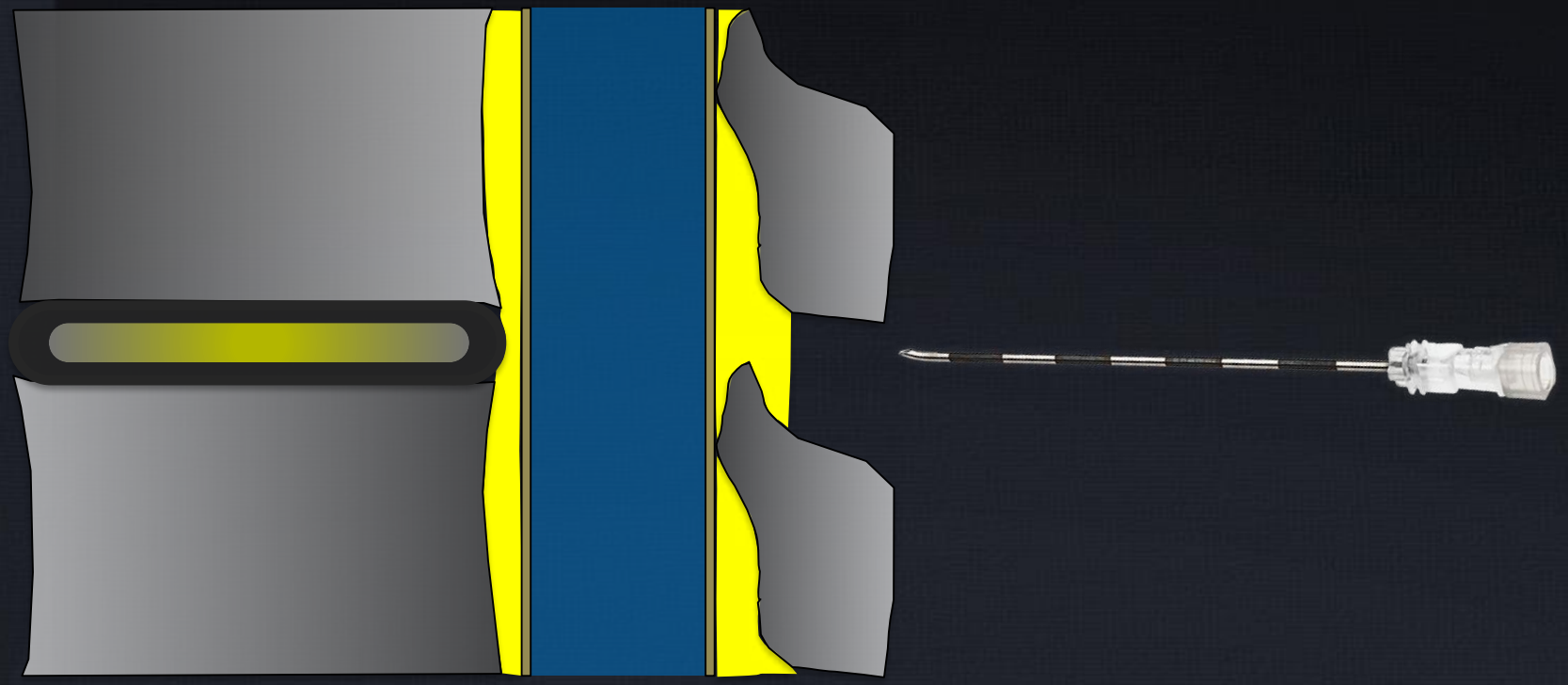


Epidural Blood Patch: *Post Lumbar Puncture*



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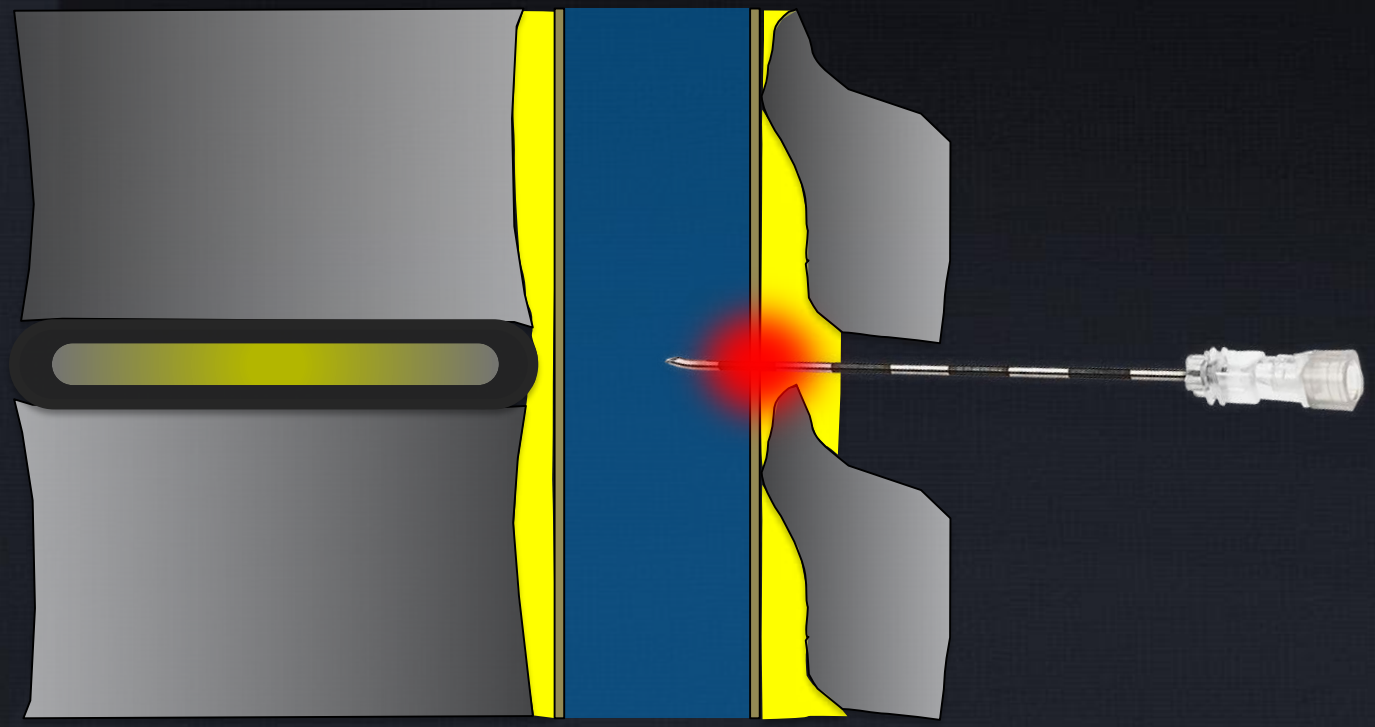

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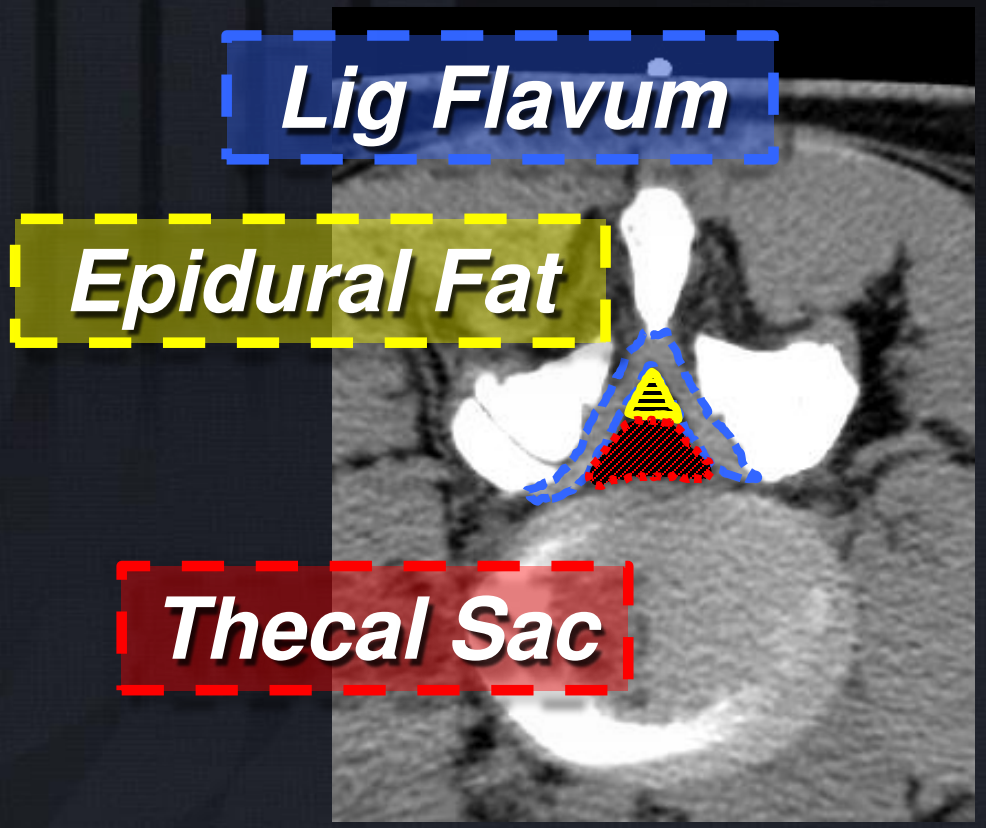
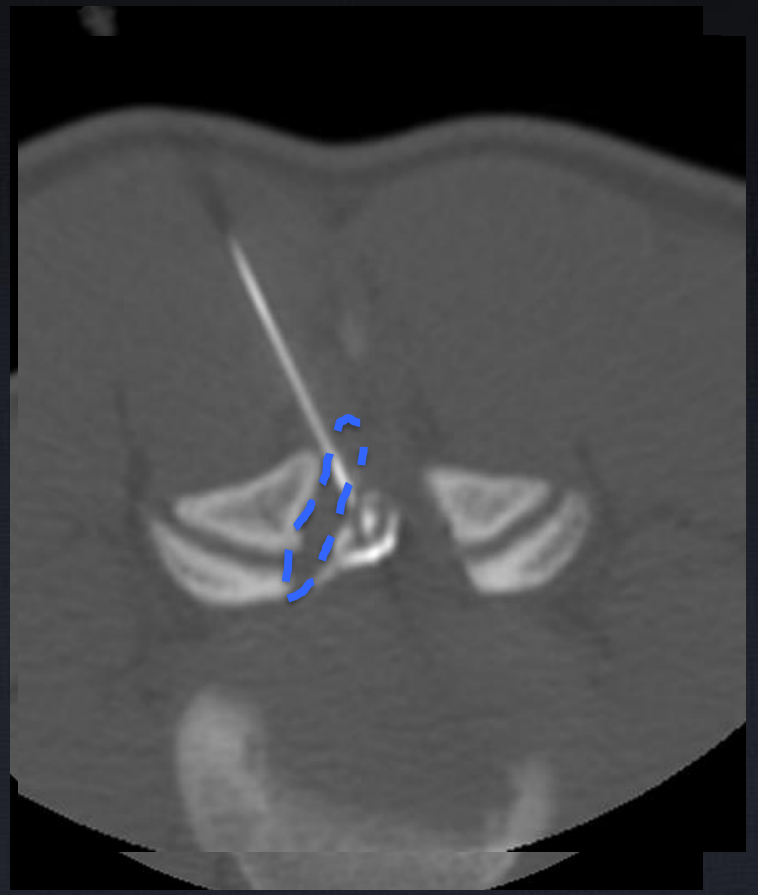
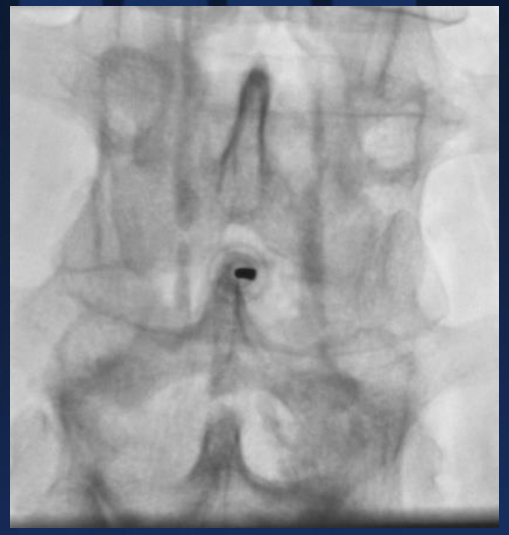
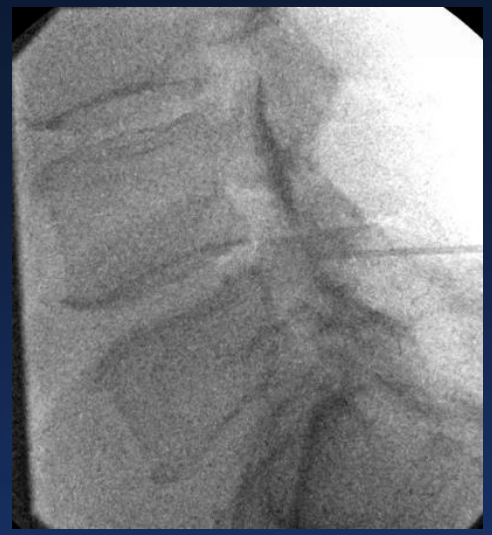
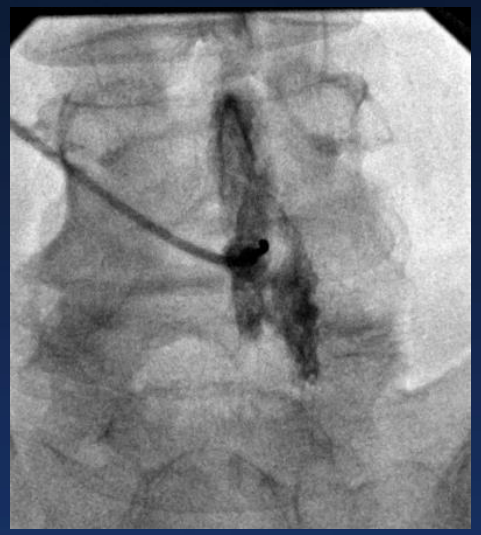
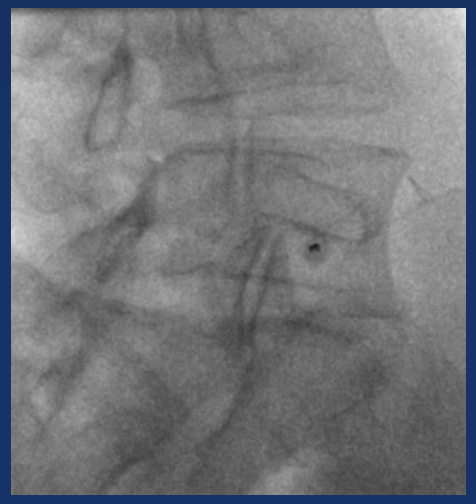
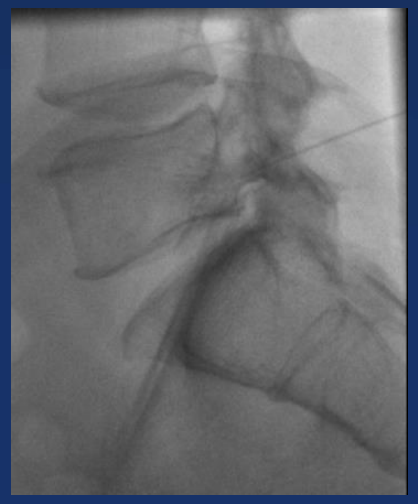
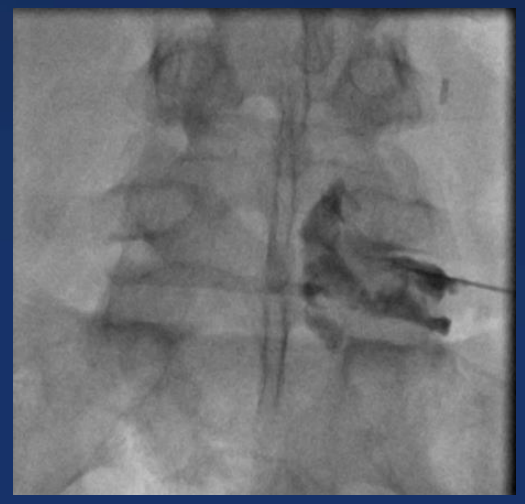
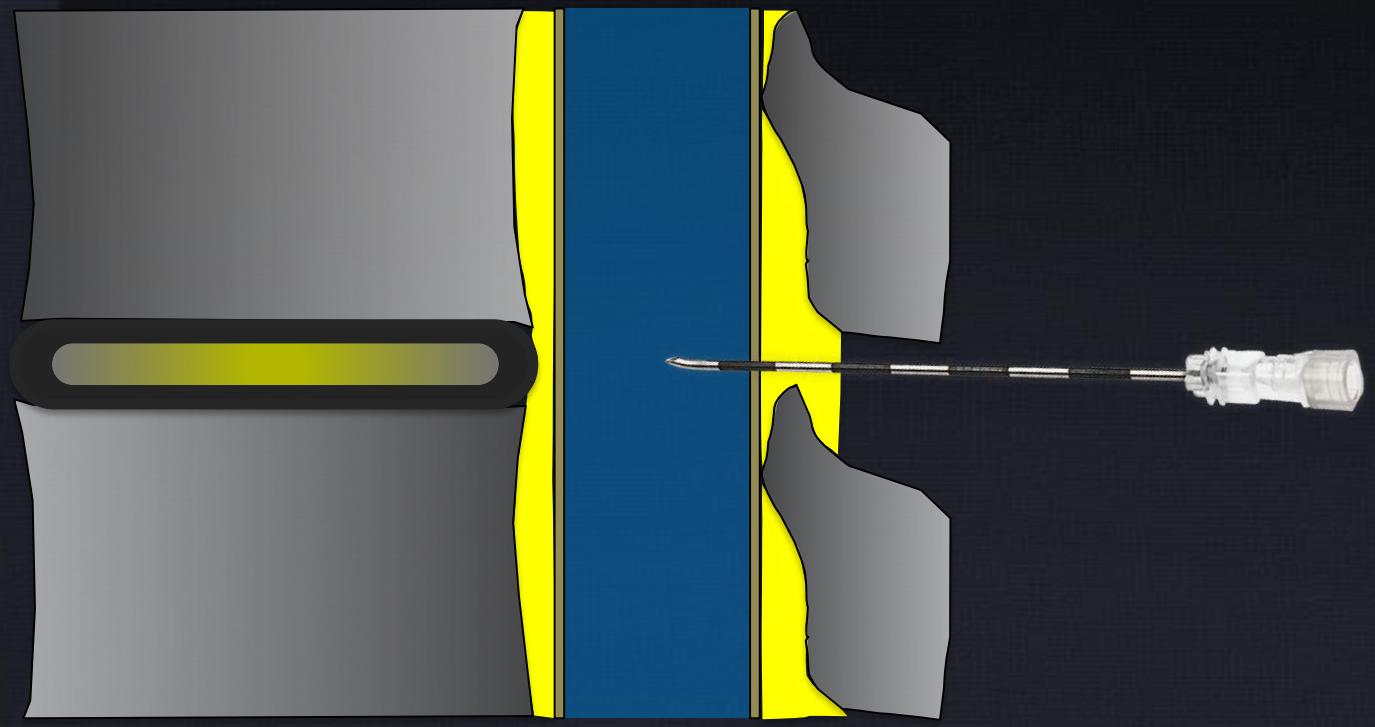




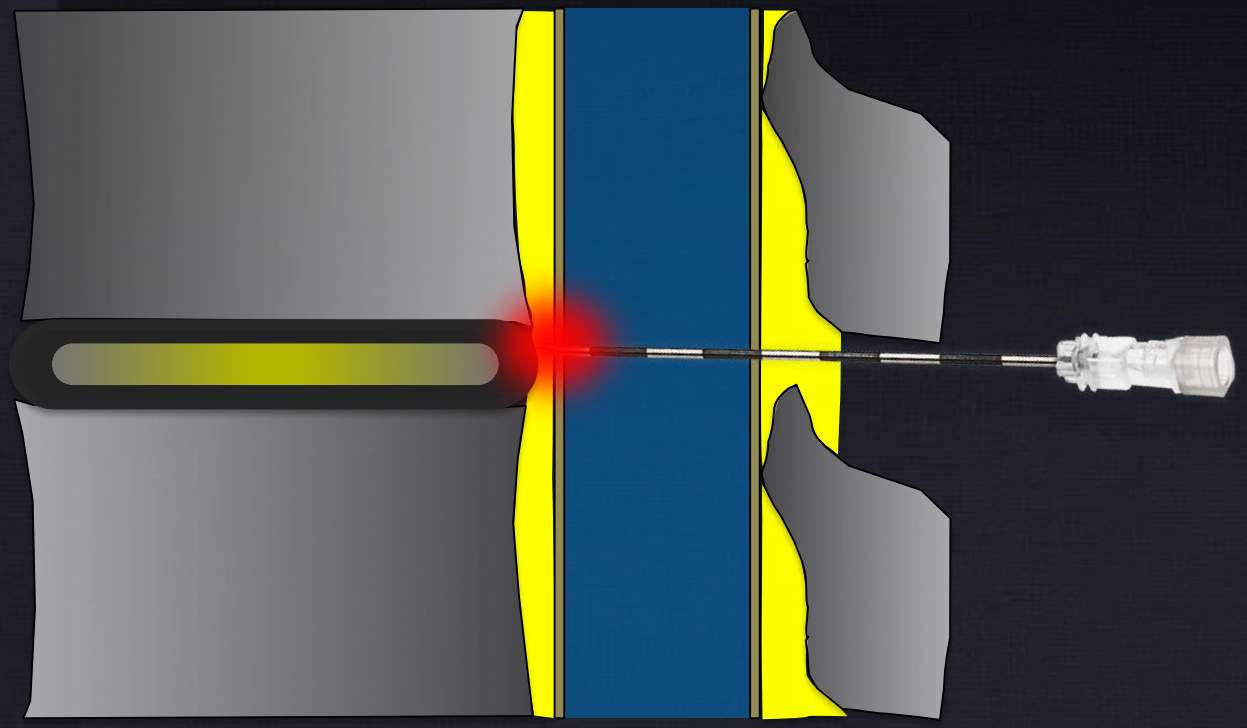
EBP: Treatment: Fluoro Approaches

Epidural Blood Patch: *Post Lumbar Puncture*



Epidural Blood Patch: *Post LP Ventral*



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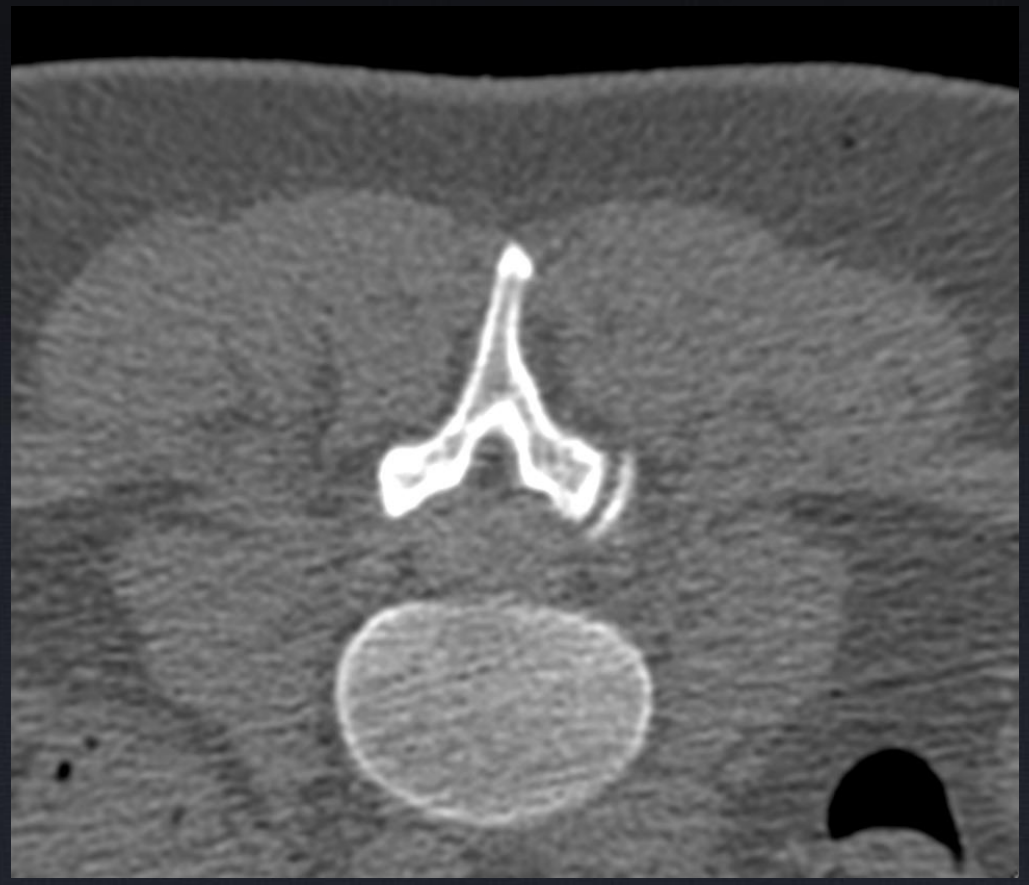
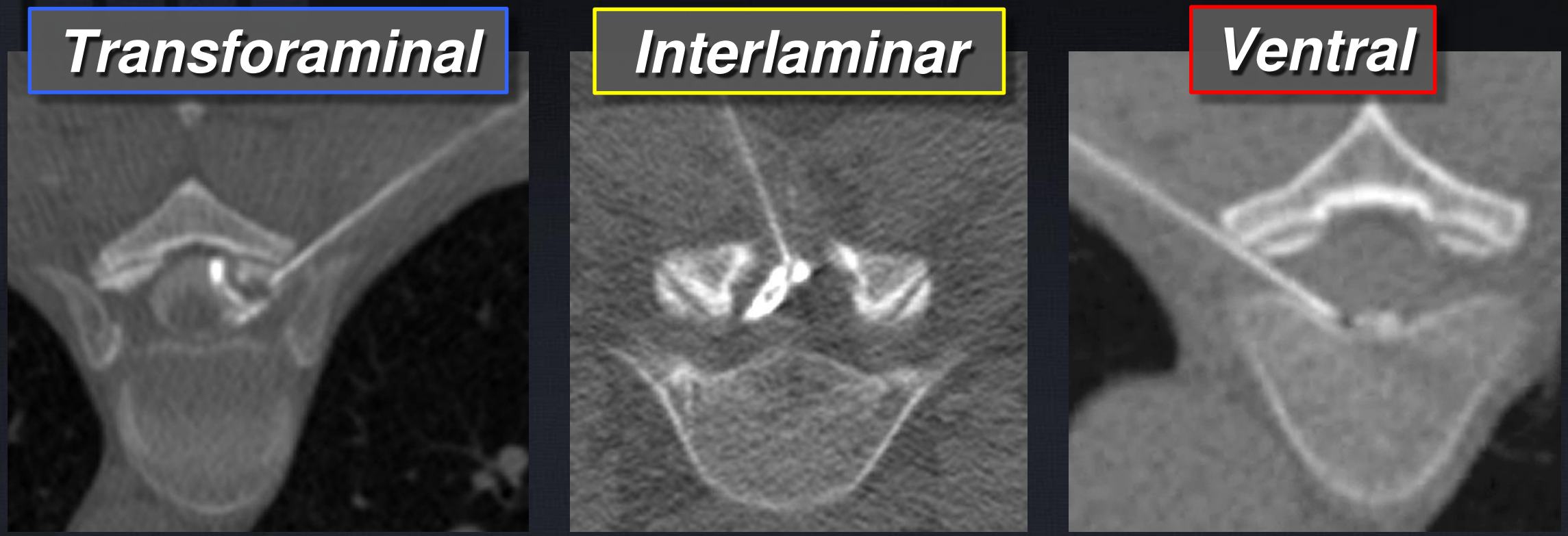


SIH: Treatment: CT Approaches



Amrhein TJ, Gray L, Kranz PG. AJNR 2016 37:1951-6

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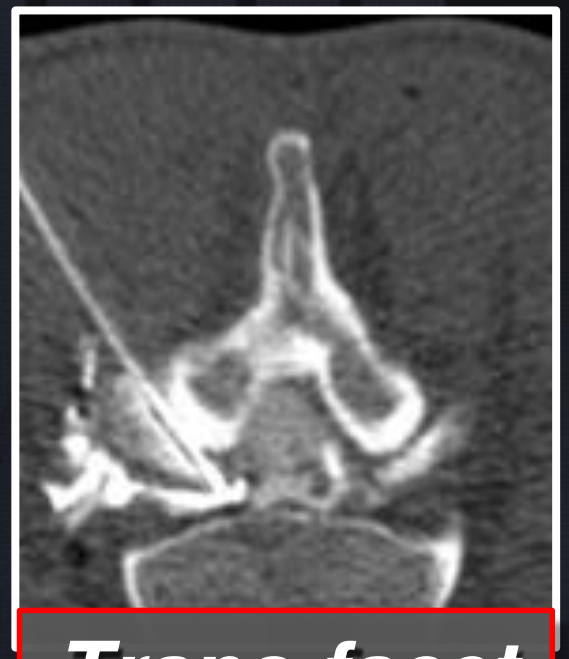
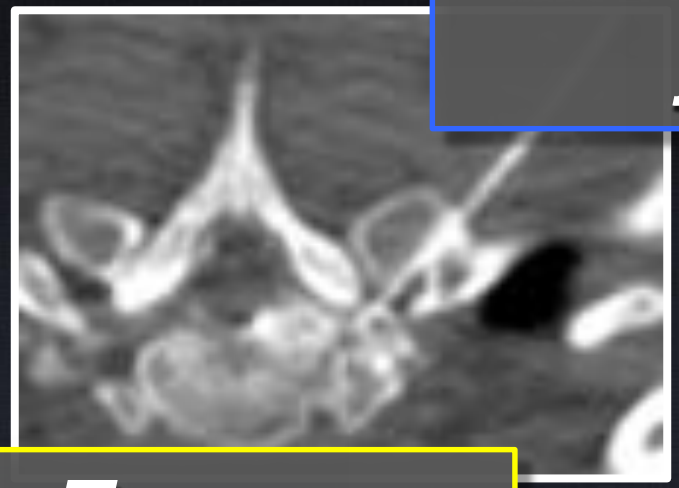
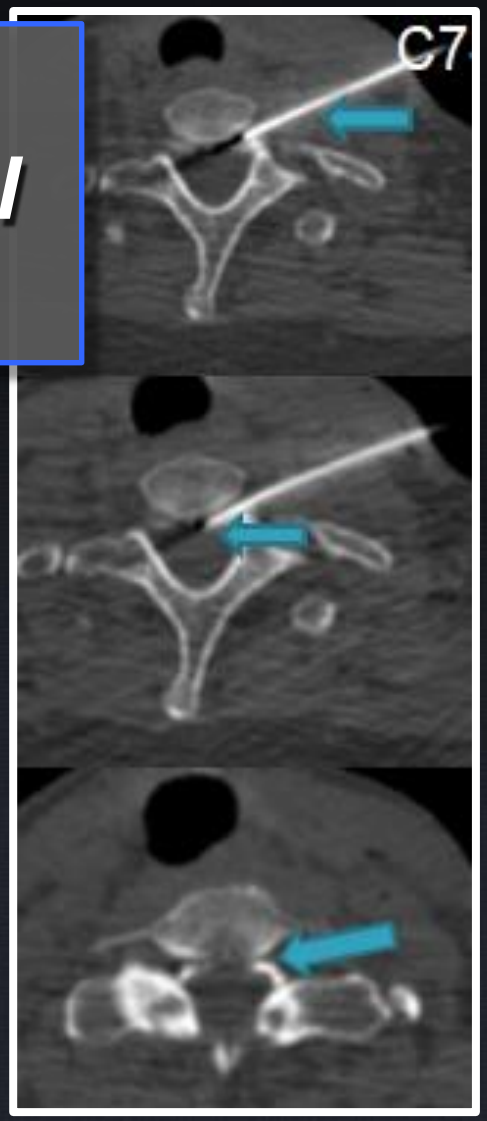


Trans-facet



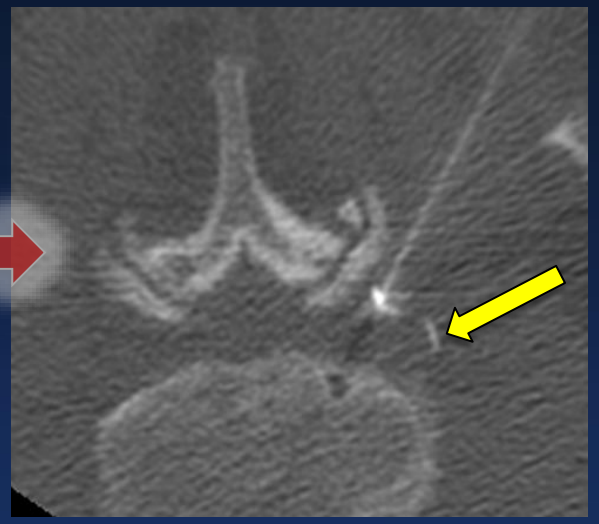
Trans-costovertebral joint

Trans-uncovertebral joint!

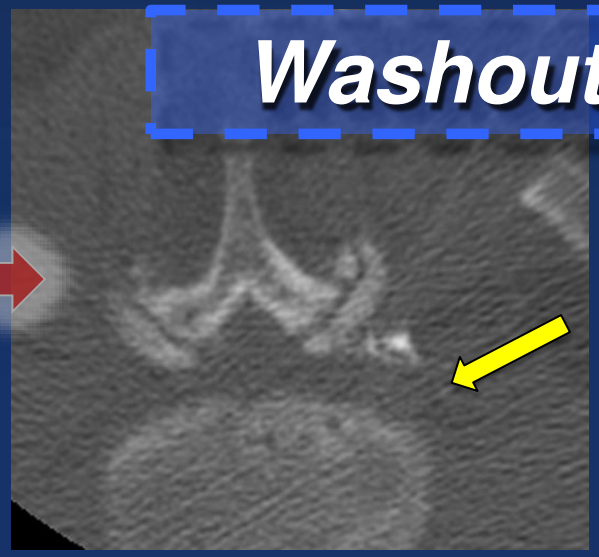


Intravascular Injection (CT)

Immediate



1-2 seconds



Washout

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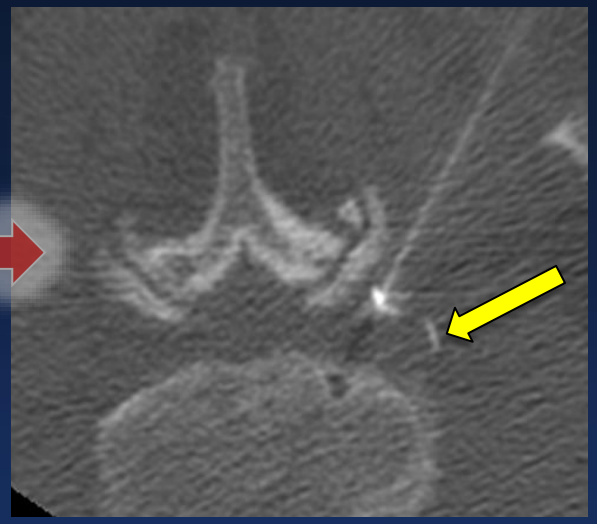

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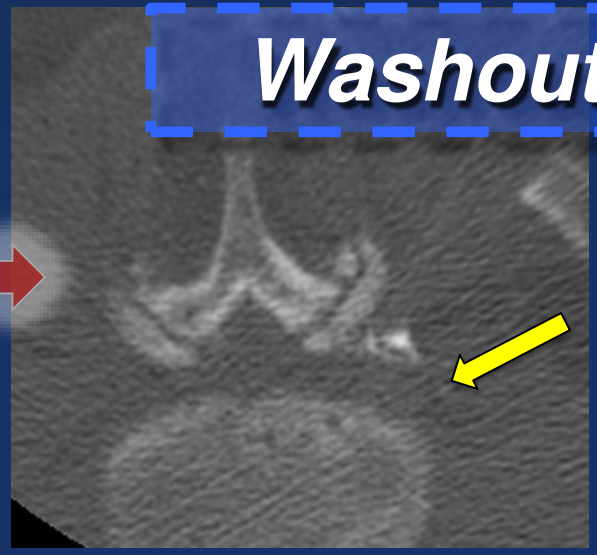

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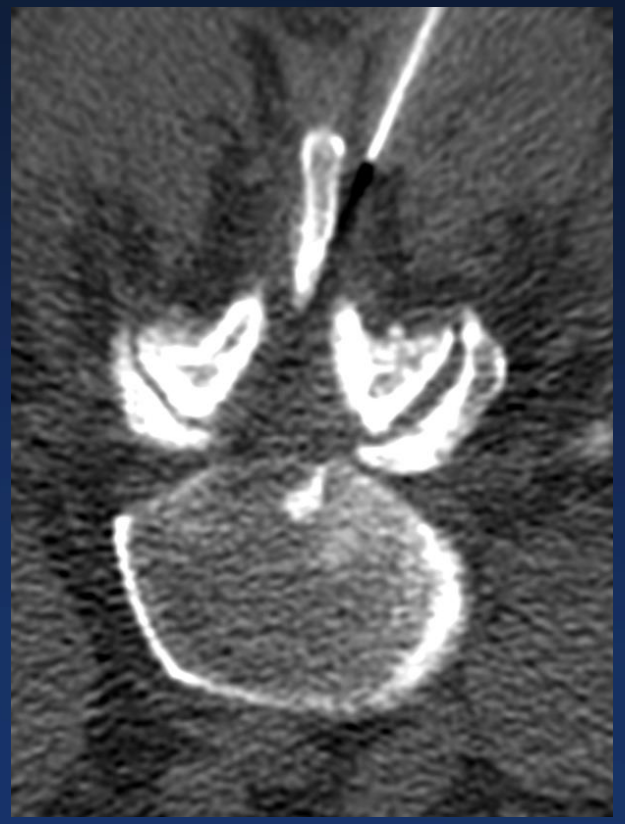
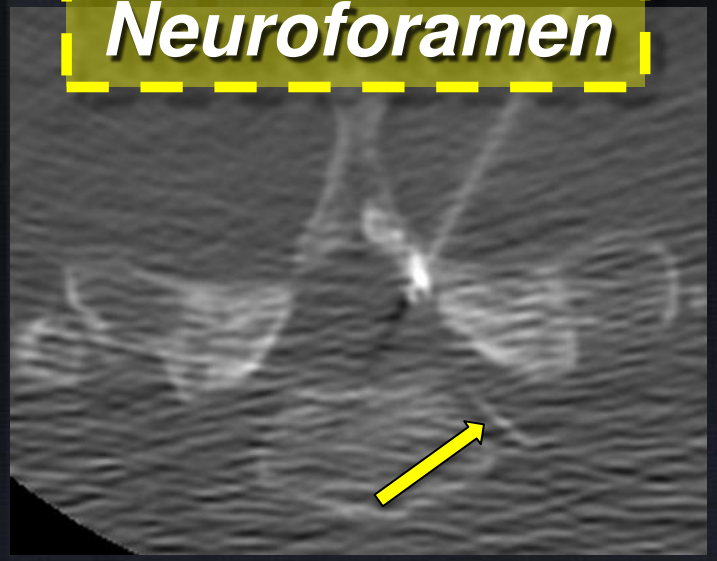
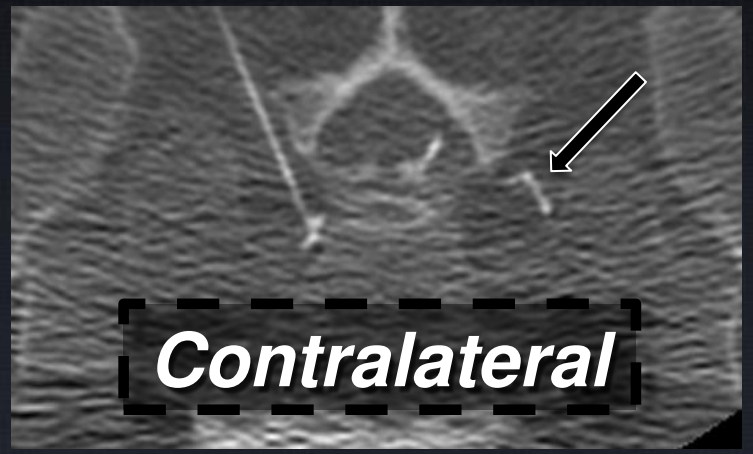
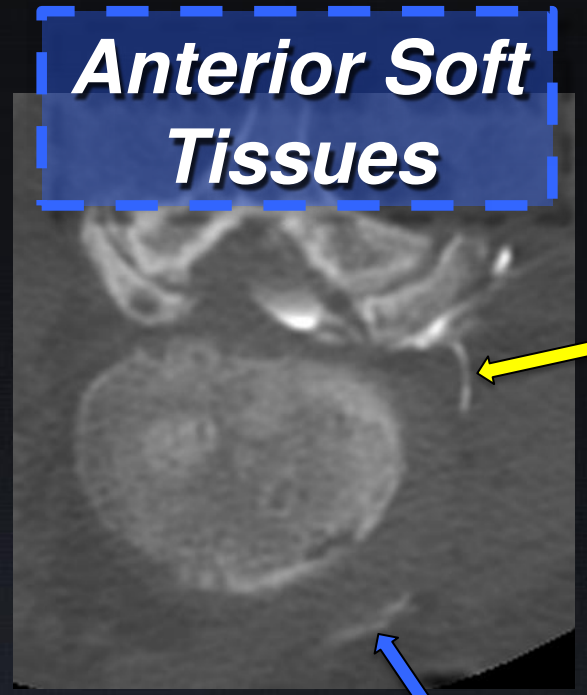
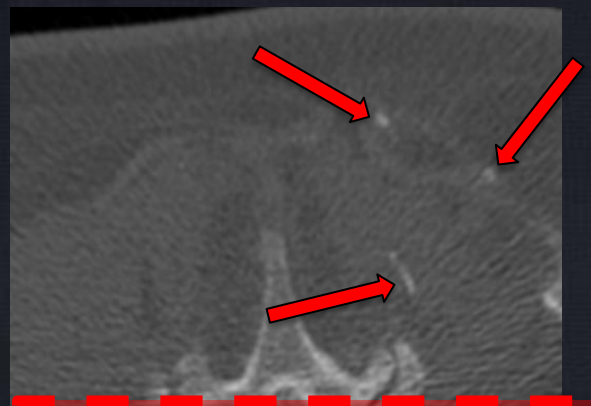


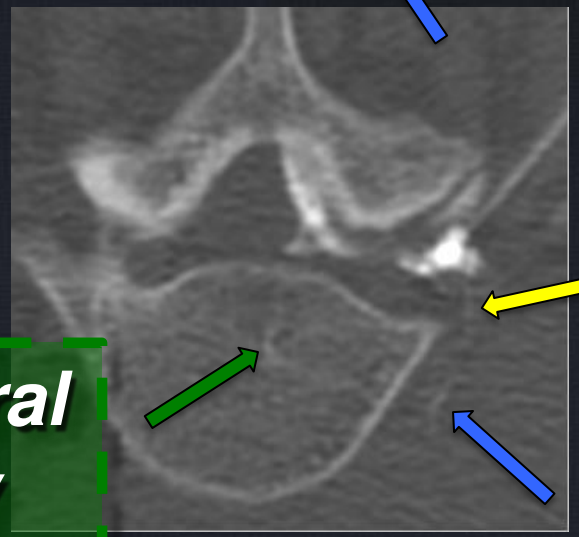
Intravascular Injection (CT): Locations



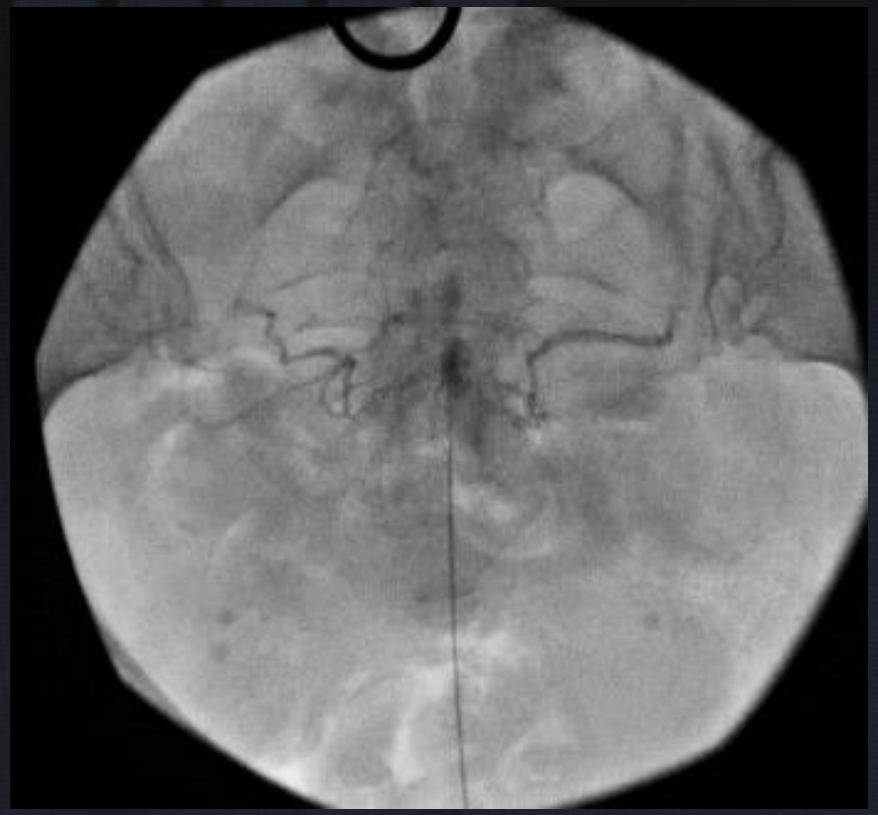


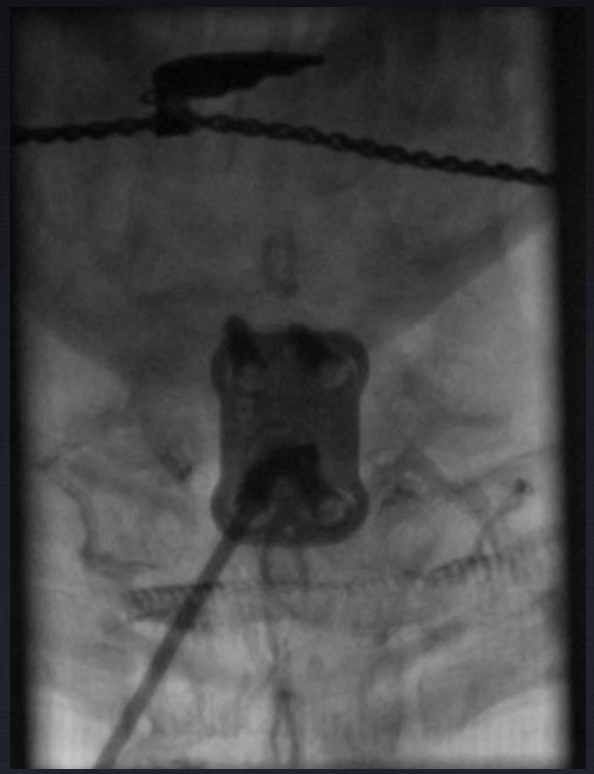


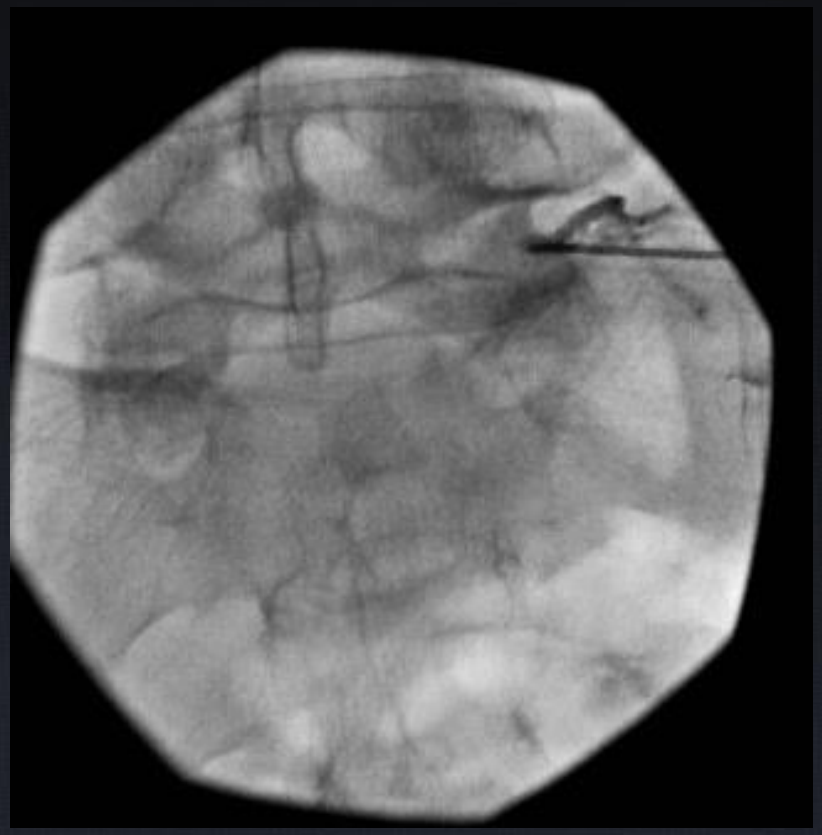




Intravascular Injection (CF)







Epidural Blood Patch: *When To Stop?*

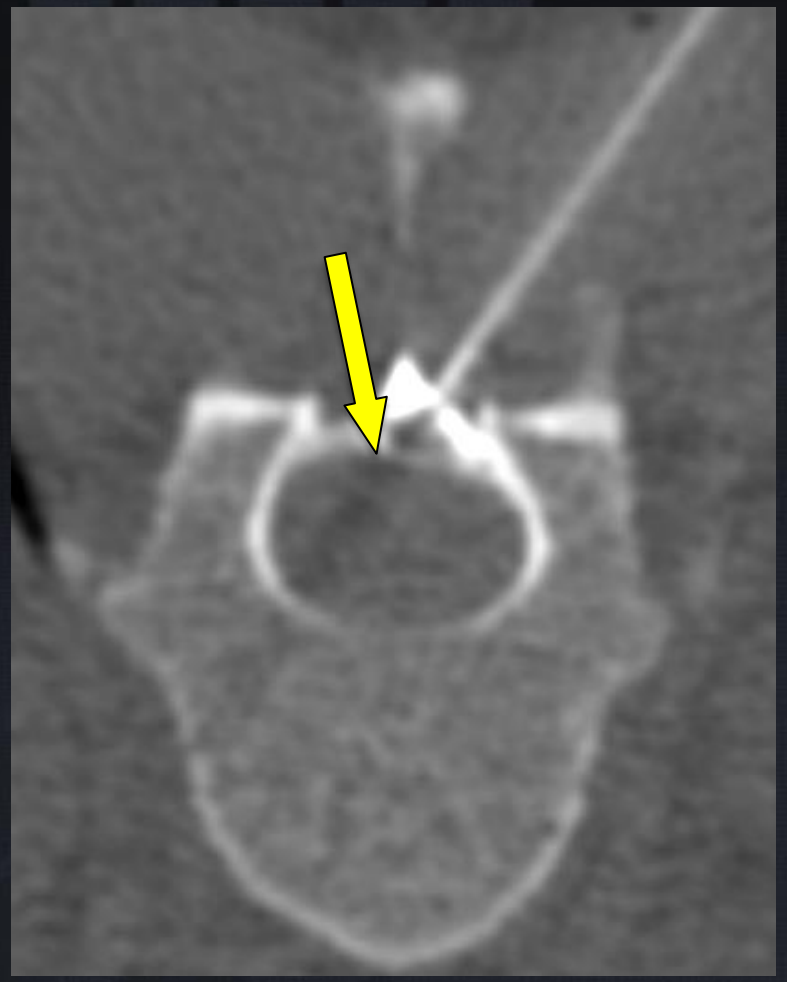
Leak Coverage

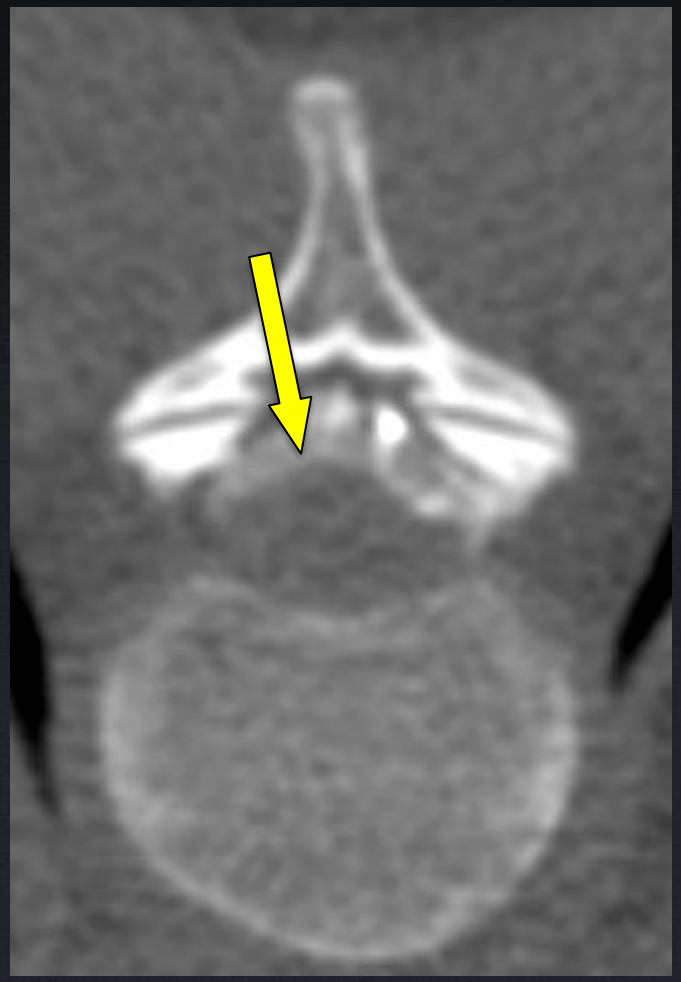
Pain / Deficits

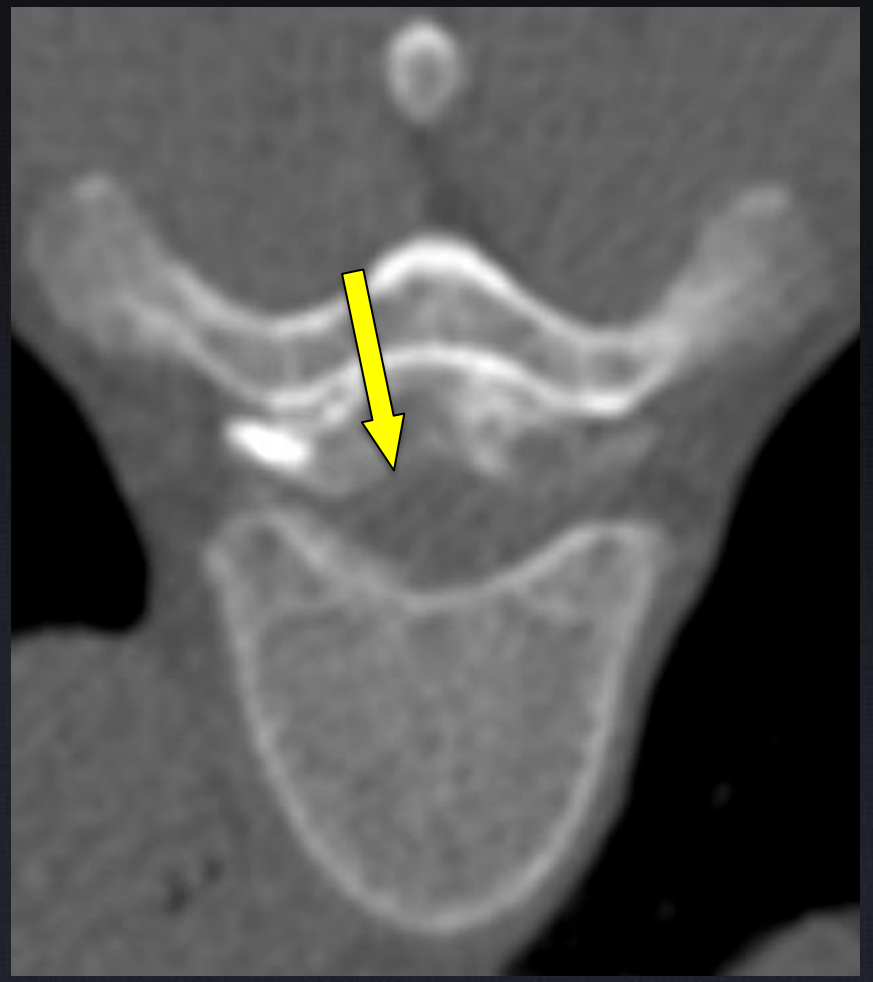
Volume

Mass Effect

Epidural Blood Patch: *When To Stop?*





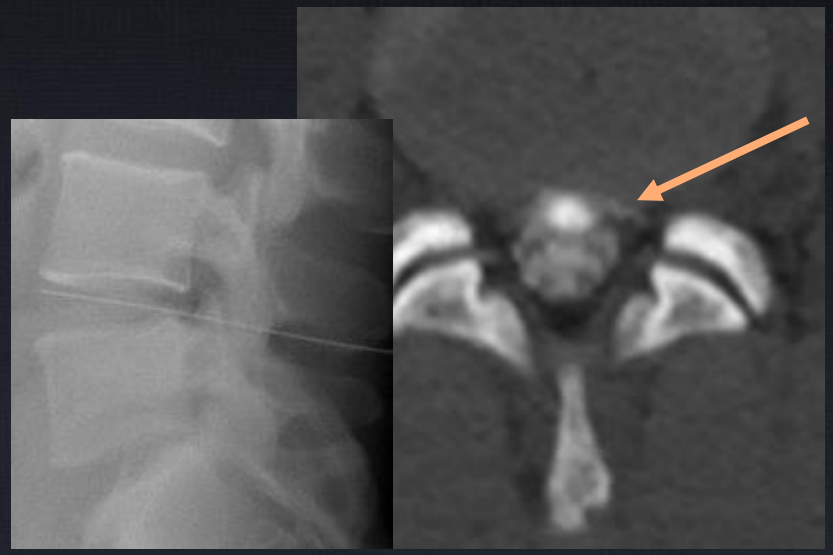


PDPH types

	Uncomplicated	Complicated
Acute	Headache	CN palsies subdural hematoma obtundation/herniation
Chronic	Headache > 2 weeks or Unresponsive to EBP	CN palsies subdural hematoma myelopathy

PDPH imaging

- Brain MRI
  - Usually negative
  - Best use: distinguish complicated PDPH from other pathology

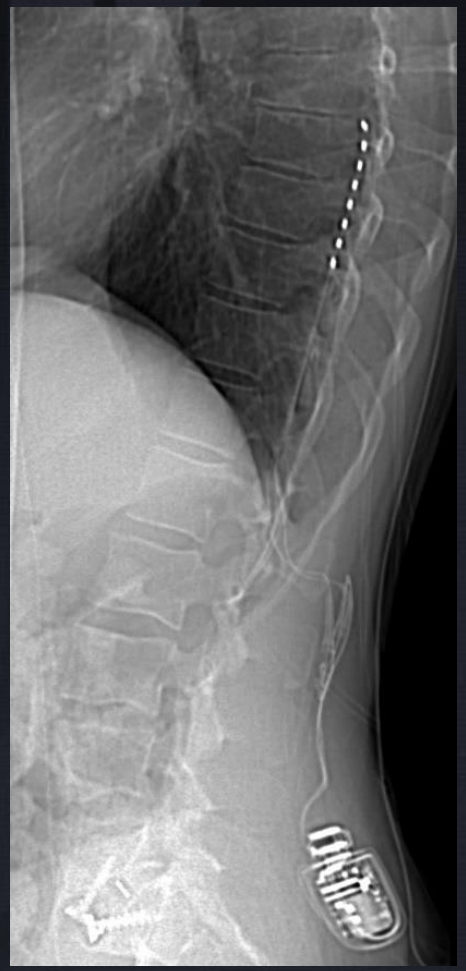


- Myelography
  - Acute: not needed
    - level = the bandaid
  - Chronic: often normal
  - Best use: definite PDPH refractory to EBP[1]

1. Schievink et al. J Neurosurg Spine 26:760–764, 2017.

Case 1: SCS

- 28 yof undergoes spinal cord stimulator placement
- Immediate postop positional headache, EBP requested POD 4



- Did myelogram because numerous potential leak sites

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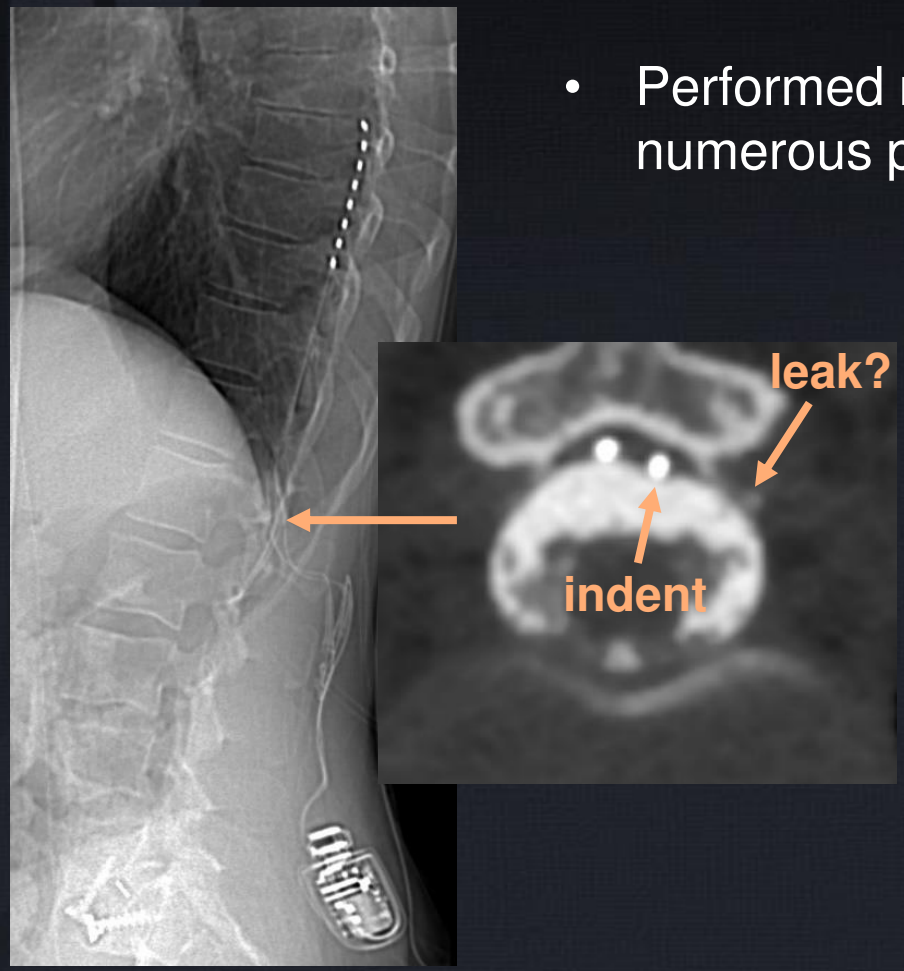

- Performed myelogram because numerous potential leak sites

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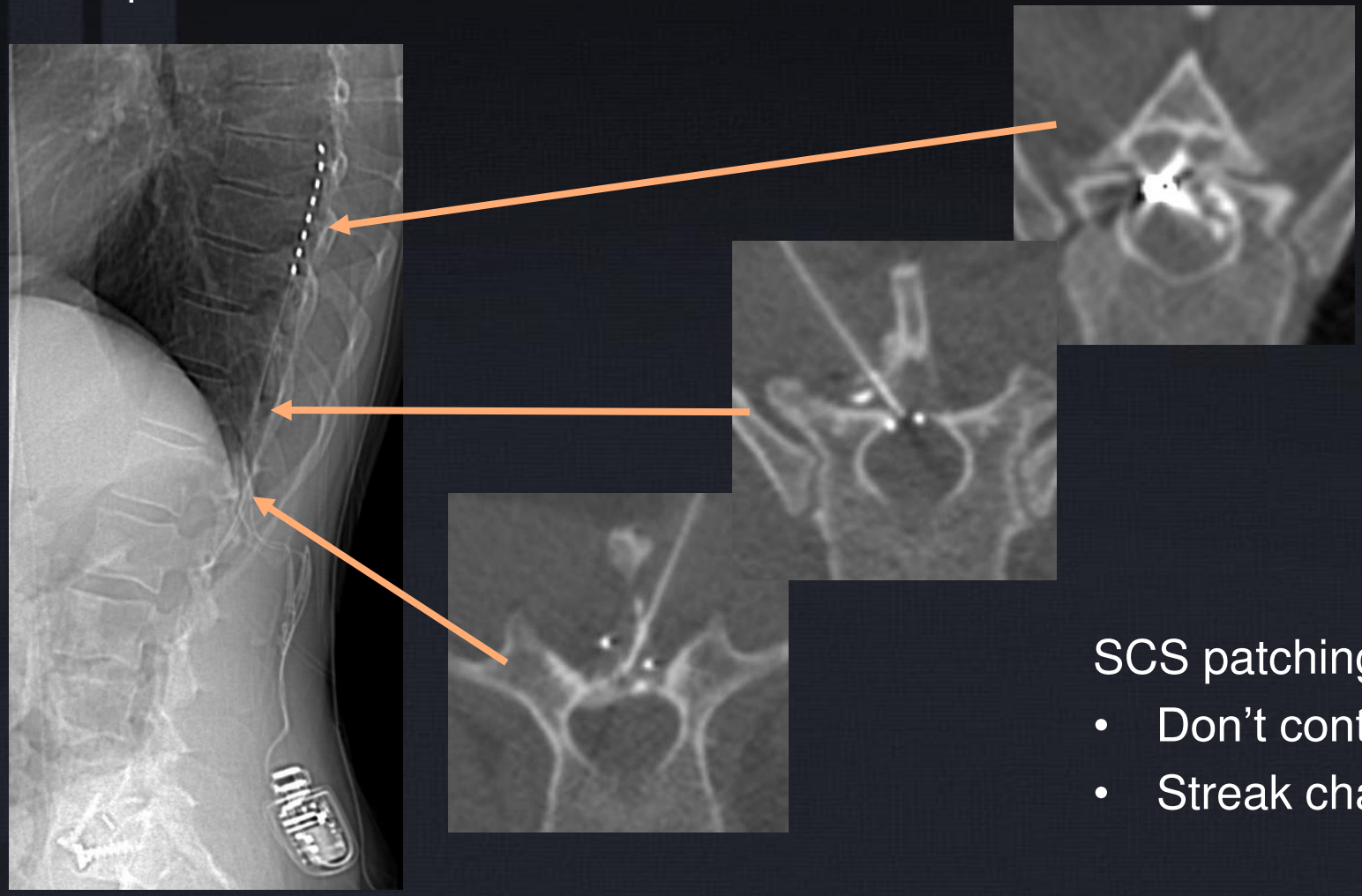
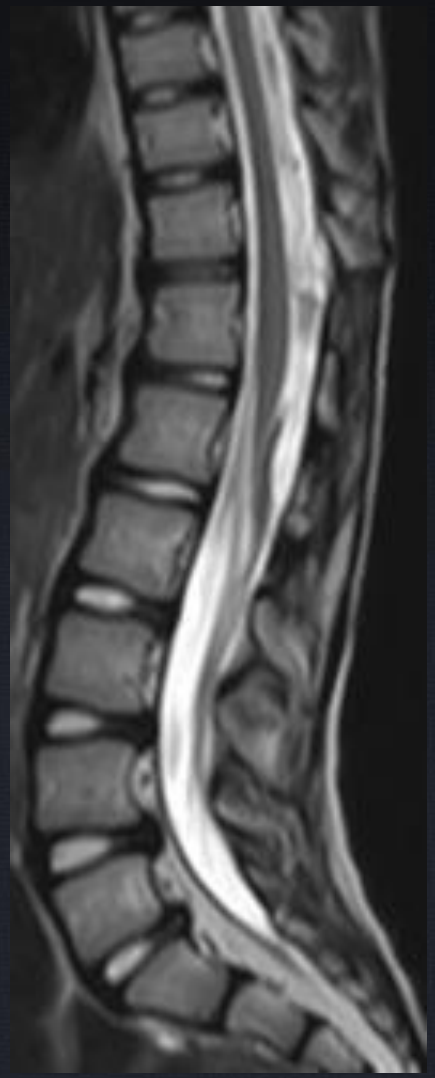


SCS patching

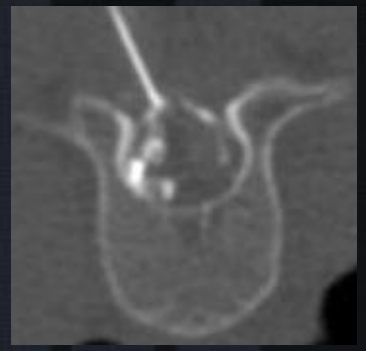
- Don’t contact leads
- Streak challenging

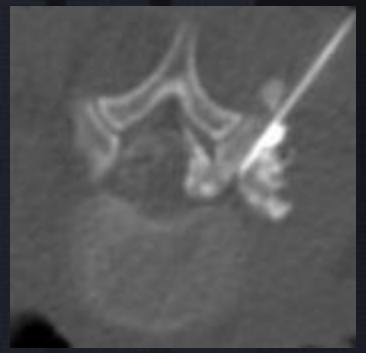
Case 2: intrathecal catheter

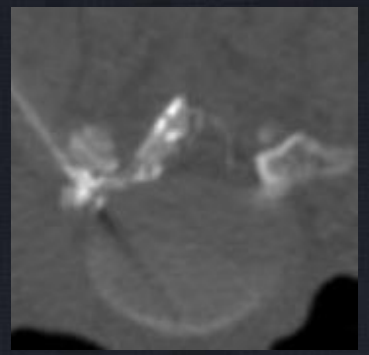
- 9 year old boy CP, nonverbal, severe spasticity
- Failed baclofen pump trial
  - Catheter arrested at L2 rhizotomy scar
  - Dural punctures at L3-L4, L4-L5
  - New pain and positional emesis
- Choices
  - Myelogram or not? → low yield
  - What kind of patch? → long circumferential
    - Suspected lateral/ventral dural injury
    - Level uncertain

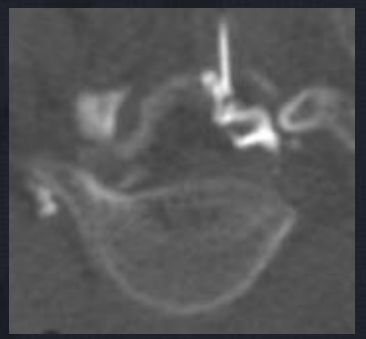


Case 2







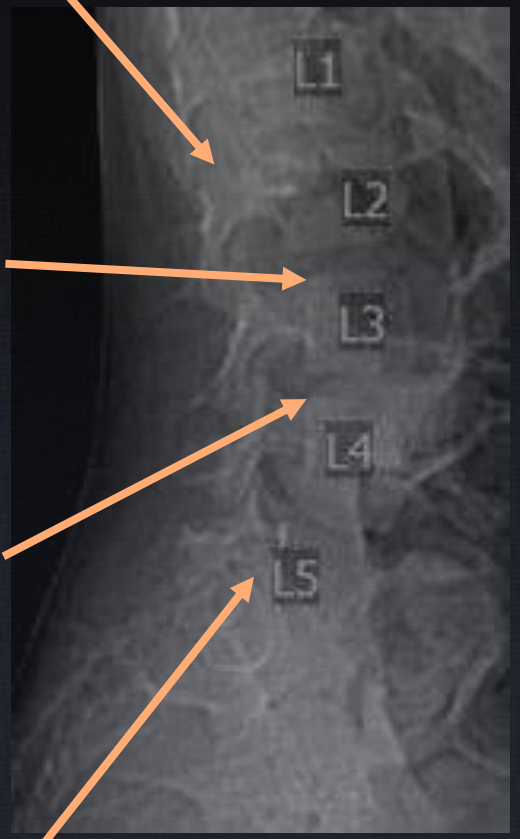


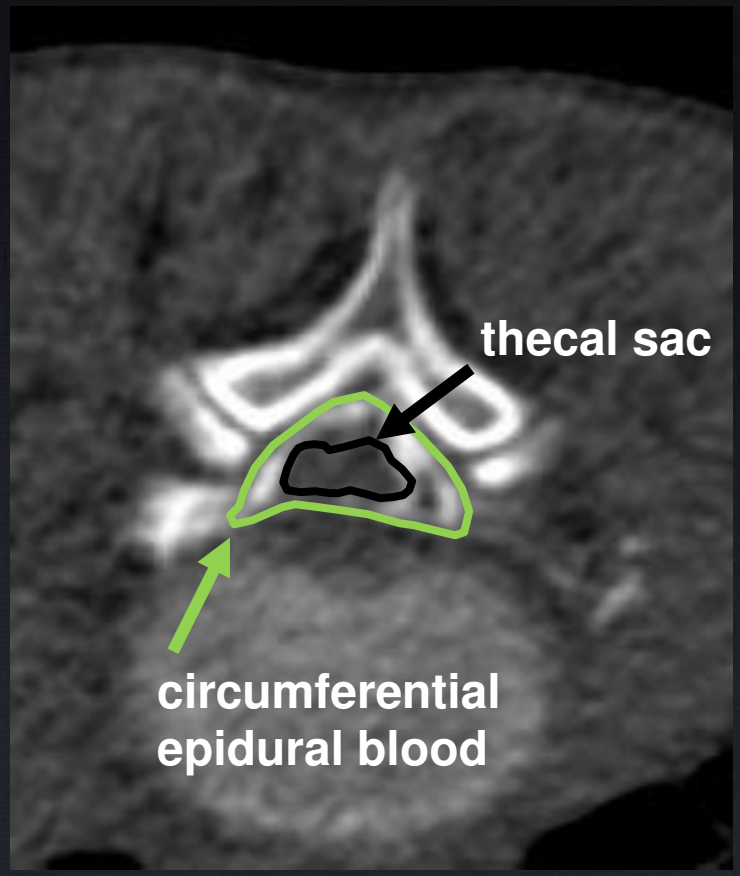
L2 left posterior

L3 right ventral

L4 left ventral

L5 right posterior

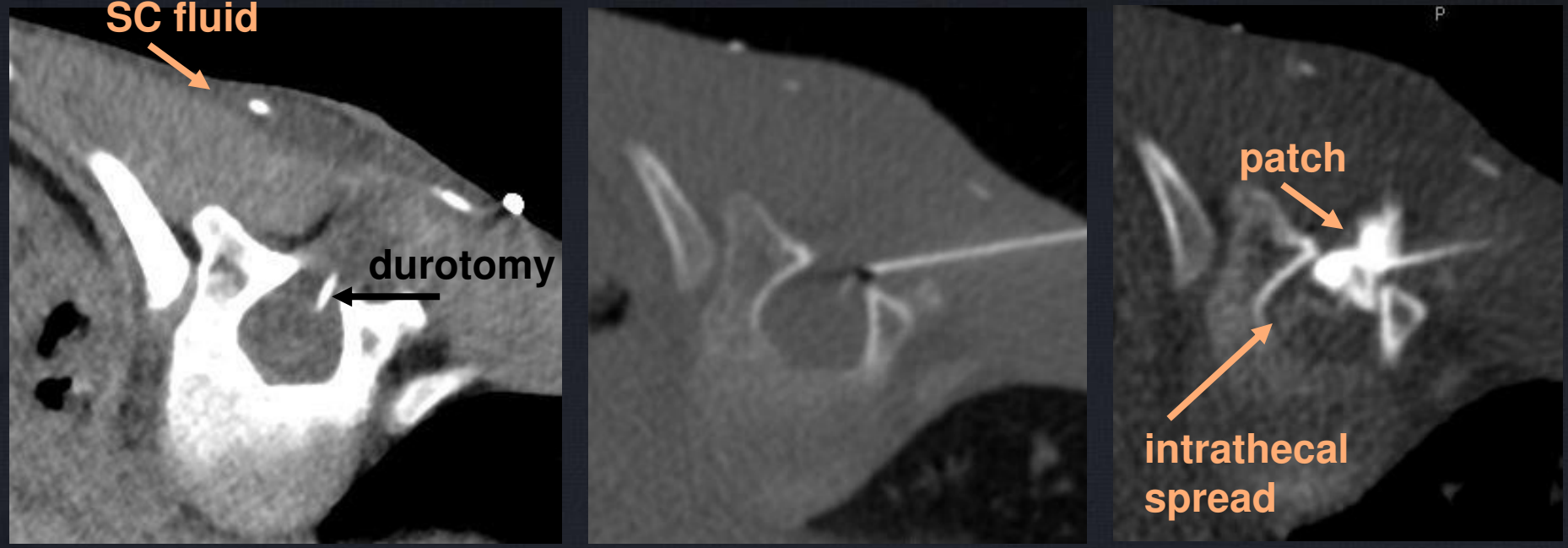




Case 2: intrathecal catheter

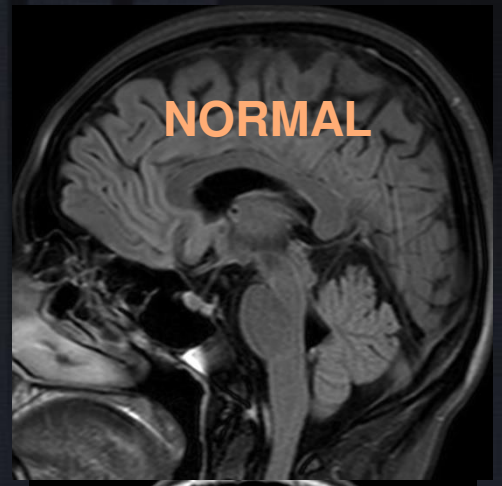
- Positional emesis and pain resolved after circumferential patch

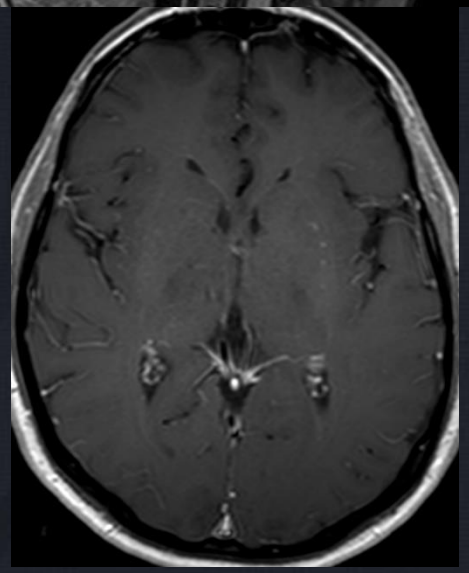
- Baclofen pump placed 1 month later
  - Laminectomy with dural puncture at T11-T12
  - POD 3 lethargic
  - POD 7 swelling from incision to pump pocket



Case 3: chronic uncomplicated

- 43 yof with 8 year history of positional headache starting after OB epidural





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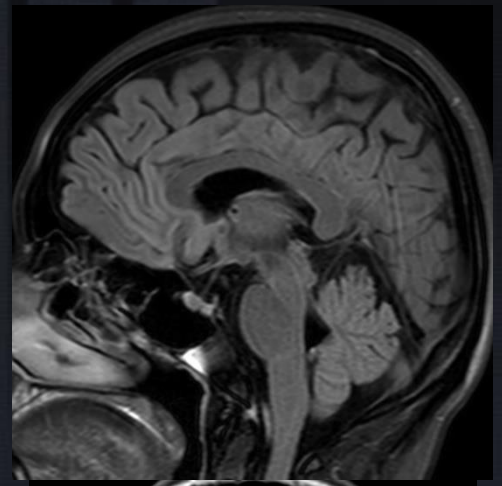

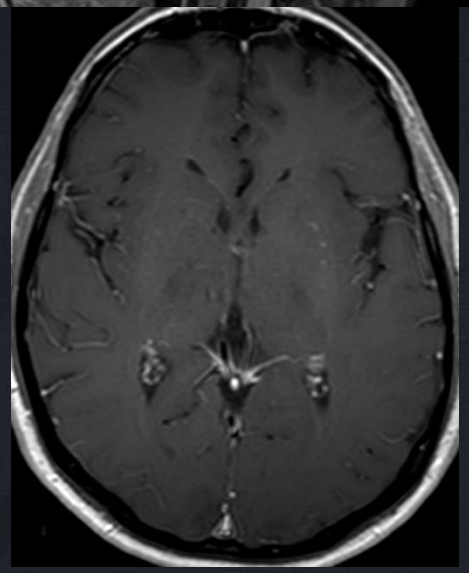

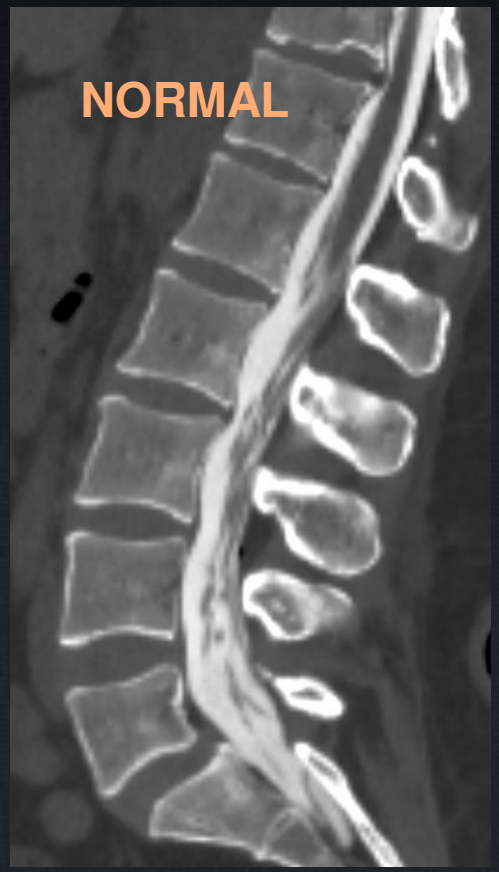

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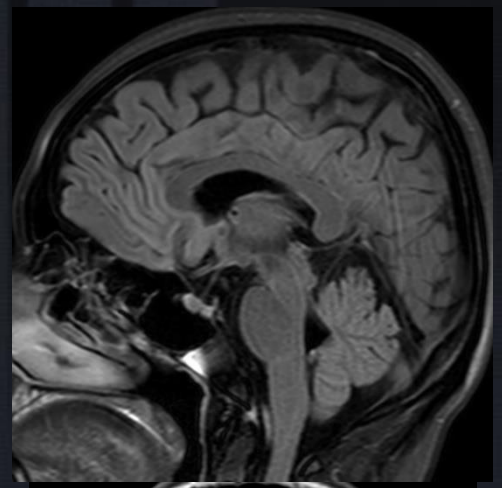
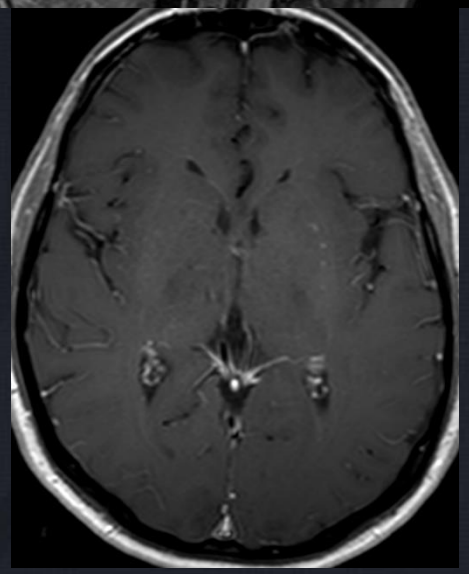
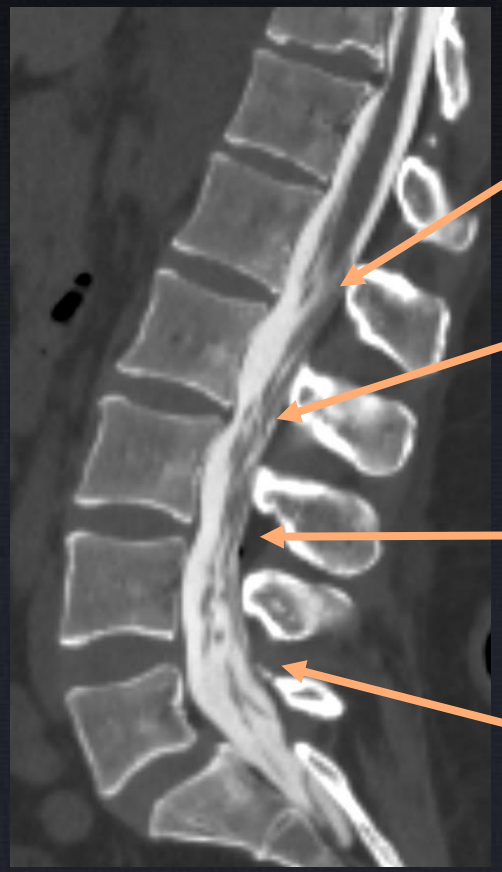
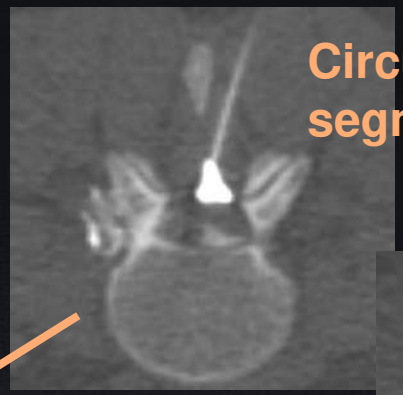
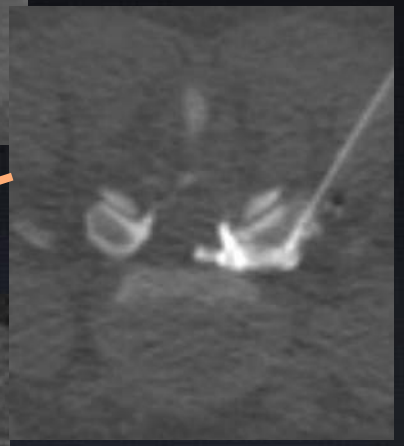
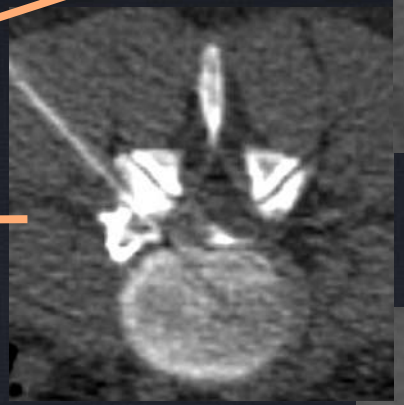


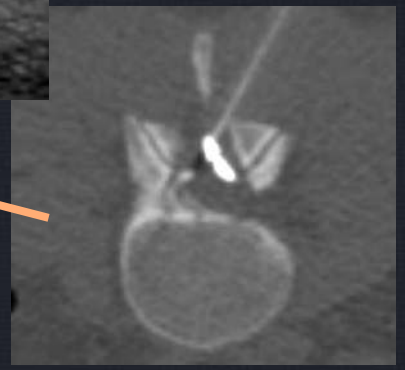








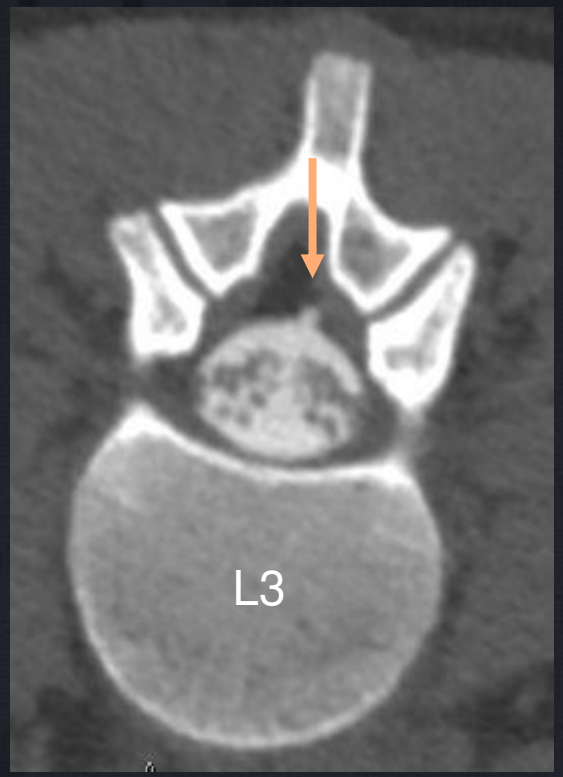


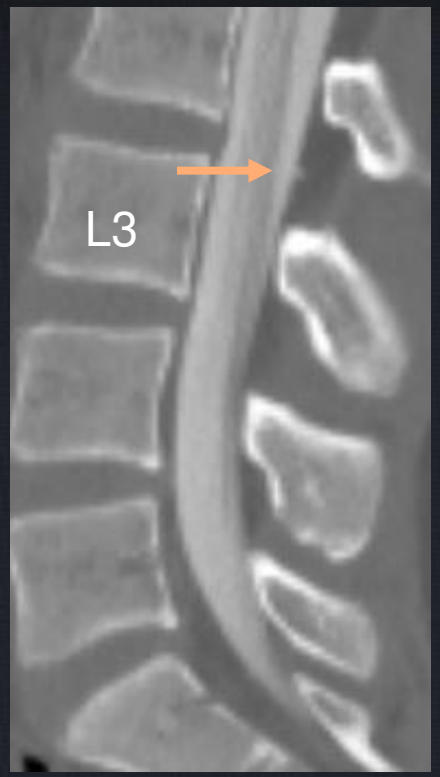


Circumferential long segment patch

Case 4

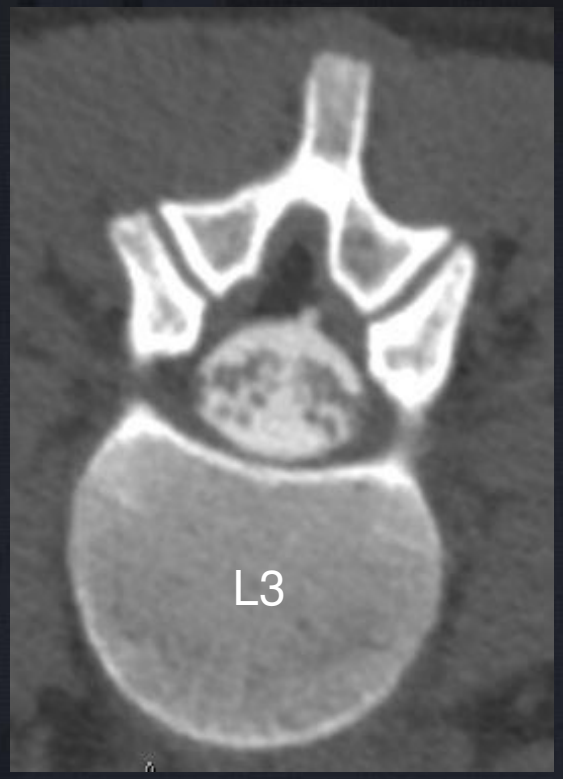
- 13 y/o female
- 6 months of occipital, positional headache following LP for meningitis

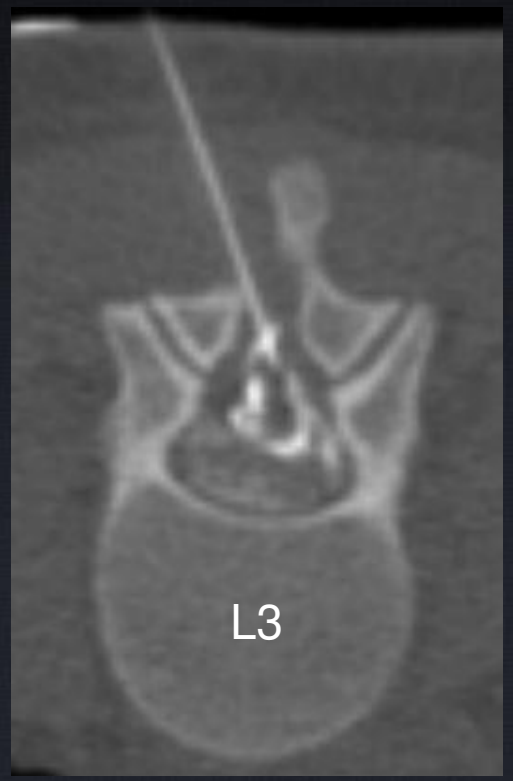




Case 4

- 13 y/o female
- 6 months of occipital, progressively positional headache following LP for meningitis
- 3 EBPs each provided excellent temporary relief





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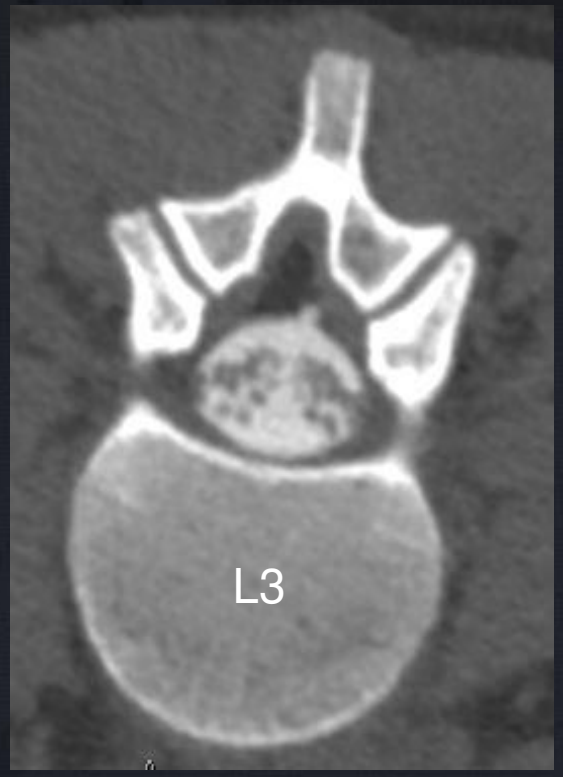
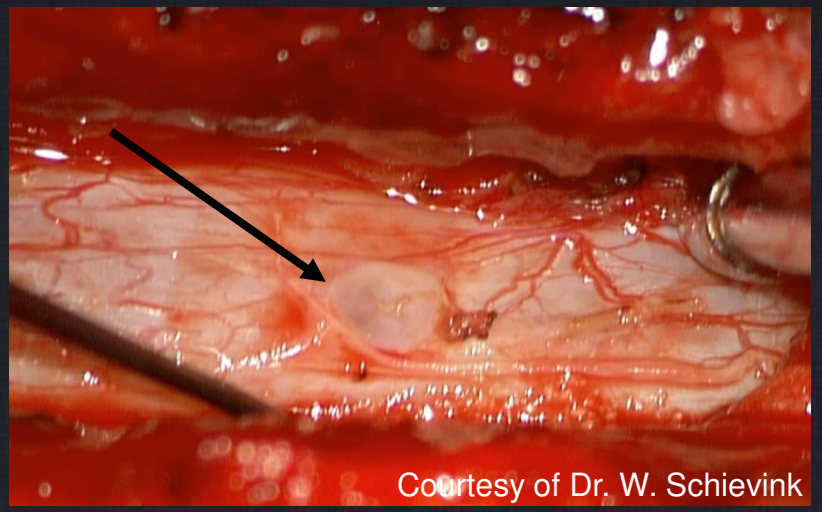
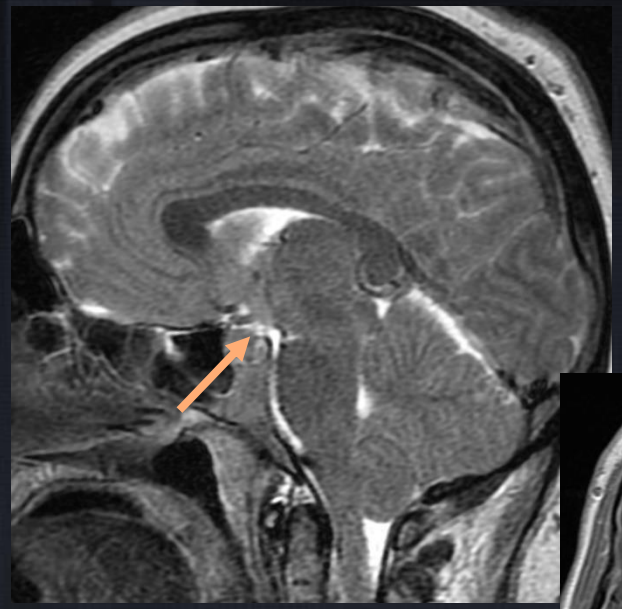


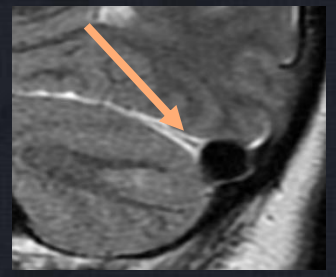
Suture repair of ovoid dural defect
→ lasting 80% HA improvement

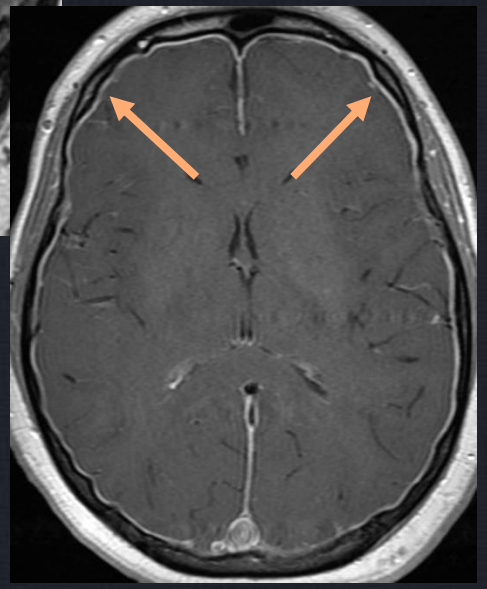


Case 5: acute complicated

- 21 yo s/p 4 attempts at OB epidural develops headache, rapidly progresses to seizures and decreased consciousness.







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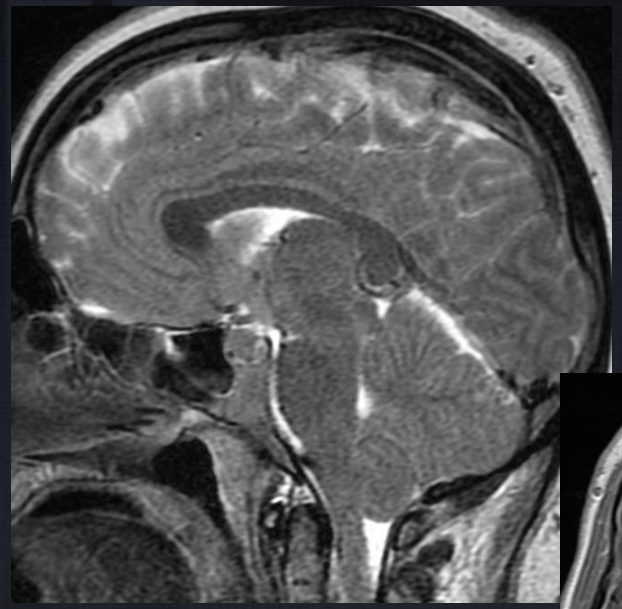
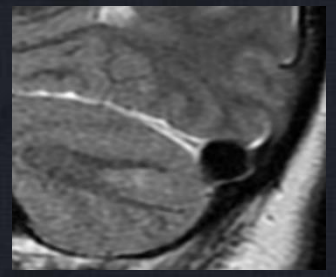
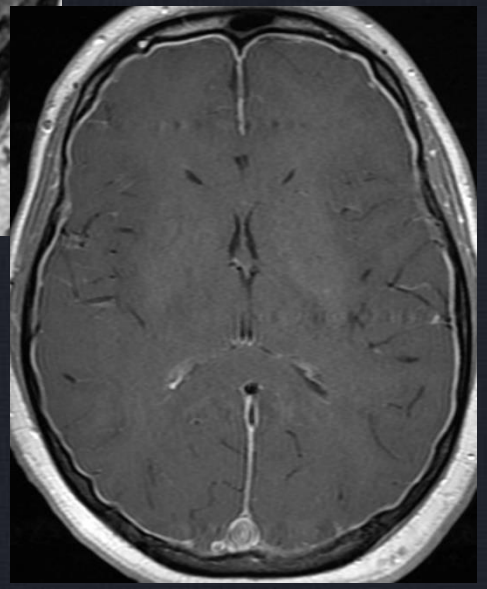
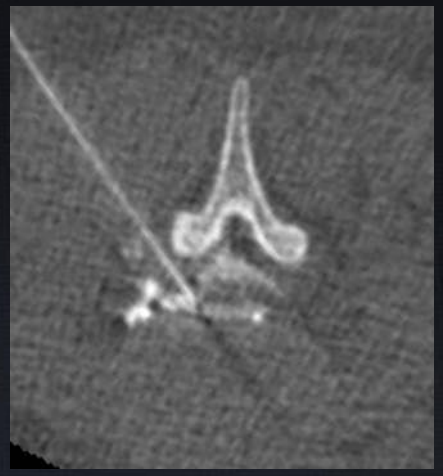
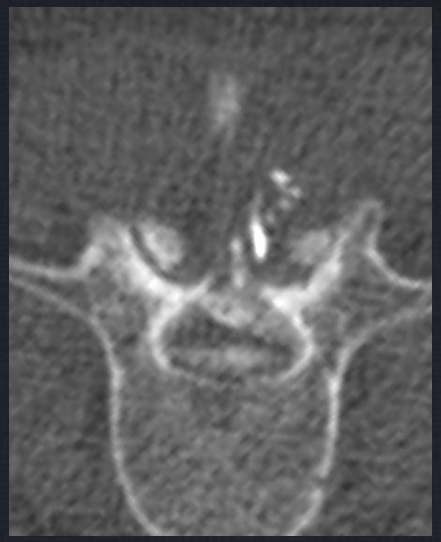






Circumferential short segment patch





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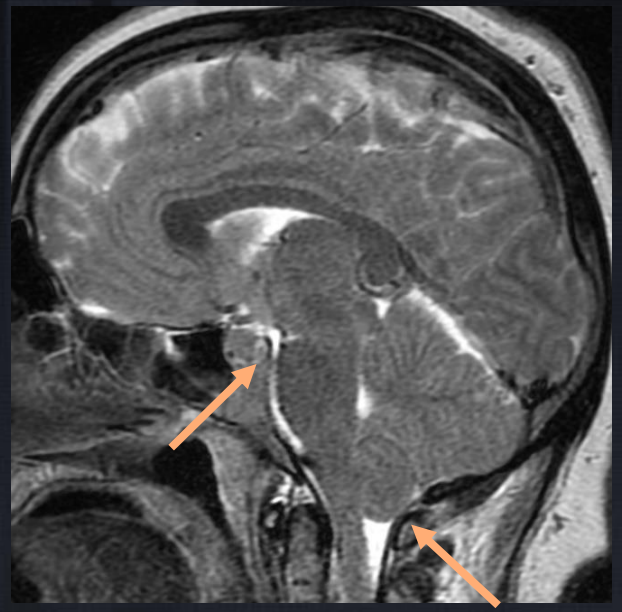
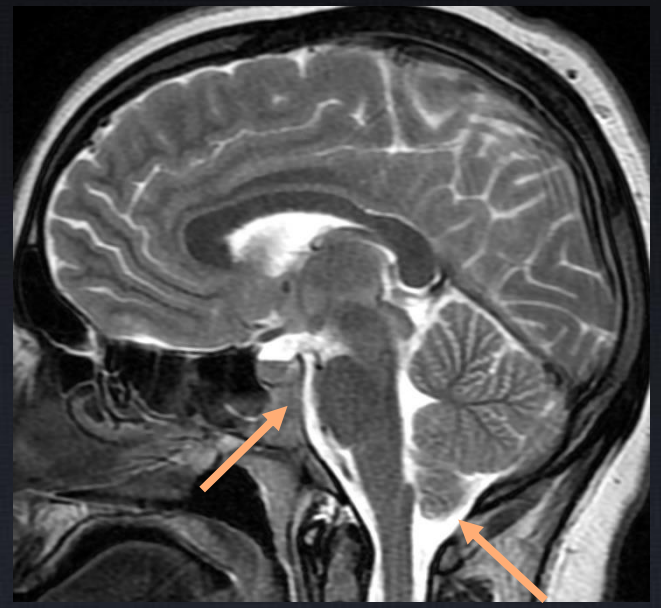


Pre patch

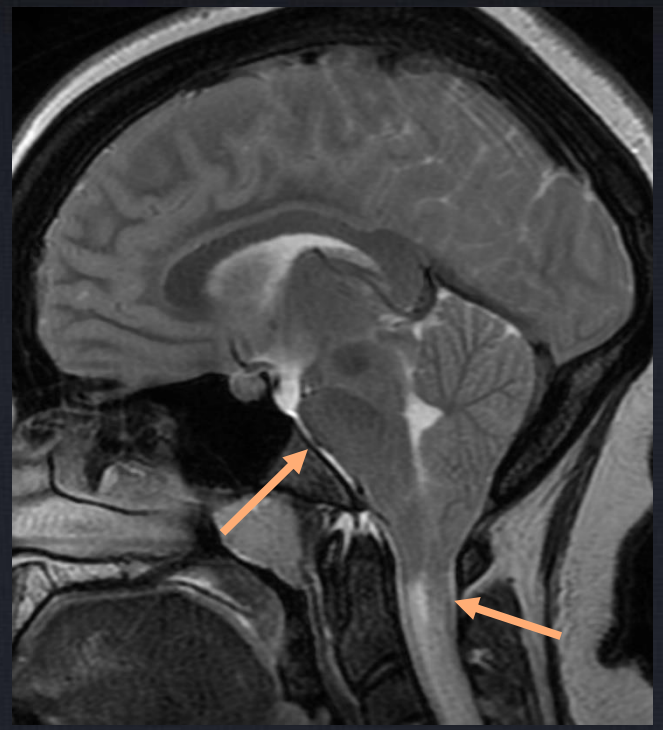


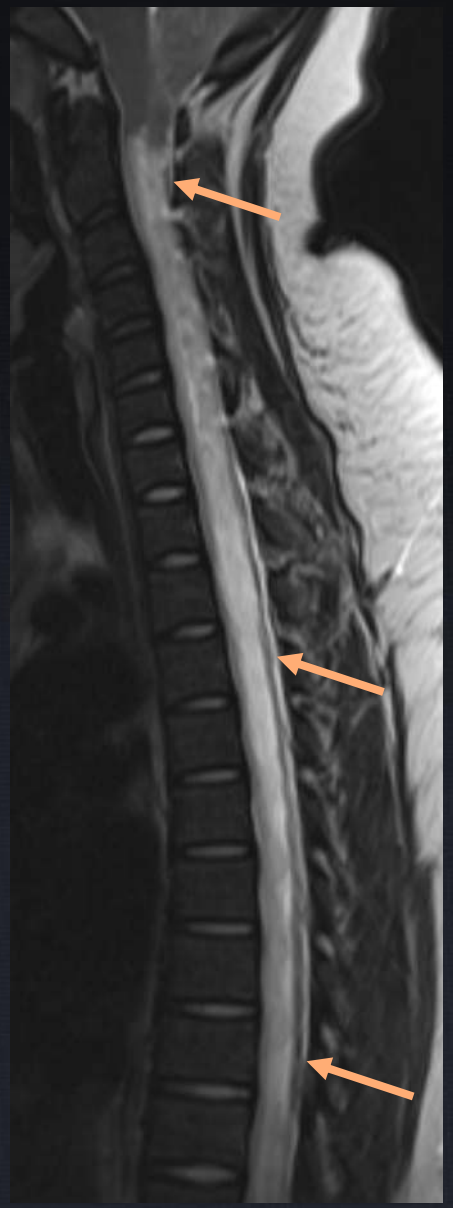
Post patch

Discharged home POD 3

Case 6: chronic complicated

- 23 yof s/p OB epidural with self limited headache
- Progressive BUE numbness and weakness, now with right foot drop





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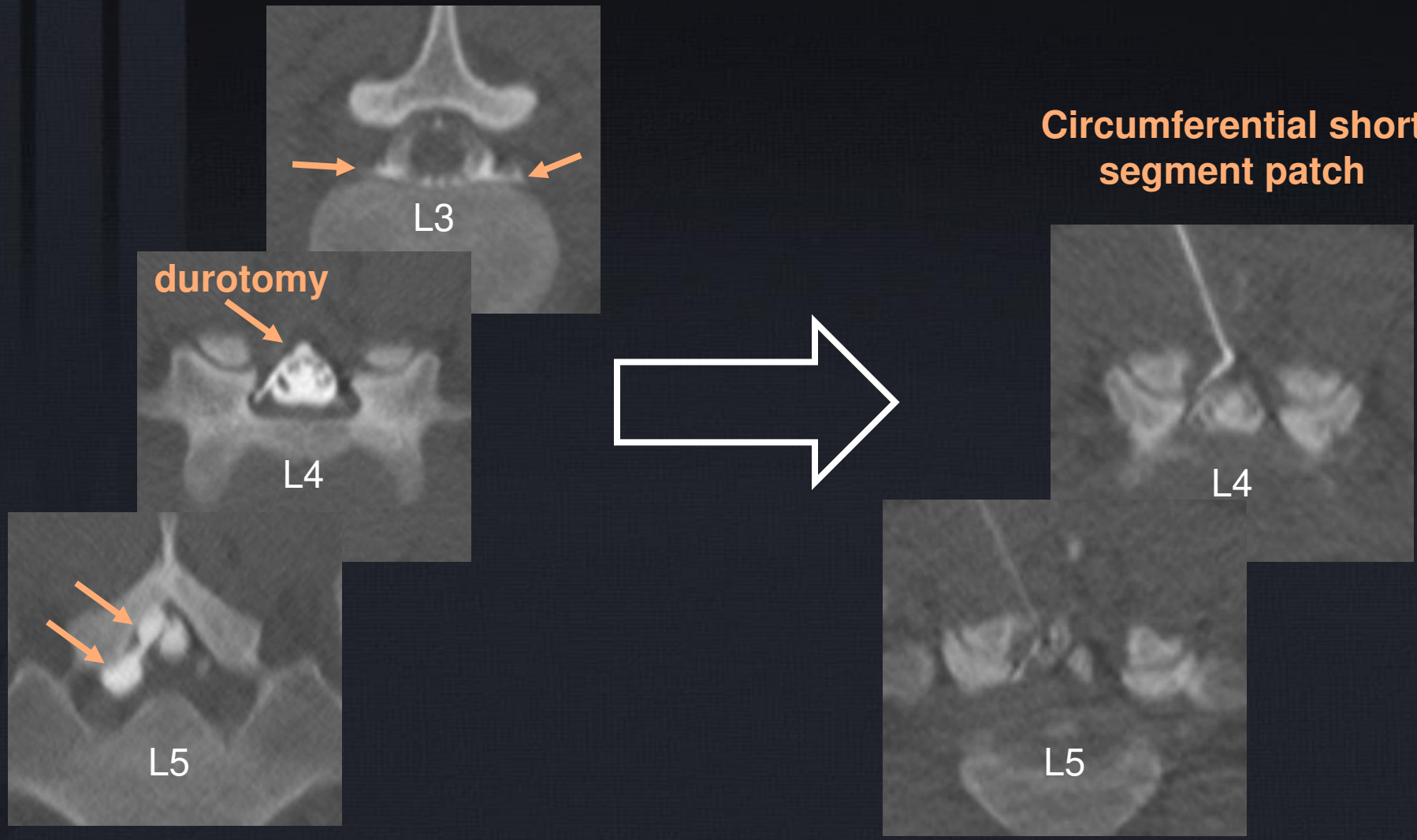

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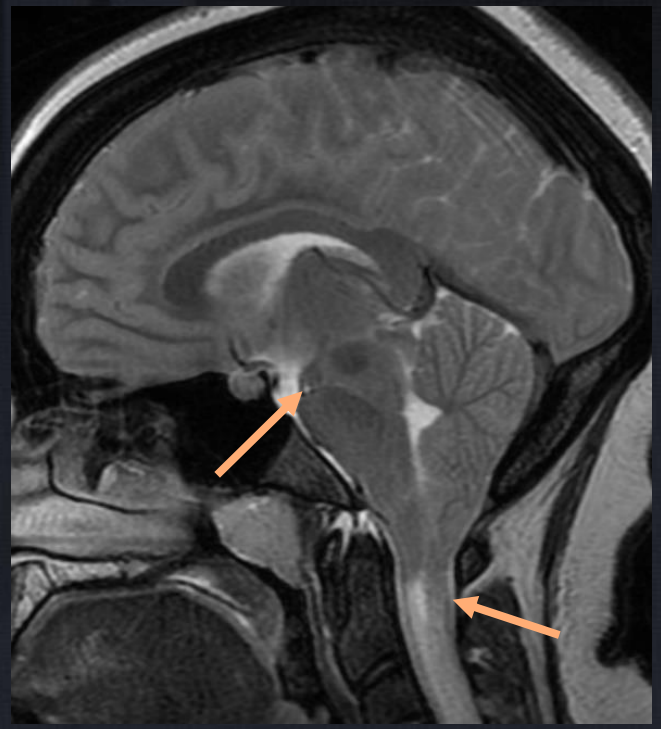
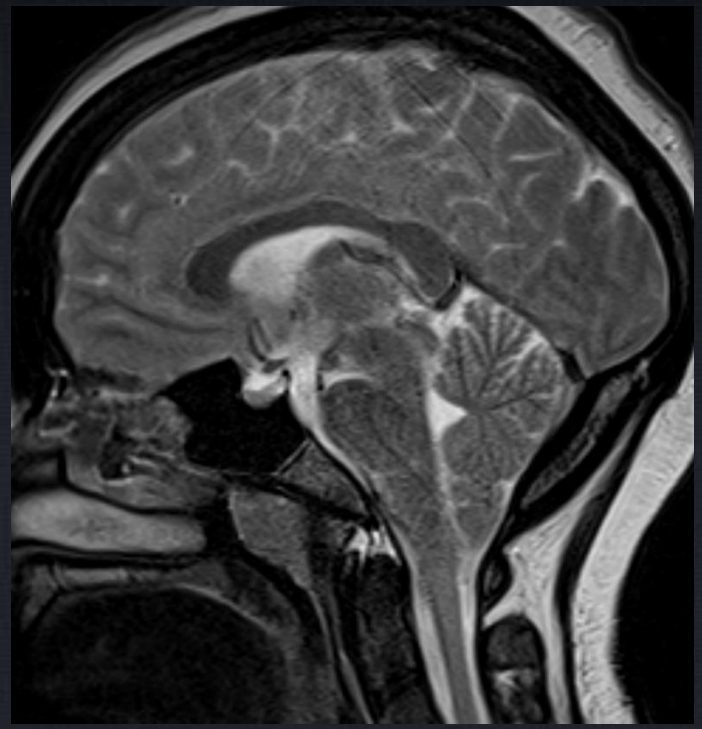


Pre patch



8 weeks post patch

PDPH: EBP

- EBP: Standard of care treatment refractory PDPH
  - Imaging-guided
  - Consider covering ventral surface if dorsal patch fails
  - MRI and Myelography often negative
- Multiple patches may be required
- Surgery if EBP fails and spine imaging positive

Thank You!

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Director of Spine Intervention
Duke University Medical Center
@TimAmrheinMD