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Lumbar Disc Access

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Conflicts of Interest

None

Outline

- Indications
- Contraindications
- Equipment & Monitoring
- Setup & positioning
- Procedural steps
- Clinical pearls for L5–S1
- Complications
- FIPP testing tips

Why Access the Disc?

- **Provocative Discography**
- **Analgesic disc injection**
  - Local anesthetic +/- dexamethasone
- **Discogenic pain emerging treatments**
  - Platelet Rich Plasma (PRP)
  - Nucleus pulposus allograft (VIA disc)
  - Autologous cell products (BMAC, adipose/MSC, cultured MSCs)
  - Allogeneic mesenchymal precursor cells (rexlemestrocel-L, Mesoblast)

Discography

- The best available method to implicate or exclude a disc as a pain generator
- Long slow decline after Carragee 10-year matched cohort raised the concern that disc puncture itself possibly causes early degeneration with inability to predict surgical outcomes
- May come back for emerging therapies

Contraindications

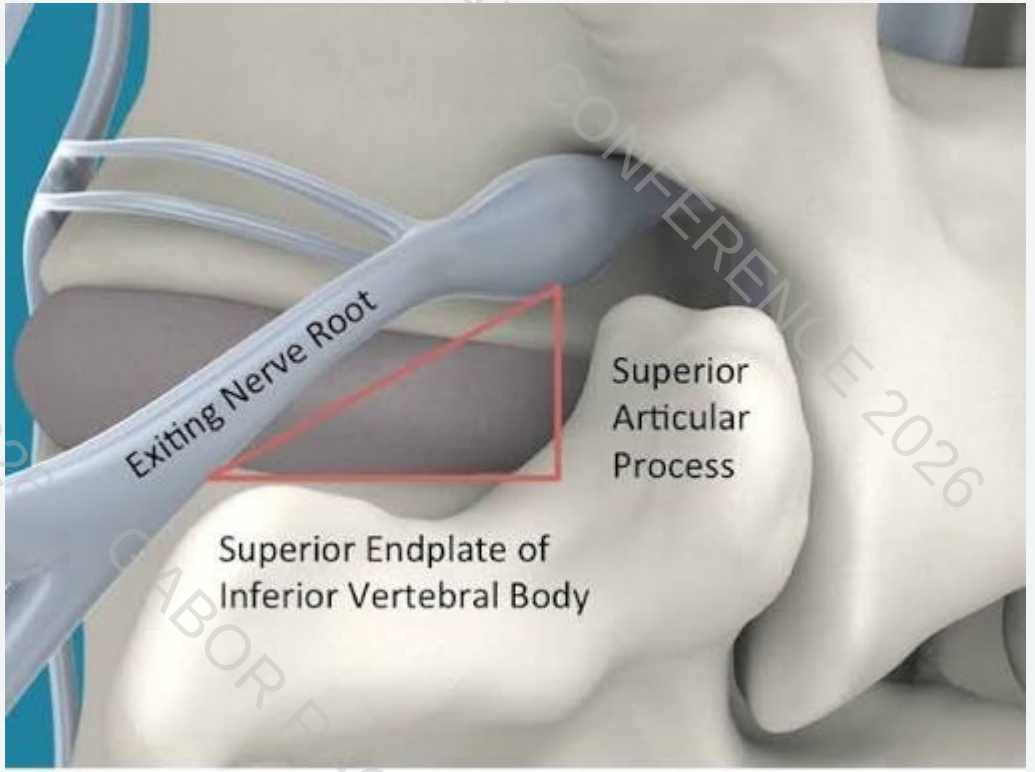
- Severe central canal stenosis at level testing
- Active local or systemic infection
- Allergy to injected agents
- Pregnancy
- Inability to obtain informed consent
- Inability to assess the patient's pain response for discogram testing

Equipment & Monitoring

- Standard ASA monitoring
- Fluoroscopy
- Sterile prep and drape
- Gown, mask, cap, sterile gloves
- Local anesthetic for skin
- CPR medications, AED, etc
- IV ± intradiscal cefazolin or clindamycin
- 22-gauge 7-inch and 5-inch stylette needles
- 18-20 gauge introducer needle per preference or for L5-S1 level
- Manometry
- Nonionic contrast

Safe Working Zone = Kambin's Triangle

- **Too posterior / medial** → thecal sac & traversing root
- **Too superior / lateral** → exiting root



Fluoroscopy Set Up

- **Step 1 — Square the endplates:** tilt the C-arm cephalad or caudad until the target endplates are squared off
- **Step 2 — Oblique to the SAP:** rotate ipsilateral ~20–35° until the SAP tip sits ~ mid disc or until spinous process overlaps other side of vertebral body
- **Step 3 — Entry:** Just anterolateral to SAP
- **Target = Mid point of disc in AP and lateral views**

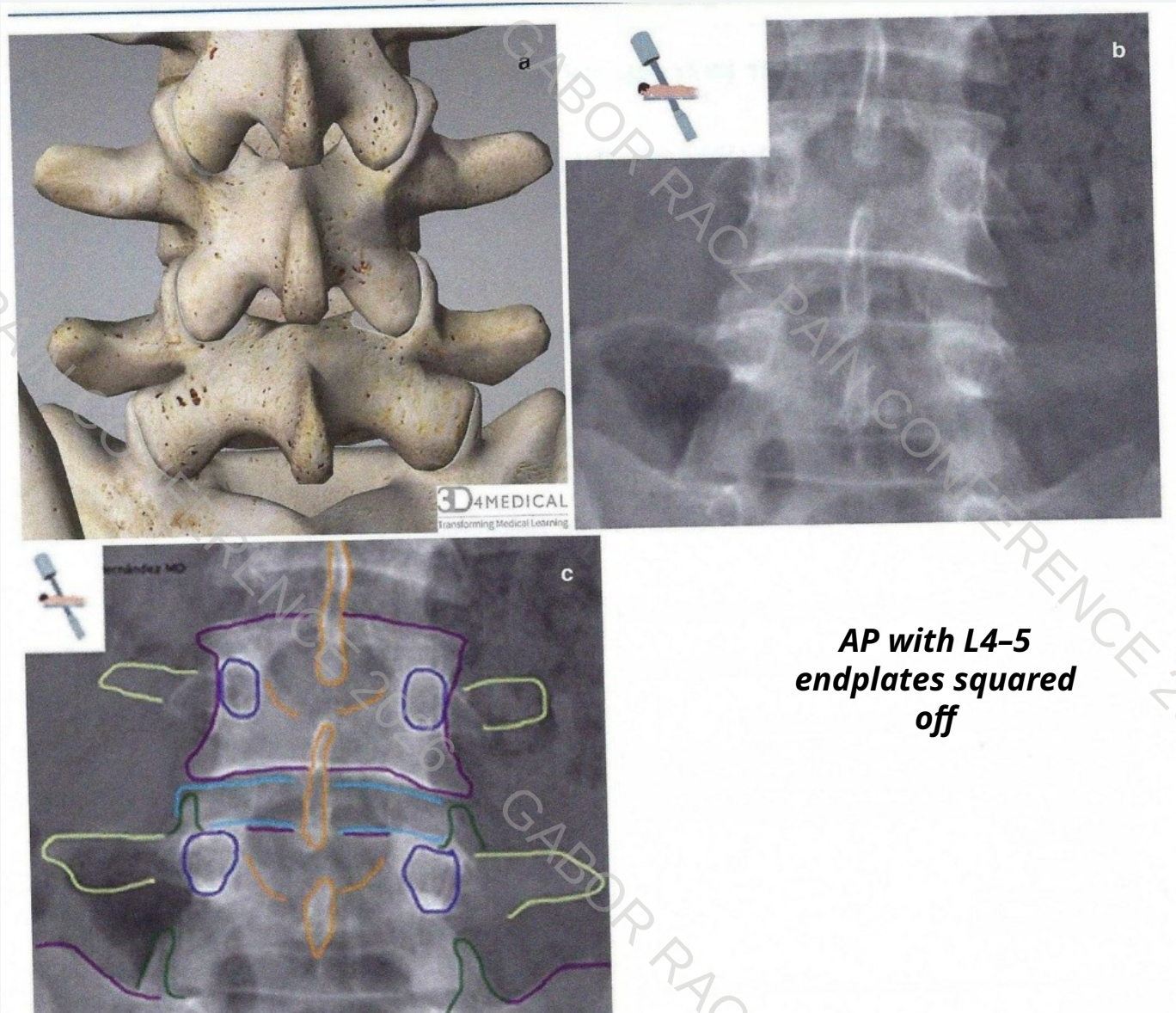
Procedural Technique

- **Down the barrel:** Advance parallel to the beam (tunnel or coaxial view vision)
- **Depth protection:** "dock" on the lateral SAP, then walk the needle ventrally off the bone to the dorsal disc
  - Think "low in the hole" at the SAP/SEP junction
- **Feel resistance change at disc surface**
- **BEFORE entering disc → CHECK AP & LATERAL**
  - ***Verify trajectory before entering***

Fluoro Technique

- **Endplate alignment by level**
  - **L3–4 often needs none**
  - **L4–5 needs 0–15° Cephalad**
  - **L5-S1 needs 25–35° Cephalad**

- **Color key:**
  - **Orange = spinous process & lamina**
  - **Yellow = transverse process**
  - **Dark green = SAP**
  - **Dark blue = pedicle**
  - **Purple = vertebral body & sacrum**
  - **Light blue = disc**

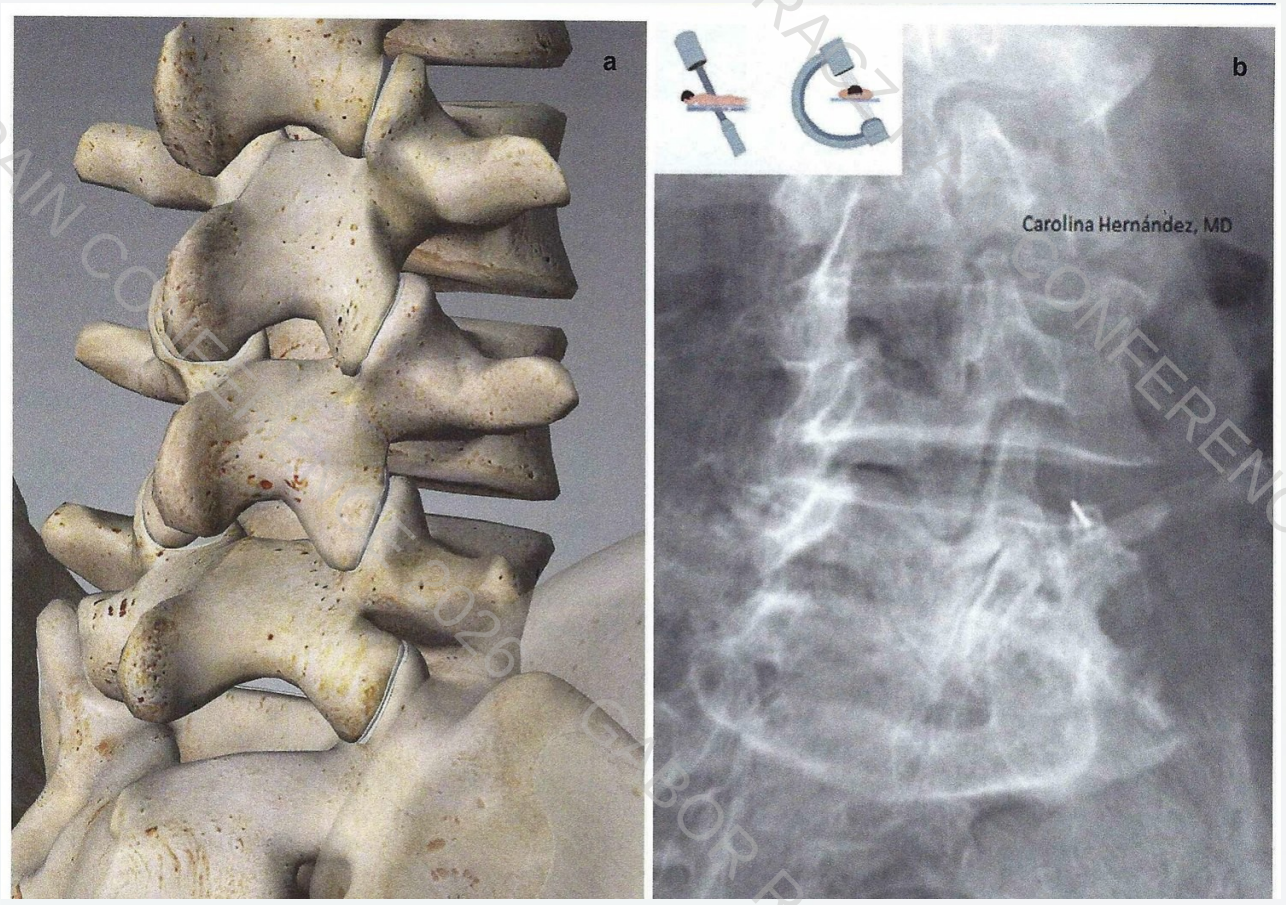


AP with L4–5 endplates squared off

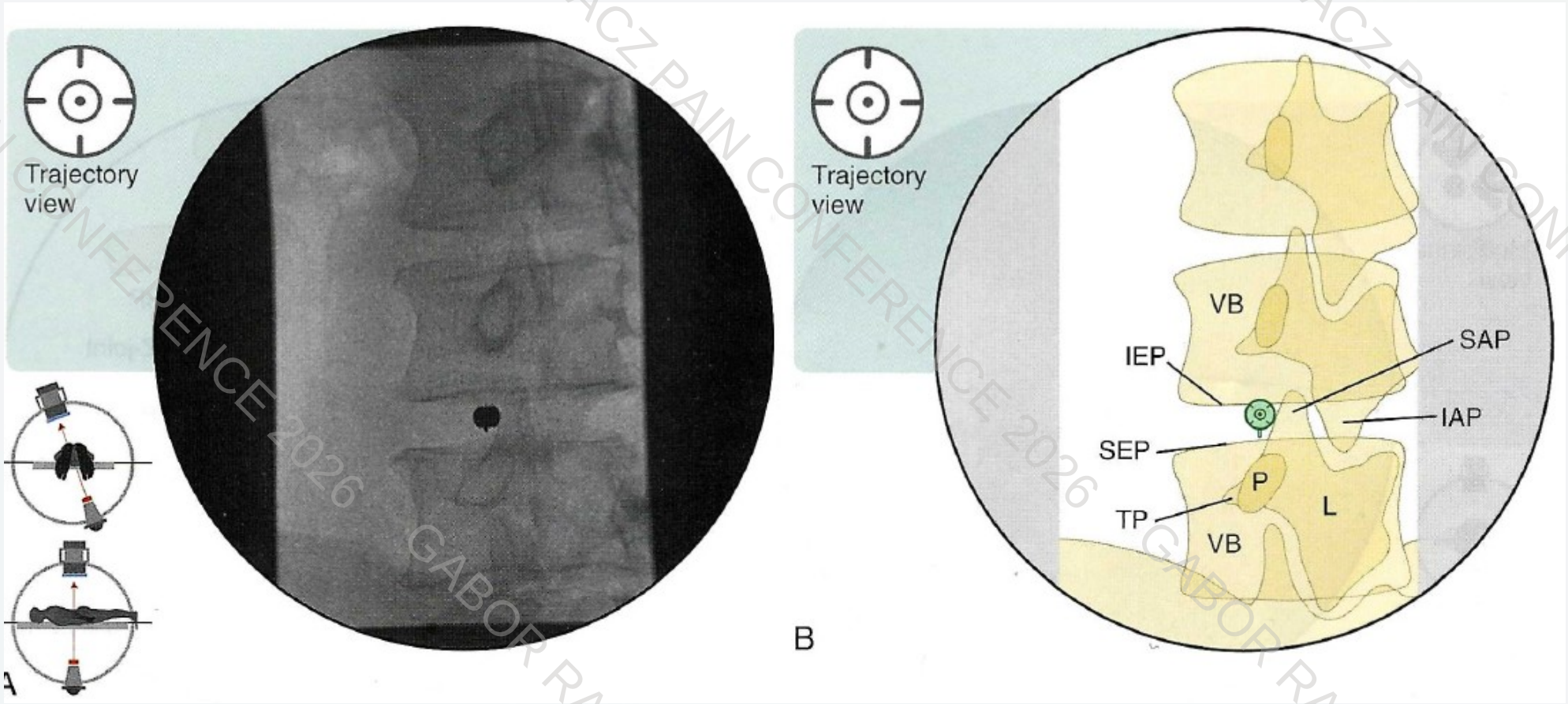
Fluoroscopy Technique

Oblique C-arm until the spinous process overlaps the other side of the vertebral body

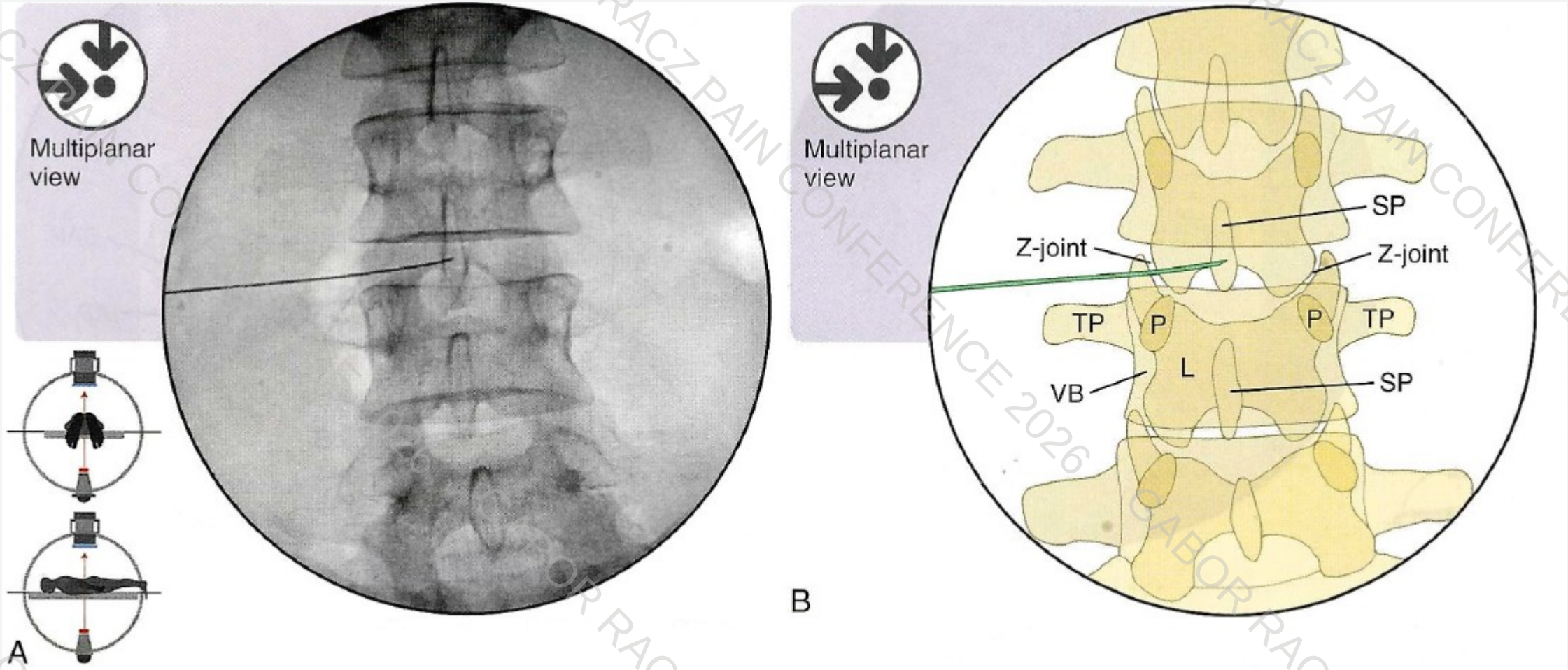
Entry point is just lateral to the superior articular process (SAP)



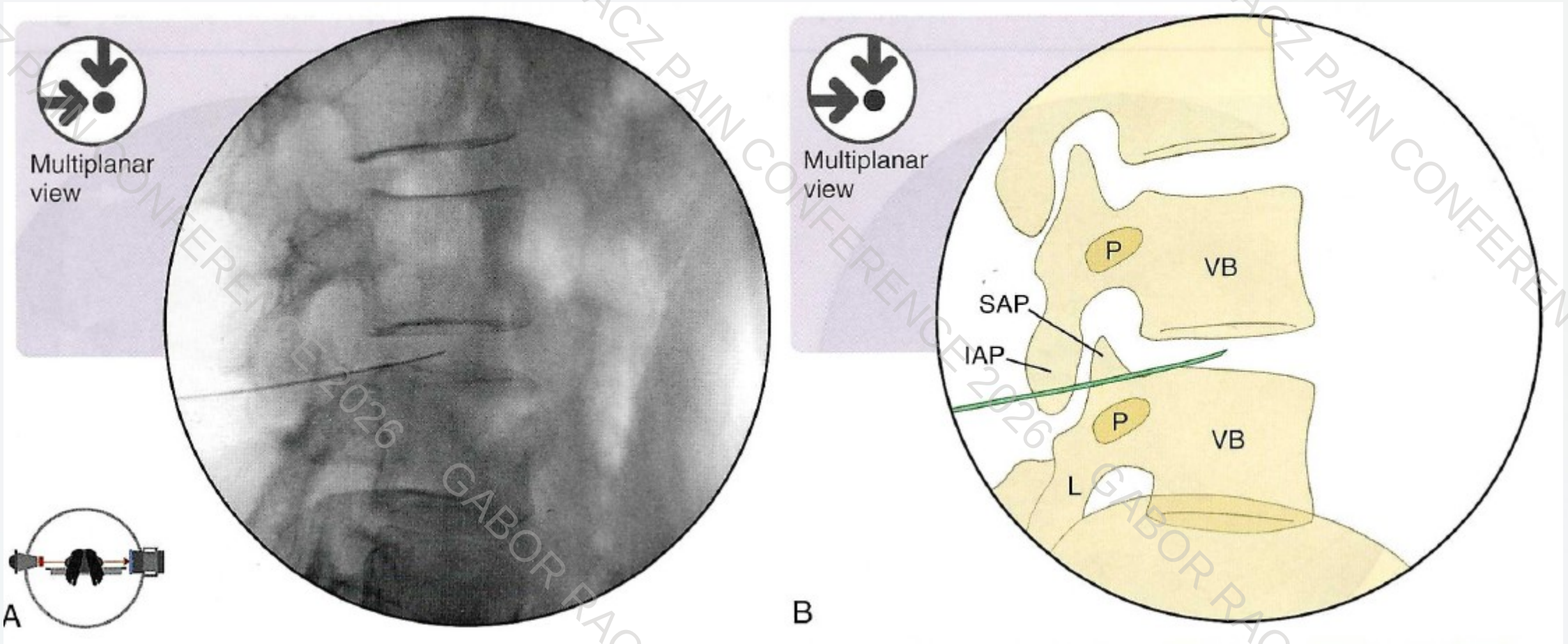
Fluoroscopy Technique



Final Needle Position



Final Needle Position



More Challenging - L5–S1

Why it's different

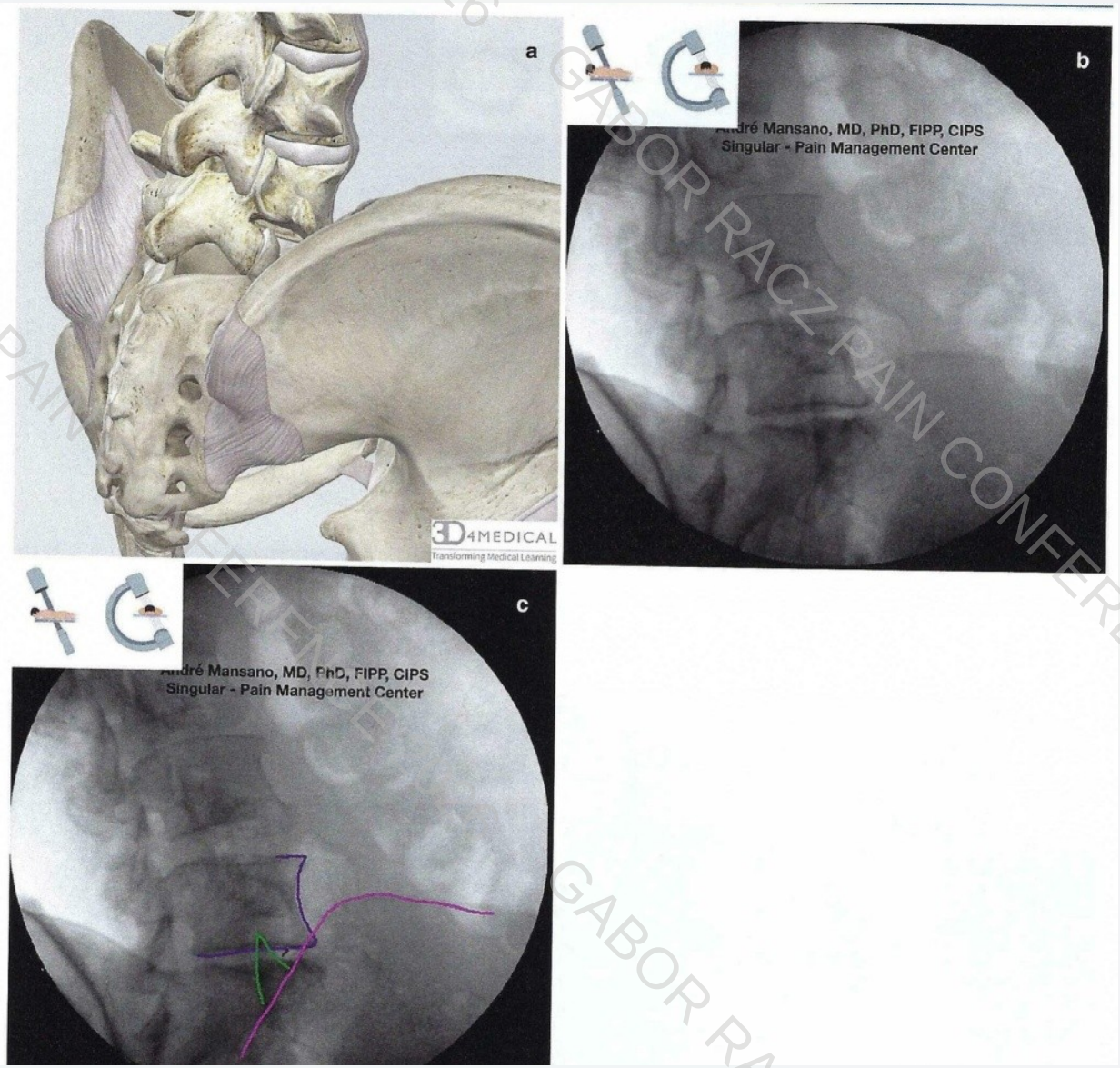
- Iliac crest blocks the usual oblique window
- The L5 exiting root crowds the corridor
- A straight down-the-barrel line often can't clear the iliac crest

Accessing

- Less oblique + steeper cephalo-caudad tilt (up-and-over the crest)
- More medial skin entry to clear the ilium
- 15-30 degrees bent / curved-tip needle to steer over the crest, under the L5 nerve root
- Double-needle: introducer to the crest window
- Introducer bevel is medial and needle bevel is lateral ie. should be 180 degrees from each other

The L5-S1 Disc

- **Decrease the oblique** — the oblique often needs to be decreased slightly, as the iliac crest can cover the needle trajectory
- **Add cephalad tilt —** a slight cephalad tilt of the C-arm helps remove the iliac crest from view



Complications

- **Discitis** — strict aseptic technique, antibiotic prophylaxis, minimize passes
- **Spinal nerve root injury** — exiting root / traversing root → if paresthesia or leg symptoms , stop & redirect
- **Radicular artery / spinal cord ischemia**
- **Dural puncture / headache** — stay lateral to the SAP
- **Anterior overshoot** — aorta/iliac arterial puncture, retroperitoneal bleed / bowel — Lateral view
- **Contrast allergic reaction**
- **Post-procedure pain flare**
- **Vasovagal reaction**
- **Post procedure pain**
- **Bleeding**

Unacceptable, But Not Harmful Needle Placement on Exam - 3

Needle position

- Too anterior: anterior fourth of the disc or outside the disc
- Too posterior: posterior fourth of the disc
- Too cephalad / caudad: touching the vertebral endplates
- Too cranial in the intervertebral space — could damage the exiting nerve root

Abandoned procedure

- Stopped after unsuccessful attempts, but the examinee was clearly cognizant of safety and the needle did not compromise the intraspinal space

Unacceptable, Potentially Harmful Needle Placement on Exam - 4

- Not checking lateral and AP views to assess needle depth
- Unnecessarily large needle (18G or larger)
- Multiple needle passes in and out of the disc
- Rough needle manipulation
- Any proof of poor lumbar-spine anatomy understanding — e.g., needle left far lateral in quadratus lumborum, believed correctly placed

References

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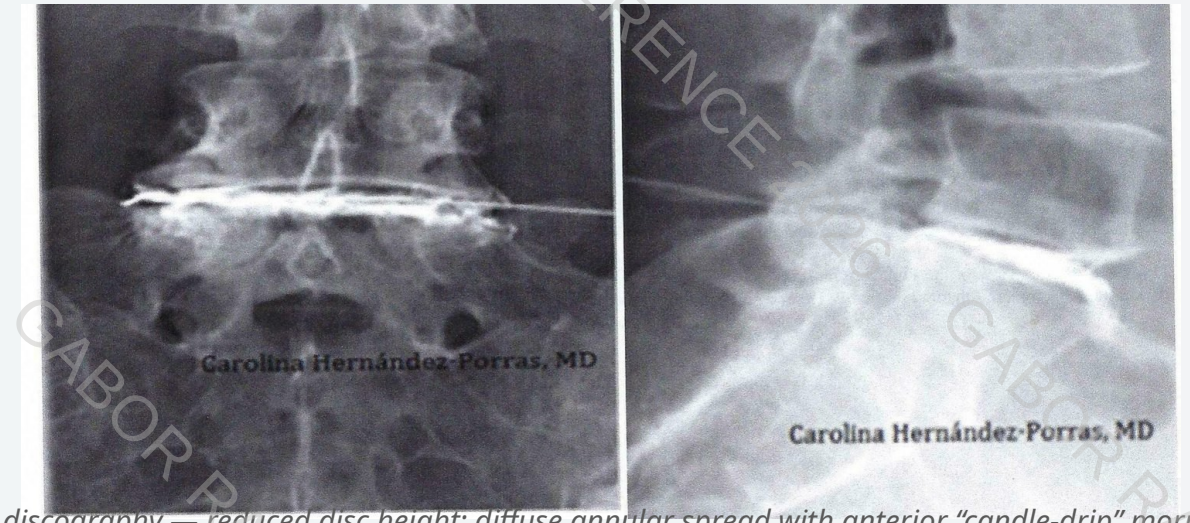
- Furman MB, Berkwits L, Cohen I, Goodman B, Kirschner J, Lee TS, Lin PS, eds. *Atlas of Image-Guided Spinal Procedures.* 2nd ed. Philadelphia, PA: Elsevier; 2018.
- Kambin P. Arthroscopic microdiscectomy: the triangular working zone.
- Guyer RD, Ohnmeiss DD. Lumbar discography — NASS position statement
- Melnik I, et al. Provocative discography technique — “low in the hole,” L5–S1 SAP contact & hockey-stick.
- Transforaminal endoscopic access literature — docking on and “walking off” the SAP (shared Kambin corridor).

Injection: Contrast & Disc Manometry

- **Inject nonionic contrast in 0.5–1 mL increments**
- **Record injection pressures, volume, and patient response**
- **Use a pressure-controlled injection (disc manometry)**
- **“Opening” pressure = pressure at first contrast visualization in the disc**
- **Monitor opening and final pressure; final = max pressure above opening — do not exceed 50 psi**



AP (a) & lateral (b) after L5-S1 discography — reduced disc height; diffuse annular spread with anterior “candle-drip” morphology

A Positive Discography

All of the following criteria must be satisfied:

a. Concordant pain

b. Pain intensity ≥7/10 NRS

c. Final pressure ≤50 psi above opening

d. Annular tear, grade 3

e. Negative control disc level

f. Maximum volume 3 mL