Key Determinants of Lumbar Medial Branch RF Ablation Outcomes

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www.DenverBackPainSpecialists.com

Colorado Pain Society Annual Meeting, April 22, 2017

Breckenridge, CO

Disclosures

- Spine Intervention Society (SIS) Senior Instructor
- Spine Intervention Society (SIS) prior board member
- Research Funding:
  - Mesoblast Ltd. funding: Principal Investigator for MSB-DR003 (Lumbar intra-discal stem cell study)
  - Seikagaku Corporation funding: Principal Investigator for SI-6603/1131 (Intra-discal chondroitinase for lumbar HNP/radicular pain)
  - And; A Multi-center, Open-label Study of SI-6603 in Patients with Lumbar Disc Herniation
  - Grunenthal “Low back pain study”
    - Quantitative Research in chronic Low Back Pain for the Development of a New Patient Reported Outcome Measure
- Speaker for Medical Education Resources, Inc.

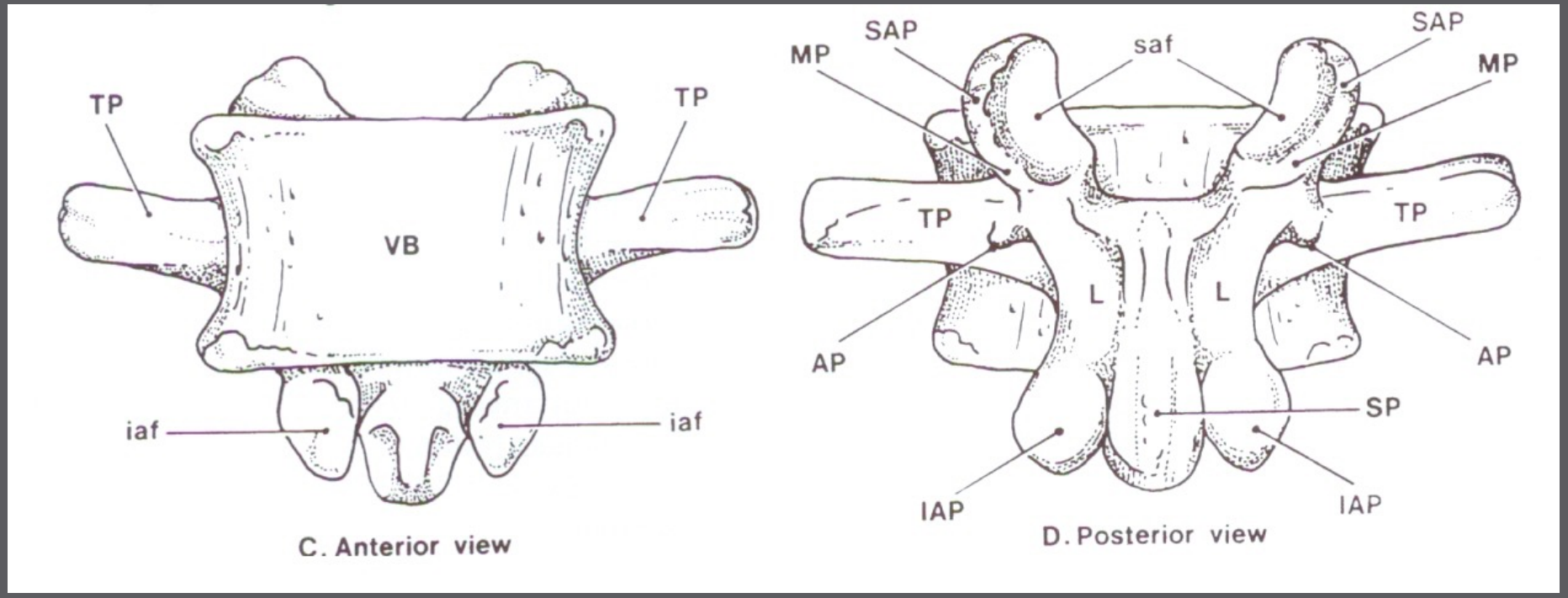
Objectives

- Attendees should be able to:
- Understand the anatomy of the spinal medial branches of the dorsal rami and how this guides medial branch blocks and RF ablation technique
- Appreciate the importance of clinical selection of patients for facet (Z-joint) procedures
- Discuss the use of medial branch blocks in selecting patients for RF ablation
- Understand RF ablation technique and its relationship to outcomes
- Discuss how literature reviews and Health Technology Assessments affect medical policy and access to spinal procedures

Terminology

- **Zygapophysial Joint (Z-joint)**
  - **apophysis = out-growth**
  - **zygos = yoke or bridge**

- **Literature: Apophysial (British), Facet (American)**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C. Anterior view
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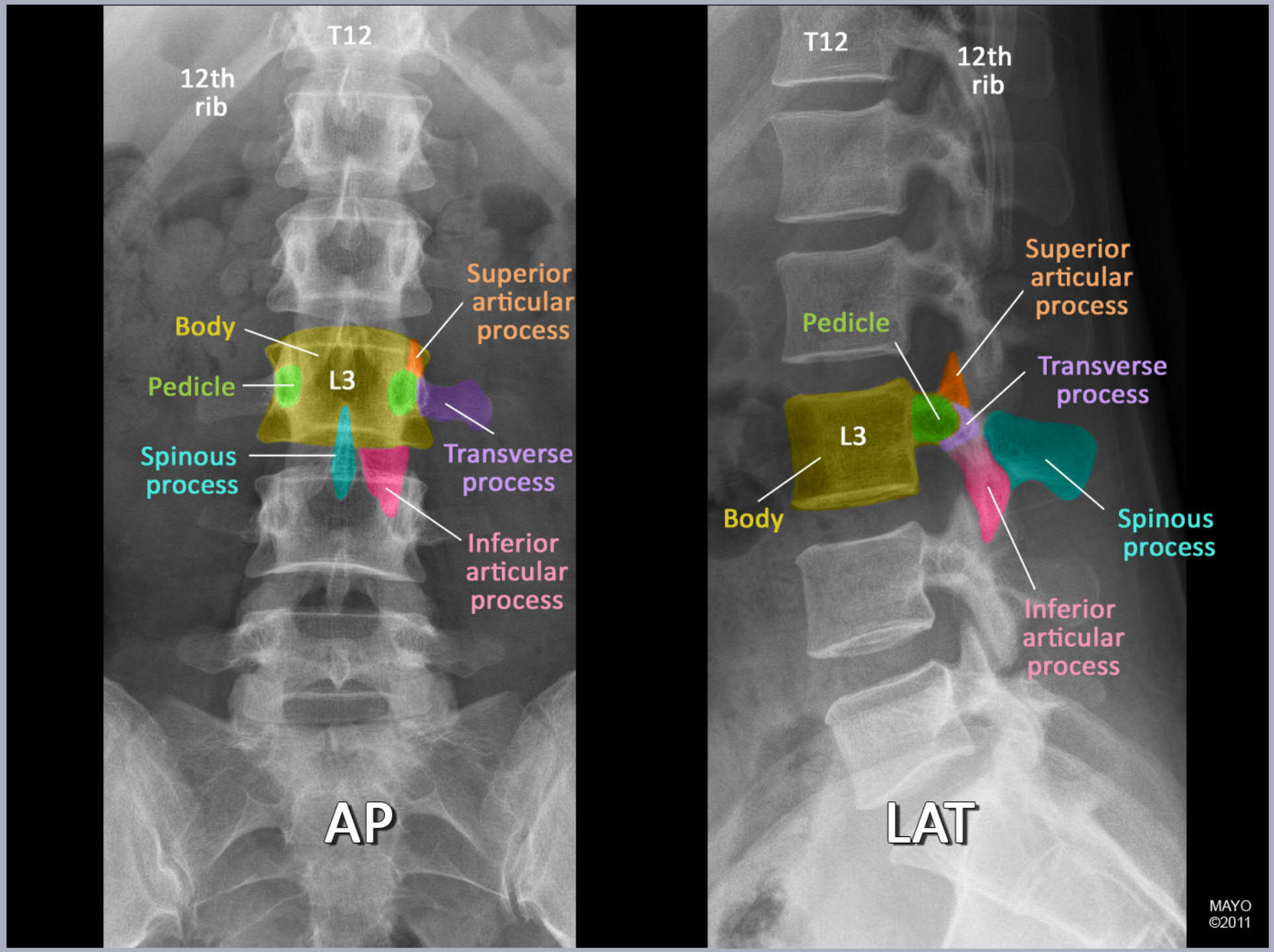
D. Posterior view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12th rib
Superior articular process
Body
Pedicle
L3
Spinous process
Transverse process
Inferior articular process
AP
T12
12th rib
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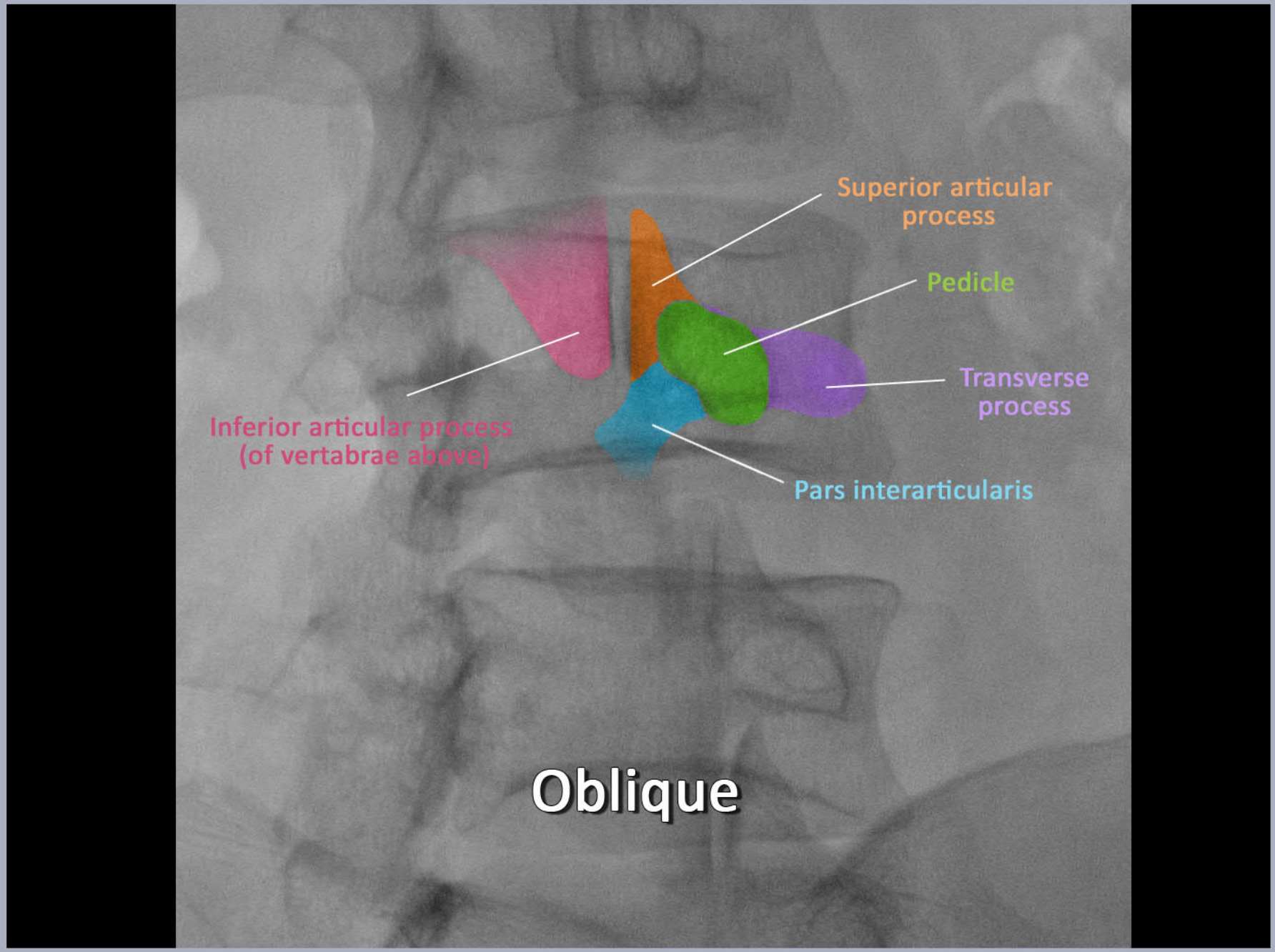
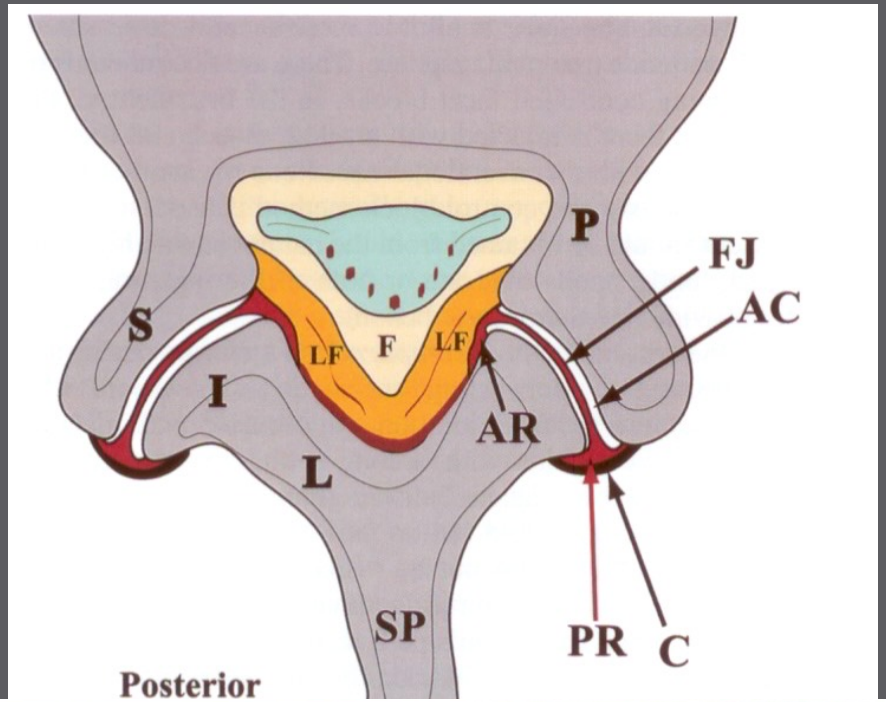
Pedicle
Transverse process
L3
Body
Spinous process
Inferior articular process
LAT
MAYO ©2011


Superior articular process
Pedicle
Transverse process
Inferior articular process (of vertabrae above)
Pars interarticularis
Oblique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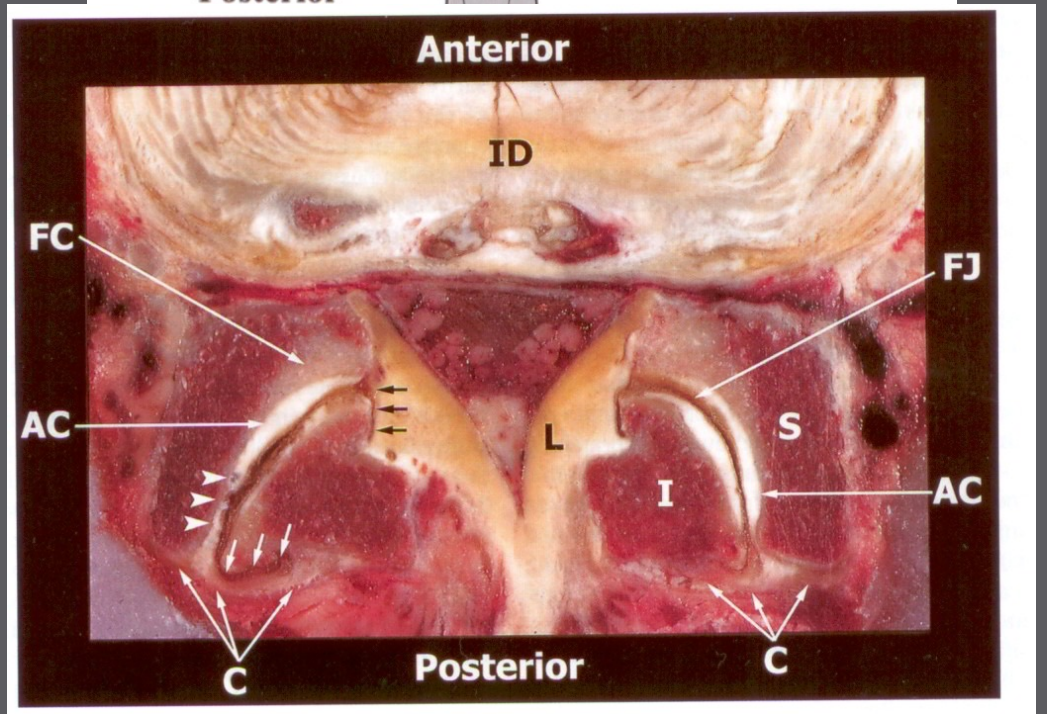
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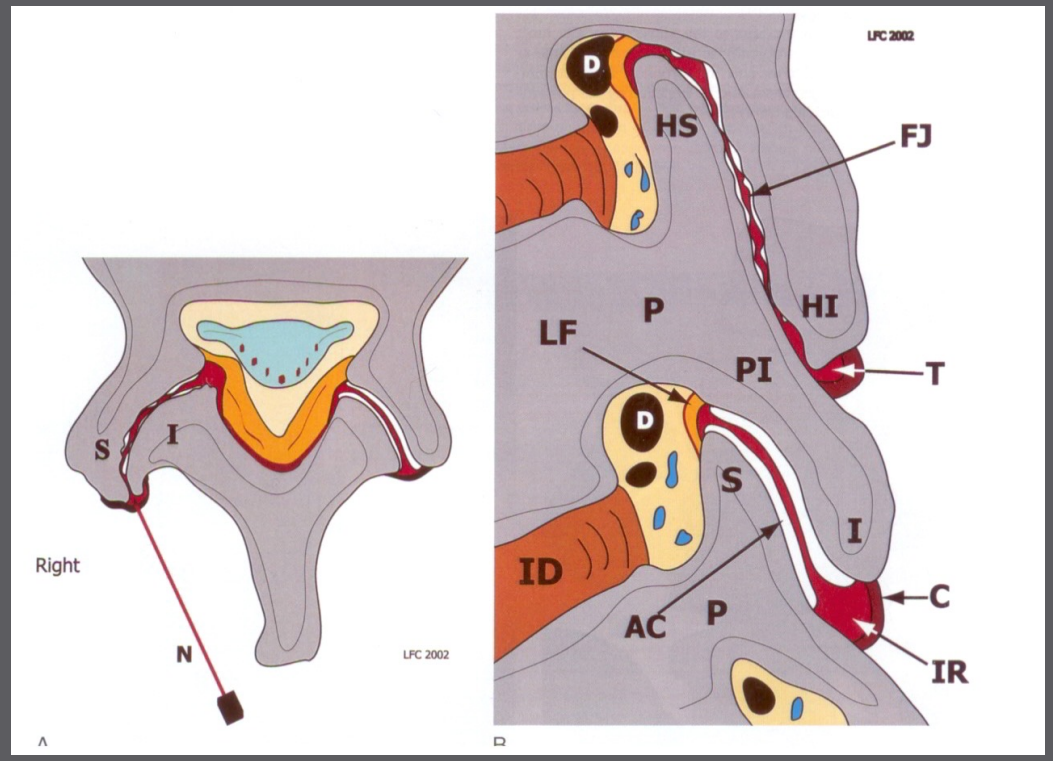
IA LZJ Injection Technique

- Align view through disc at target level
- Assess sagital plane orientation and degree of (dorsal) degenerative change (spurring)
- FIND "FIRST" OPENING
- Easier at superior or inferior recesses
- Updated evidence review of lumbar intra-articular steroid injection data in appendix
  - Reasonable if positive diagnosis with MBB or SPECT scan but not predictive of RF outcomes – start with medial branch blocks (MBBs)



Lumbar/Cervical IA Steroid: Evidence Review - Thank you to BM and PD

- Brandon Messerli DO and Paul Dreyfuss MD
  - Evergreen Health Sport & Spine Care
  - Presentation of evidence in response to Washington state's consideration of non-coverage for interventional spine procedures (consideration based on Spectrum's HTA)
    - Multiple study summary slides are from their presentation

Lumbar Facet Pain: IA steroid injections

- Prior HTCC non-coverage determination largely based on the negative RCTs of Lilius and Carrette
- These studies do not represent best practice methods - COMMON PROBLEM WITH PAIN STUDIES
  - e.g. diagnosis not confirmed with diagnostic blocks, large volume injectates which do not remain IA, suboptimal outcome measures
  - See appendix for details

Facet IA Steroid Injections

- Consider a coverage determination of facet injections
- We endorse the Multi-specialty Pain Workgroup (MPW) Guidelines, which were utilized by Medicare LCDs in 47 of 50 states.
  - See Appendix for guidelines
- New moderate quality trials show benefit of IA steroid injections vs. IM injections, and equal benefit to RF neurotomy
- Spectrum excluded evidence that shows patients with SPECT+ joints can benefit from IA facet steroid injections for 3 months
- Although there are no new efficacy trials in cervical facet injections there is one small prospective trial showing effectiveness of IA facet steroid injections in those with facet arthritis

MPW* Guidelines: Facet injections
*Multi-specialty Pain Workgroup

- For predominately axial pain, but a lesser degree of somatic referred pain into the lower extremity is not an exclusion.
- Pain has been present for at least 3 months.
- Radicular pain or neurogenic claudication is an exclusion to performing a facet injection unless the radicular pain is caused by a facet synovial cyst.
- Failure of ≥ 4 weeks of a conservative care trial unless patient is unable to tolerate such or co-morbidities limit such a trial.
- Must use fluoroscopy or CT guidance and contrast media.
- Repeat injections of same joint(s) only allowed if ≥ 50% relief and improved ADLs for a minimum of 3 months.

Lumbar Medial Branch Blocks

- MMB *vs* Intra-articular Facet Blocks

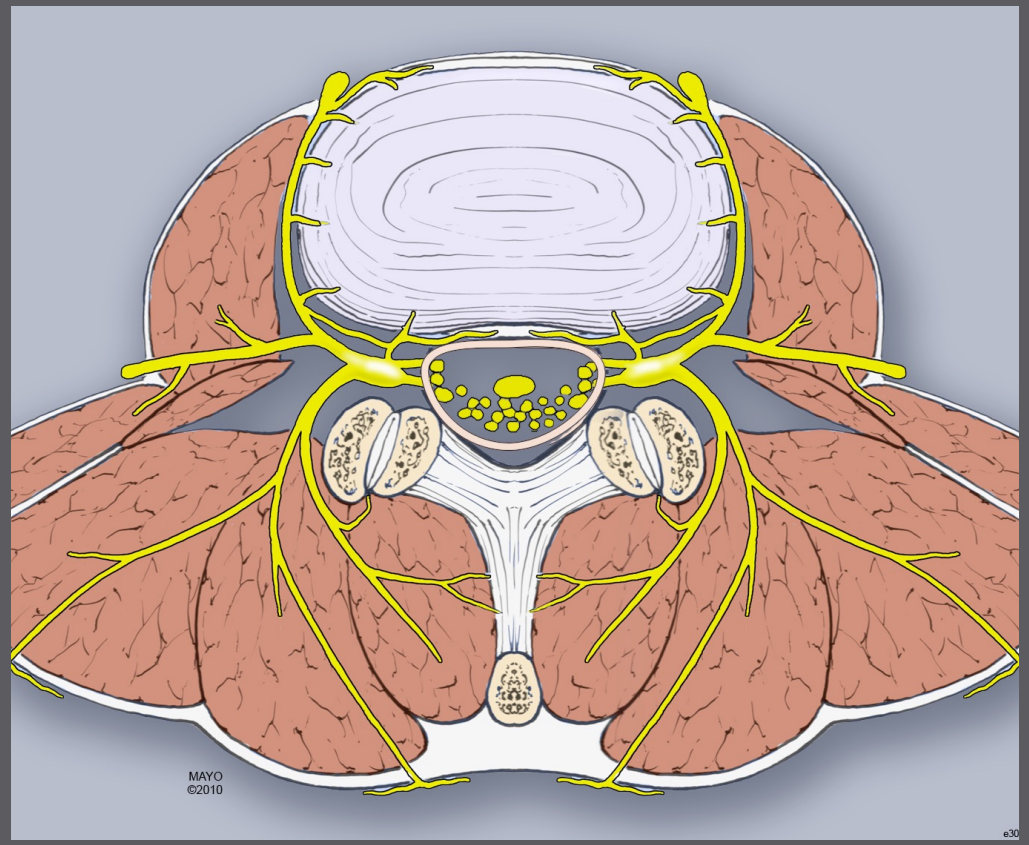
- MBB are relatively easier to perform (but harder to get right)
- MBB are safer
- MBB more easily subject to controls
- IAB lack a valid subsequent treatment
- MBB if positive can be followed by RF neurotomy
- MBB have predictive validity
  - Predictive of RF outcome
  - Useful in surgical and other treatment planning

LZJ – Anatomy of the Innervation

- Bogduk
  - The anatomy of.. articular nerves and their relationship to facet denervation; J Neurosurg 1979
  - Clinical Anatomy of the Lumbar Spine and Sacrum; Elsevier 1987, 1991, 1997, 2005
  - Lau, Mercer, Bogduk; The surgical anatomy of lumbar medial branch neurotomy. Pain Med 2004.

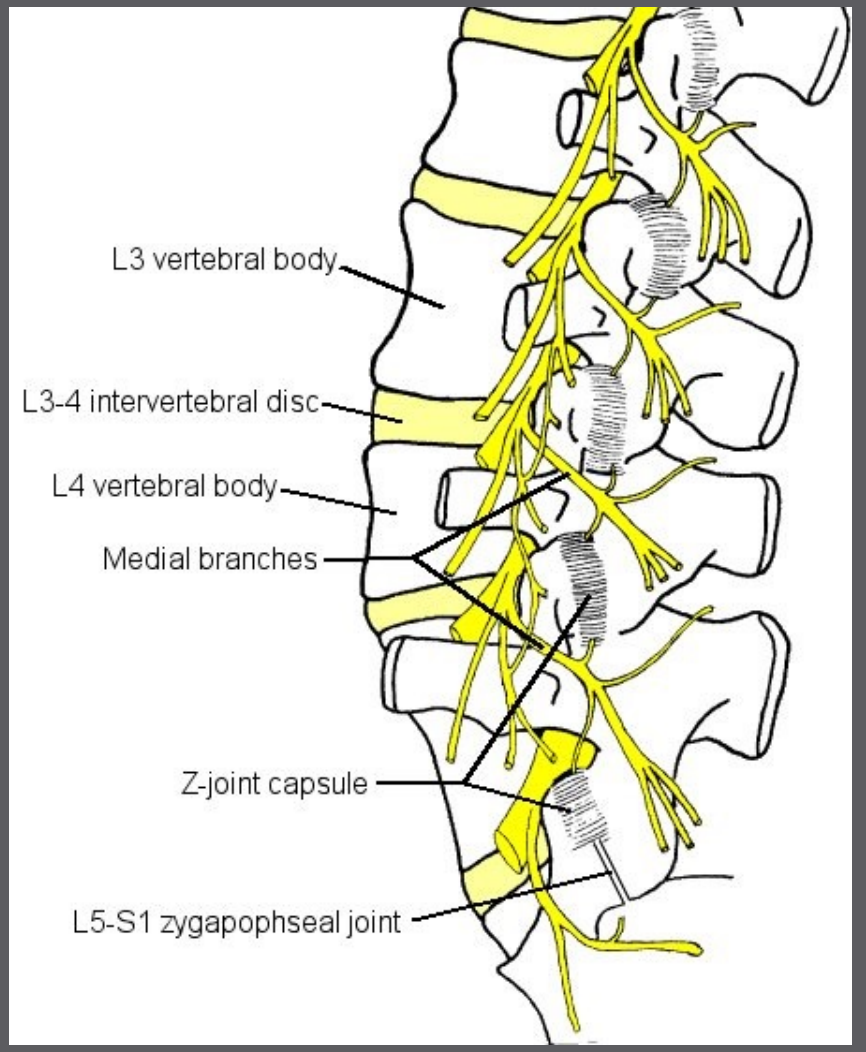
Spinal Innervation

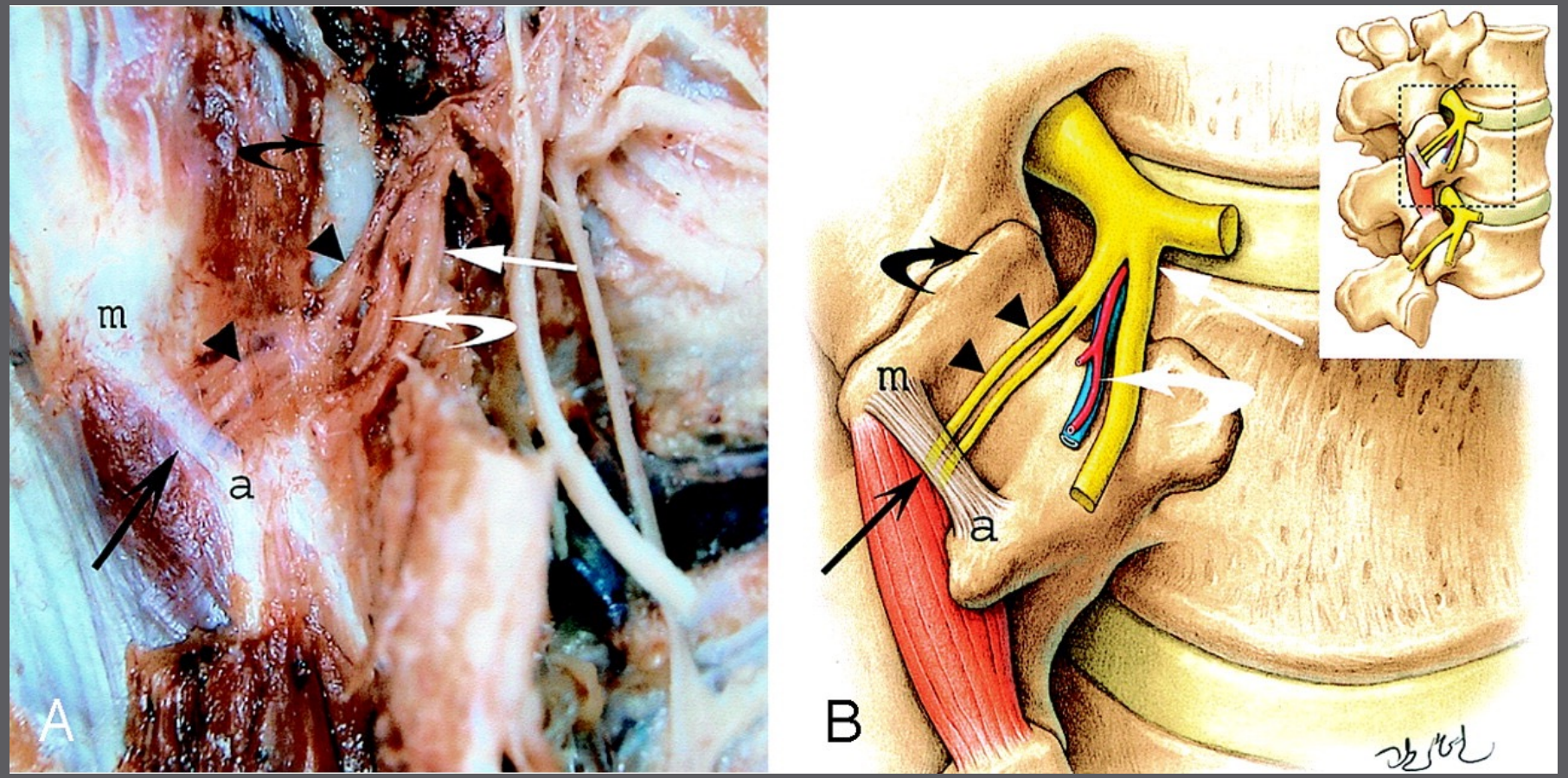
- Disc: outer annulus
  - Sinuvertebral nerve
  - Grey rami
  - Sympathetic plexus
- Ventral epidural space
  - Sinuvertebral nerve
- Facet, multifidus muscle
  - Medial br, dorsal ramus
  - Dual level innervation
- Longissimus muscle
  - Intermediate branch, dorsal ramus
- Iliocostalis muscle
  - Lateral branch, dorsal ramus



Spinal Innervation: Facet Joint

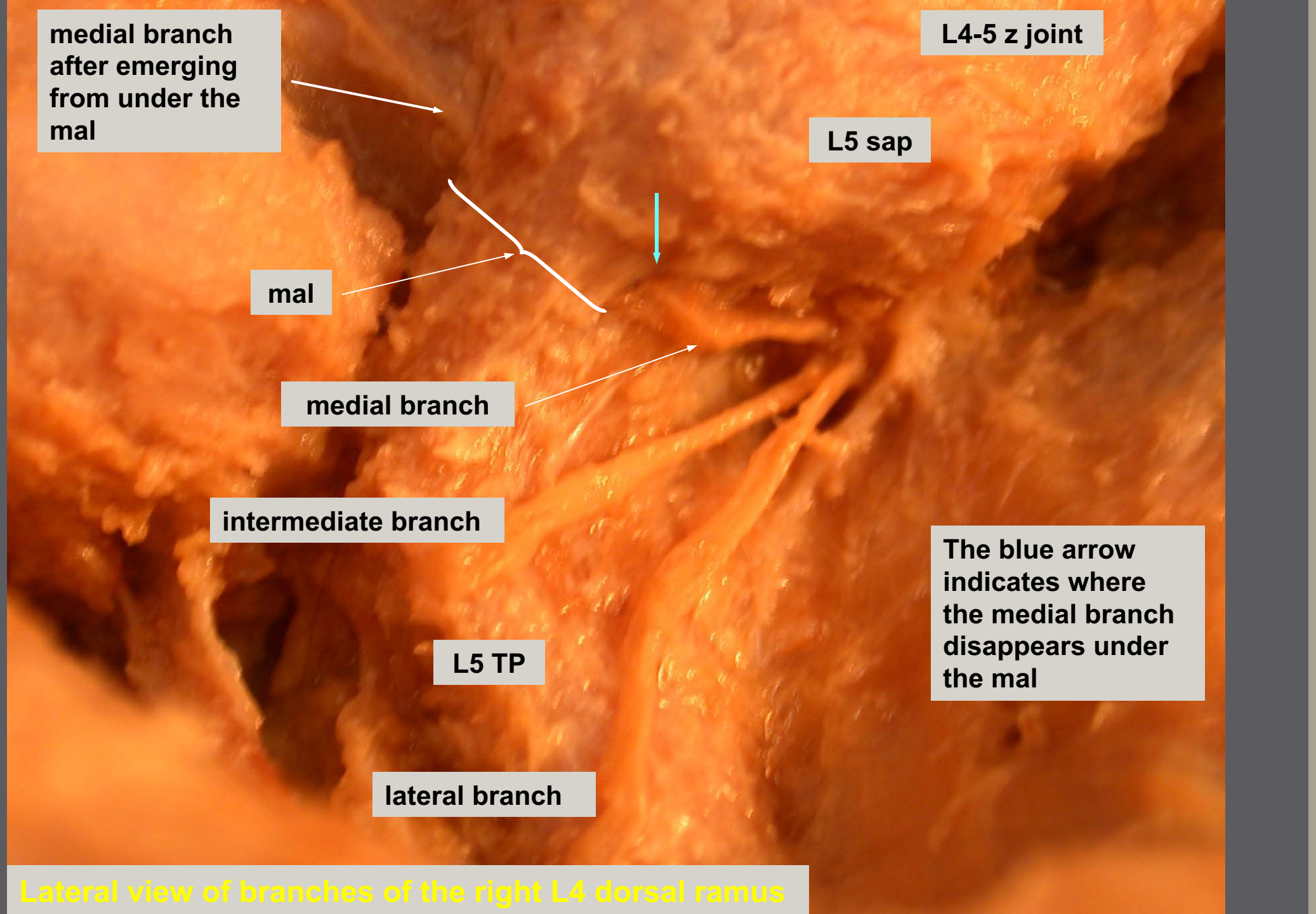
- Dual level innervation
- L4-5 facet innervation:
  - Medial branch arising from L3 dorsal ramus
  - Medial branch arising from L4 dorsal ramus
  - Medial branch crosses junction of SAP and transverse process, beneath mamillo-accessory ligament
- L3,4 MB nerve blocks (comma)
- =
- L4-5 Level MBBs (hyphen)



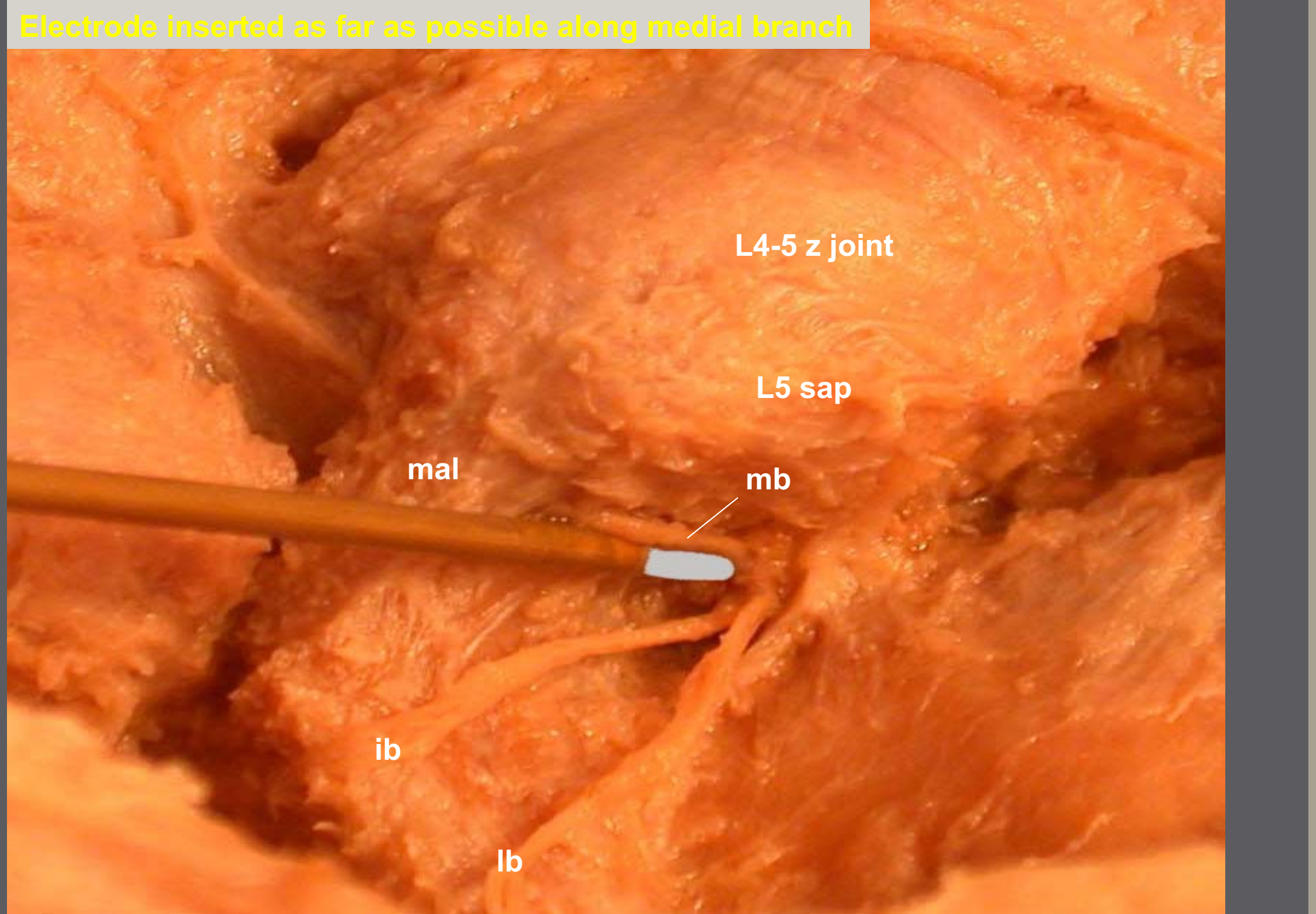


Dorsal ramus and its divisions at L2–L3. The medial branch of a L2 posterior ramus (arrowheads) runs against the lateral surface of the caudal edge of the superior articular process (black curved arrow) and then passes under a ligament (long black arrow) connecting the accessory process (a) and the mamillary process (m). Lateral branch of L2 posterior ramus (long white arrow) and vessels (white curved arrow) as well as the duplicity of the medial branch in the fibroosseous canal (twin medial branch).

Demondion, et al AJNR Am J Neuroradiol. 2005 Apr;26(4):706-10



Lateral view of branches of the right L4 dorsal ramus


Electrode inserted as far as possible along medial branch
L4-5 z joint
L5 sap
mal
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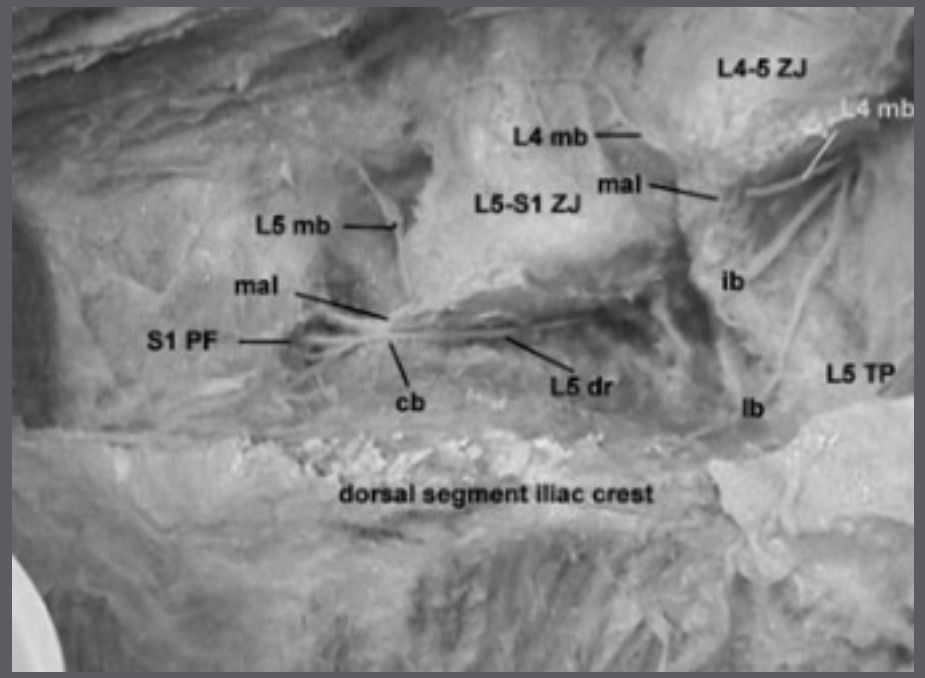
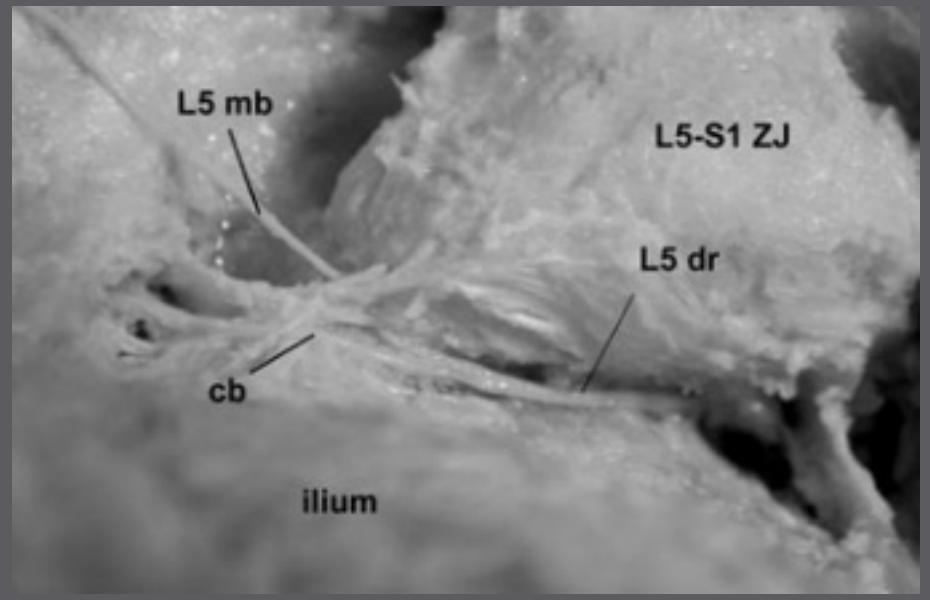
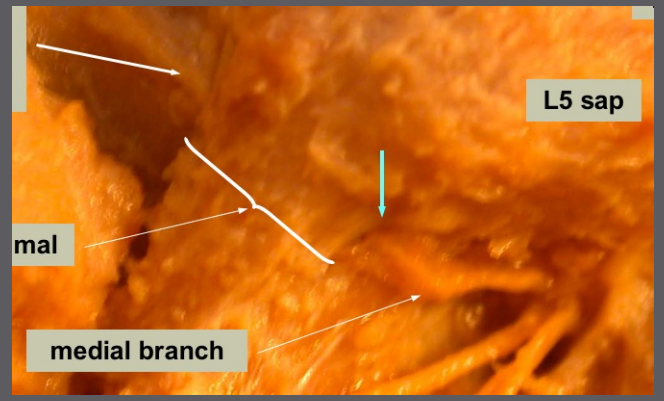
ib
lb



L5 DR Anatomy; Lau, et al





L4 MB

PAIN MEDICINE
Volume 5 • Number 3 • 2004

The Surgical Anatomy of Lumbar Medial Branch Neurotomy (Facet Denervation)

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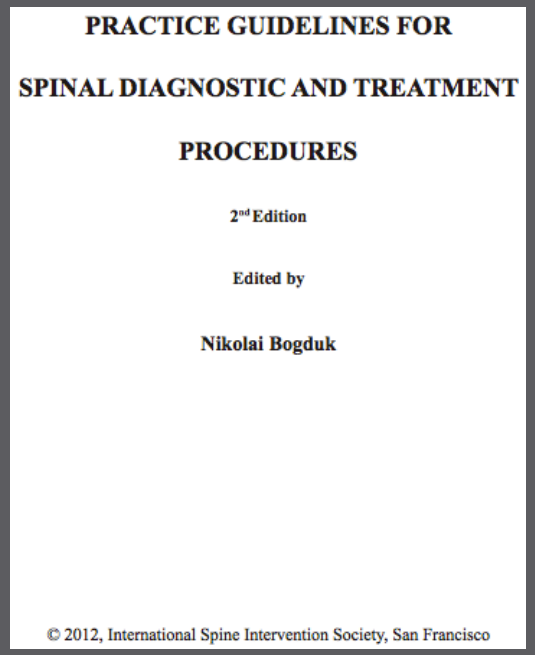
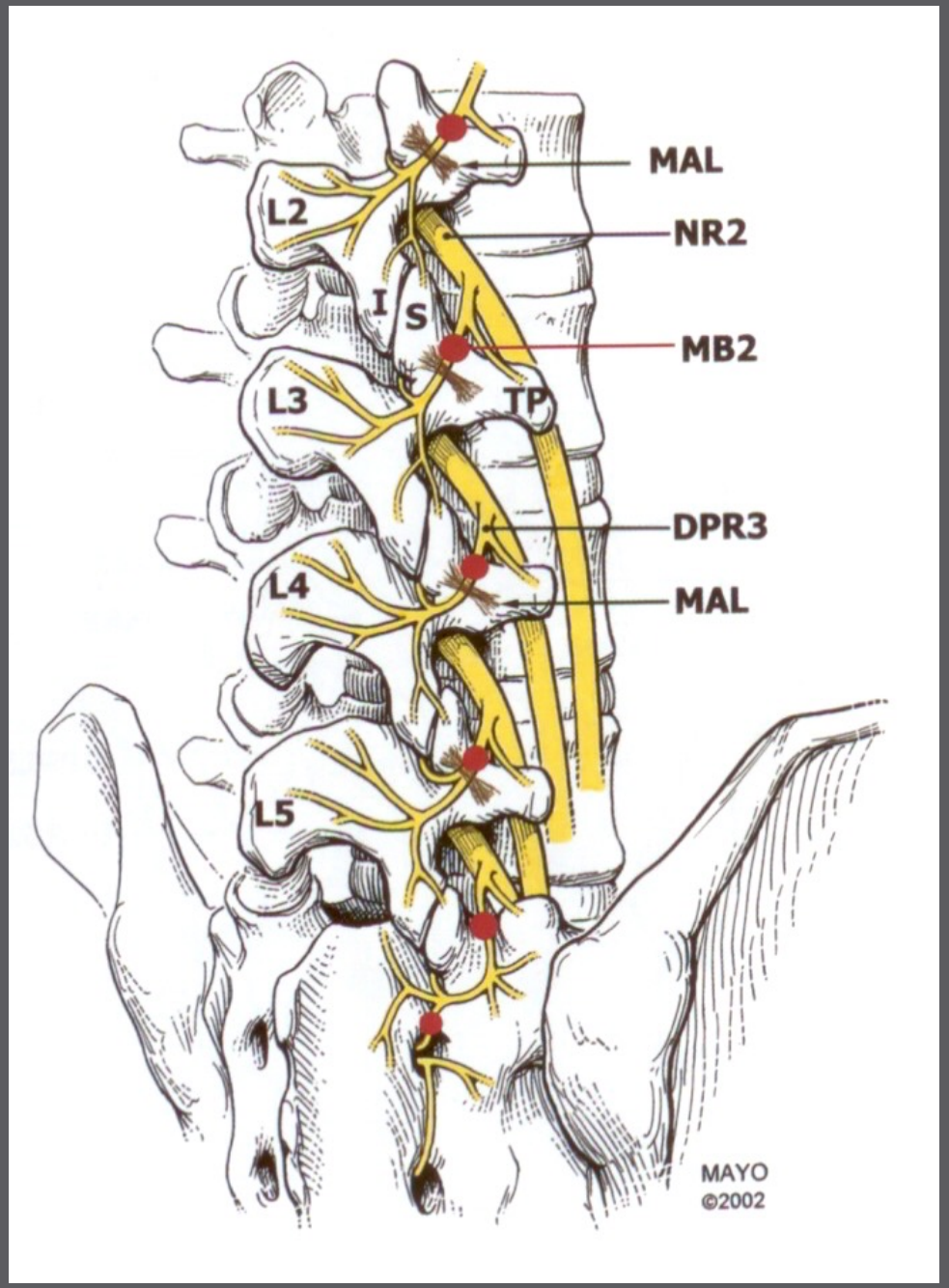
†Department of Anatomy, University of Otago, Dunedin, New Zealand



Resource for Technique and Background Information

- Practice Guidelines for Spinal Diagnostic and Treatment Procedures
  - International Spine Intervention Society
  - Second Edition
  - Edited by Nikolai Bogduk
  - www.spinalinjection.org (Spine Intervention Society)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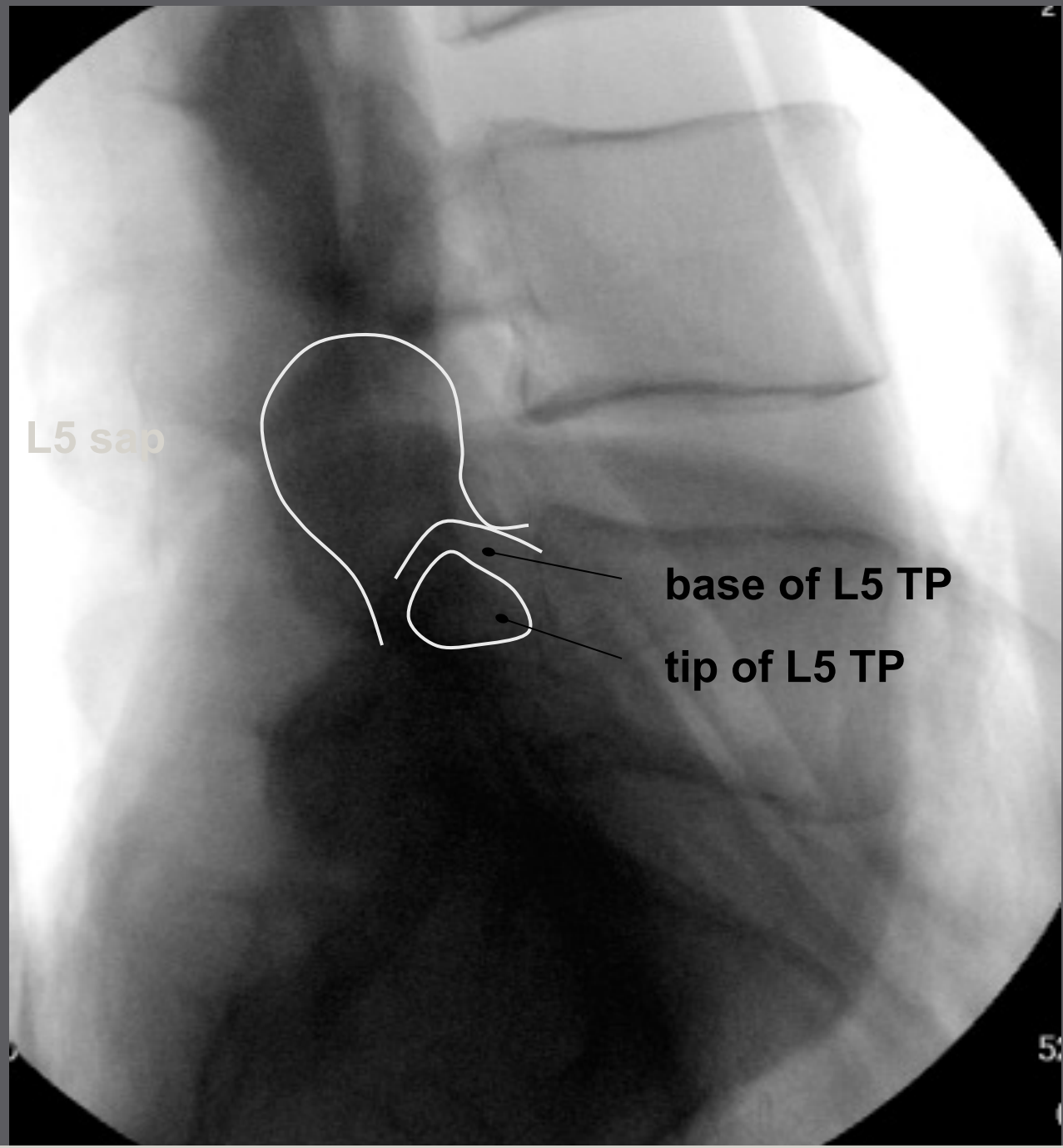
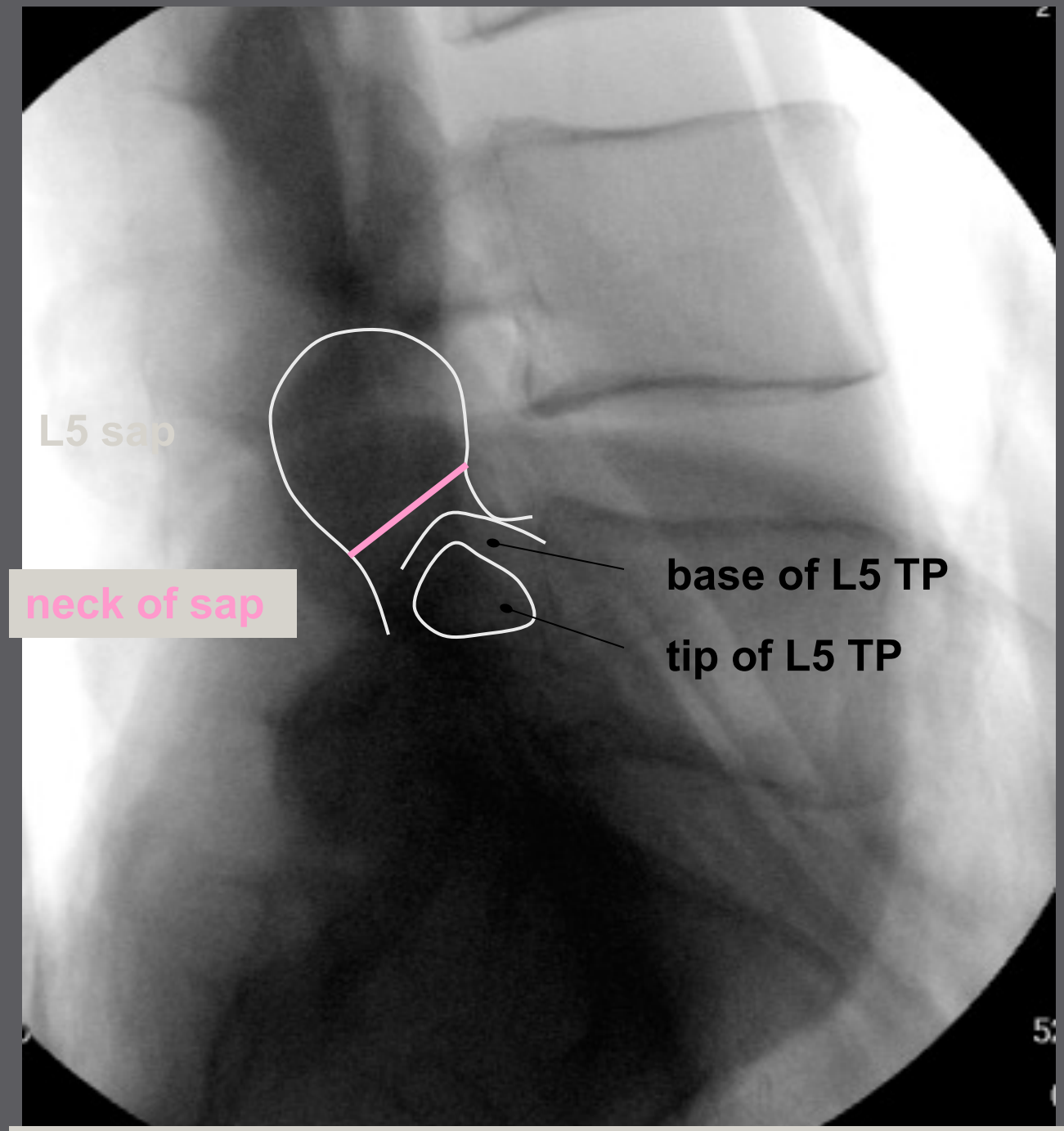
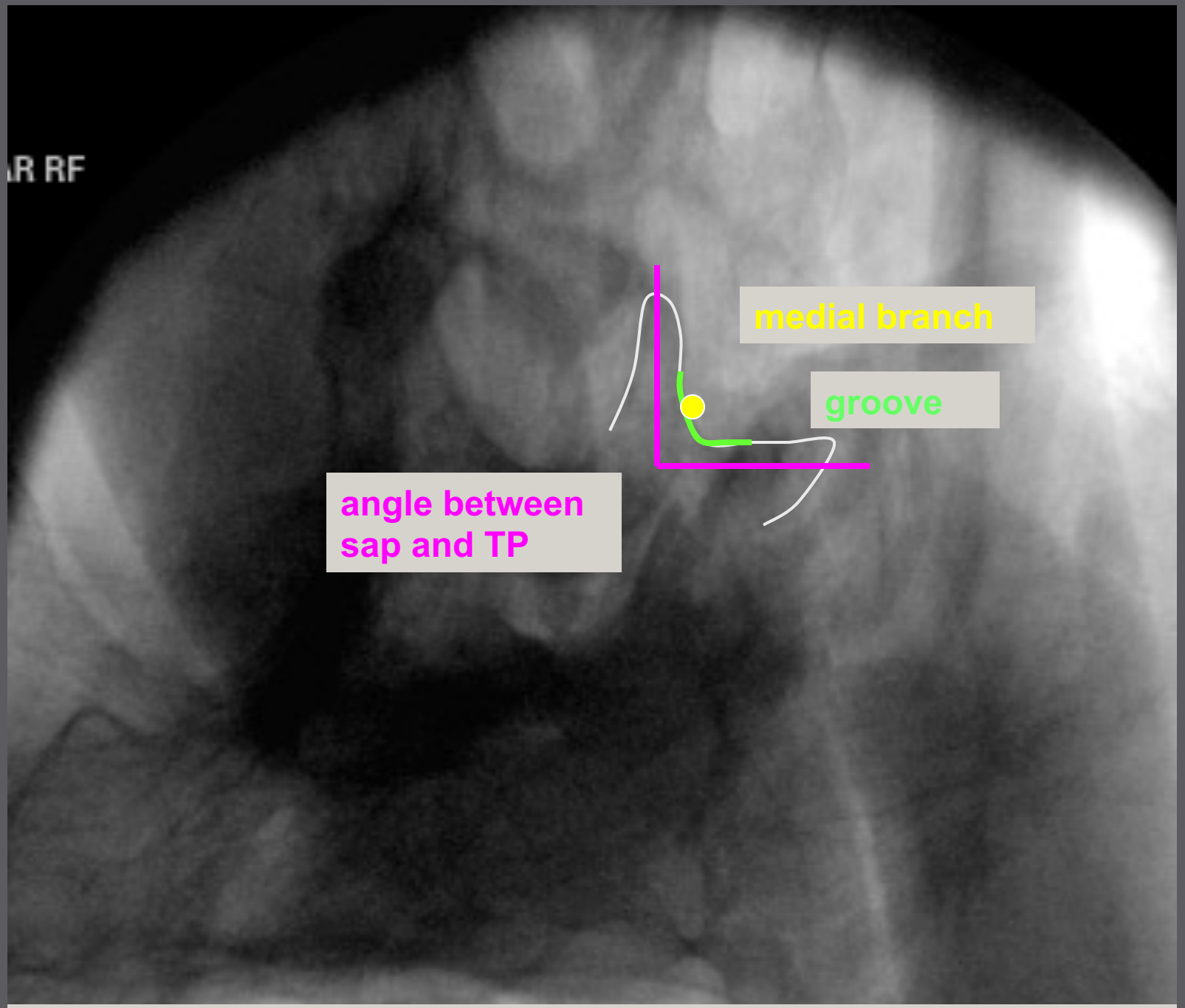


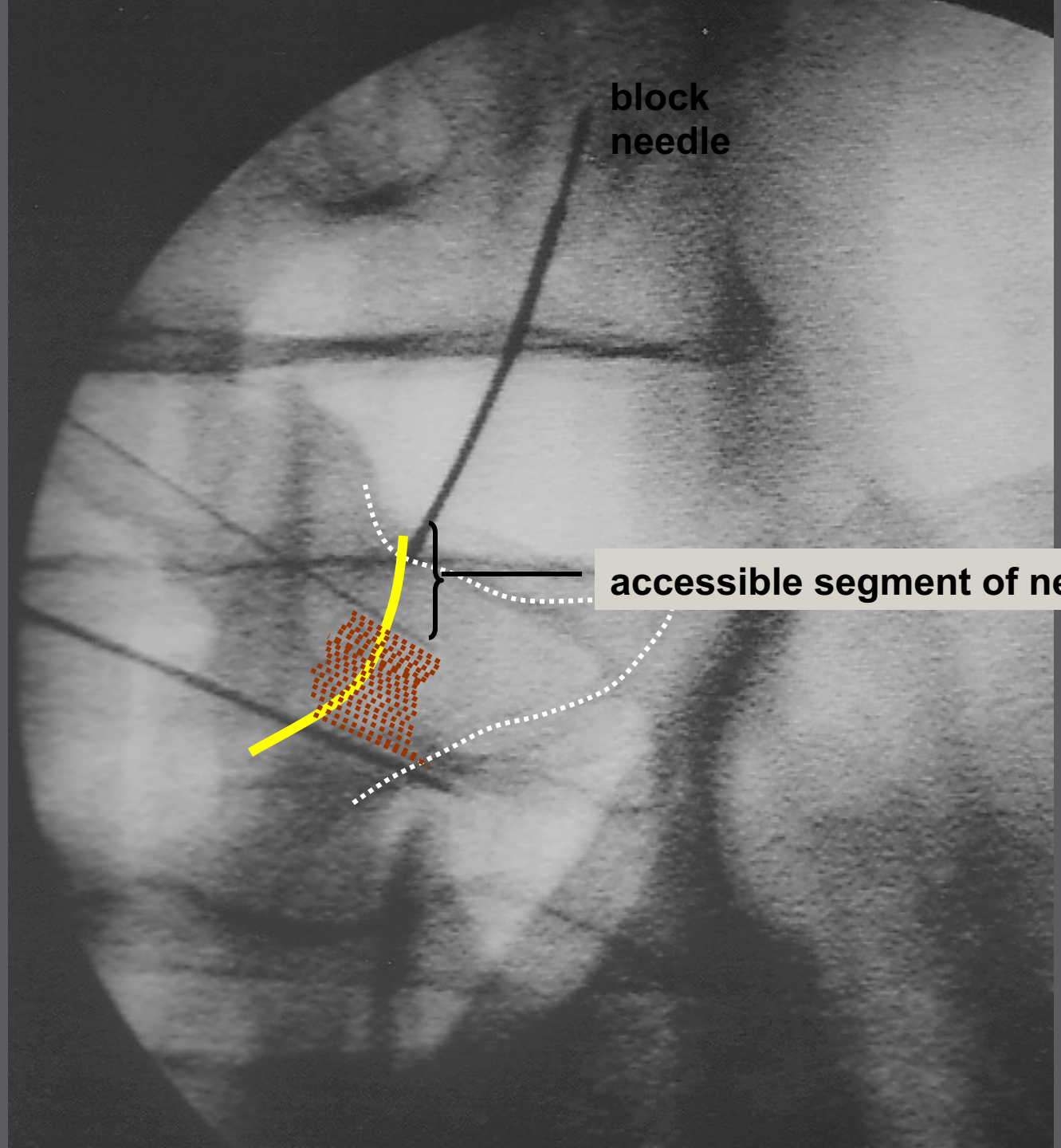
LATERAL VIEW: L5 vertebra for L4 medial branch neurotomy

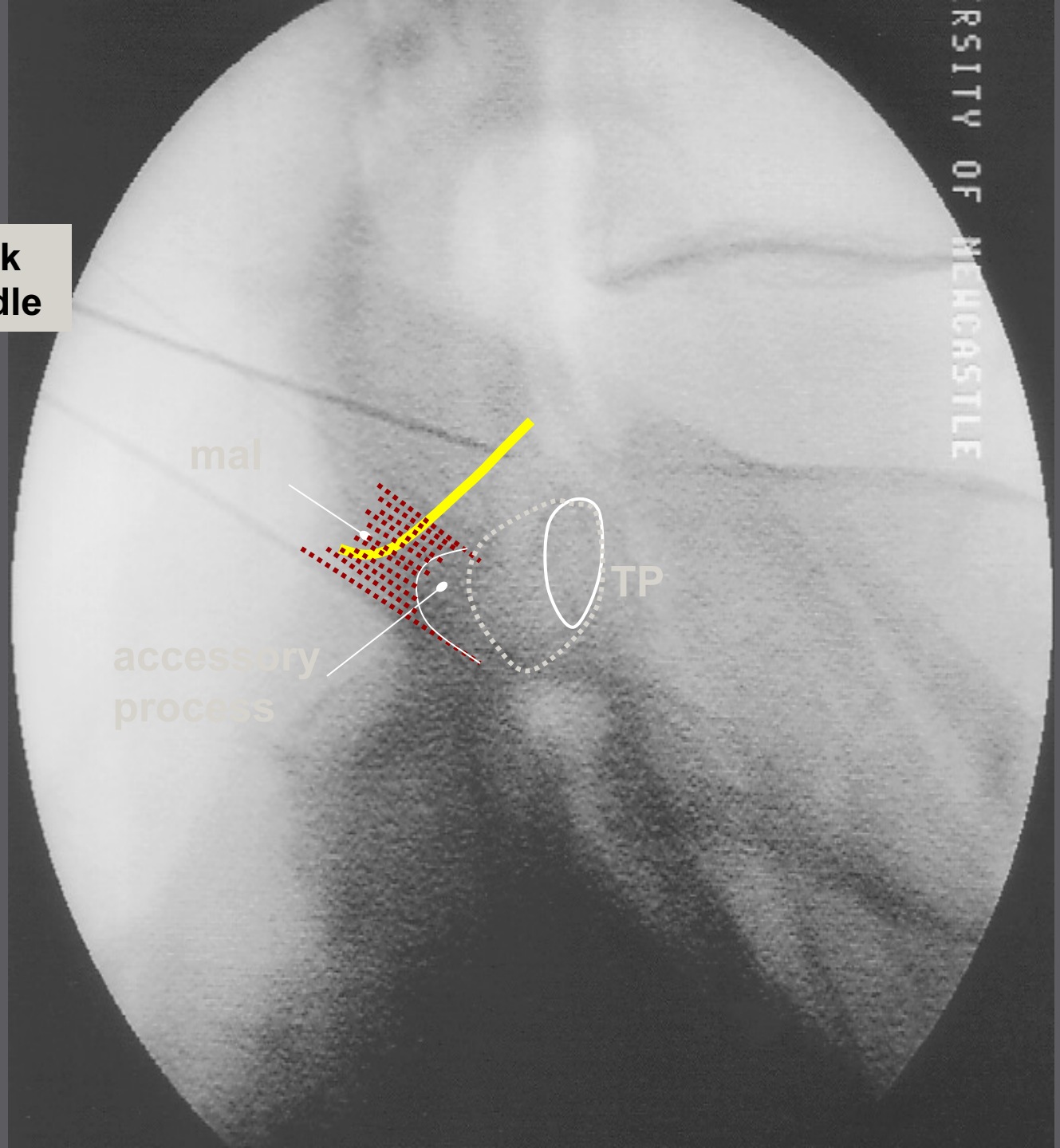


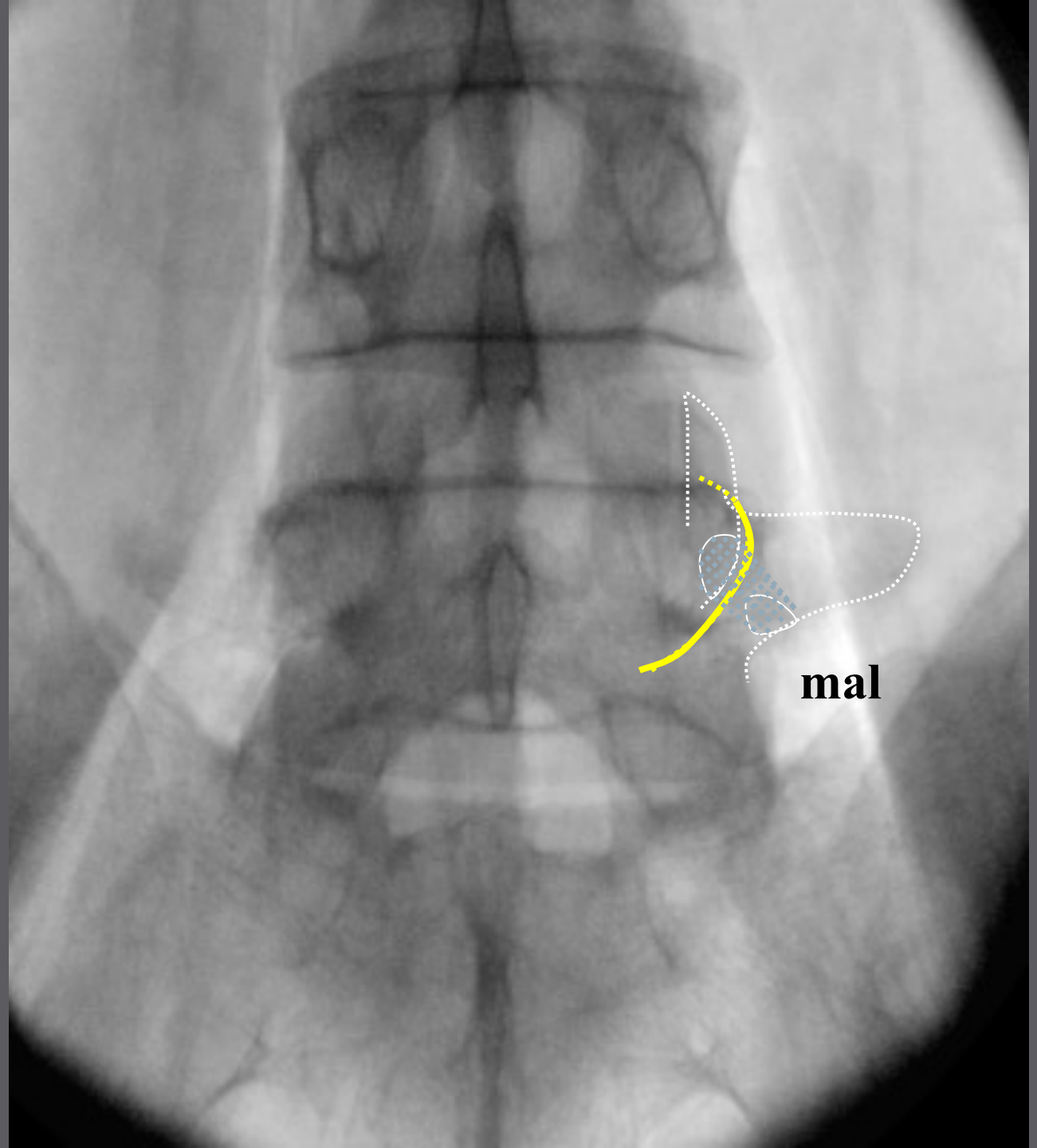
LATERAL VIEW: L5 vertebra for L4 medial branch neurotomy



PILLAR VIEW: L5 vertebra for L4 medial branch neurotomy


block
needle
accessible segment of nerve


RSITY OF NEWCASTLE
block needle
mal
TP
accessory process


mal

LZJ - Medial Branch Blocks

- Effective anesthesia of LZJ (Kaplan 1998)
- Predictive of positive outcome of MB neurotomy (Dreyfuss 2000)
- Technique important
  - 0.2 cc contrast (venous uptake > false negative rate)
  - 0.5 cc (0.3-.4cc ?) anesthetic (0.5cc recommended in SIS Guidelines -used in validation studies)
  - Rotate fluoro beam enough to avoid SAP wall
    - (+/- 40 degrees)
    - Aim for 1/3 2/3 junction along course of MB
- Dual diagnostic blocks needed

MBB ZJ Anesthesia Validation

Kaplan, et. al. Spine 23(17), 9/1/98 pp. 1847-52

- 18 asymptomatic allocated to: R or L, L4-5 or L5-S1 capsule distention with contrast; 3 excluded
- Randomized, Blinded
  - 5 controls 5/5 with pain
  - 10 MBB 2% lido

MBB ZJ Anesthesia Validation

- 10 MBB
  - 6/10 with initial venous uptake
    - 3/6 with pain relief
    - All brought back 1 week later
      - 1/6 venous uptake – excluded
  - 8/9 (89%) complete pain relief

False Negative Rate 50% if Venous Uptake

False Negative 11% if No VU

Aberrant Anatomy

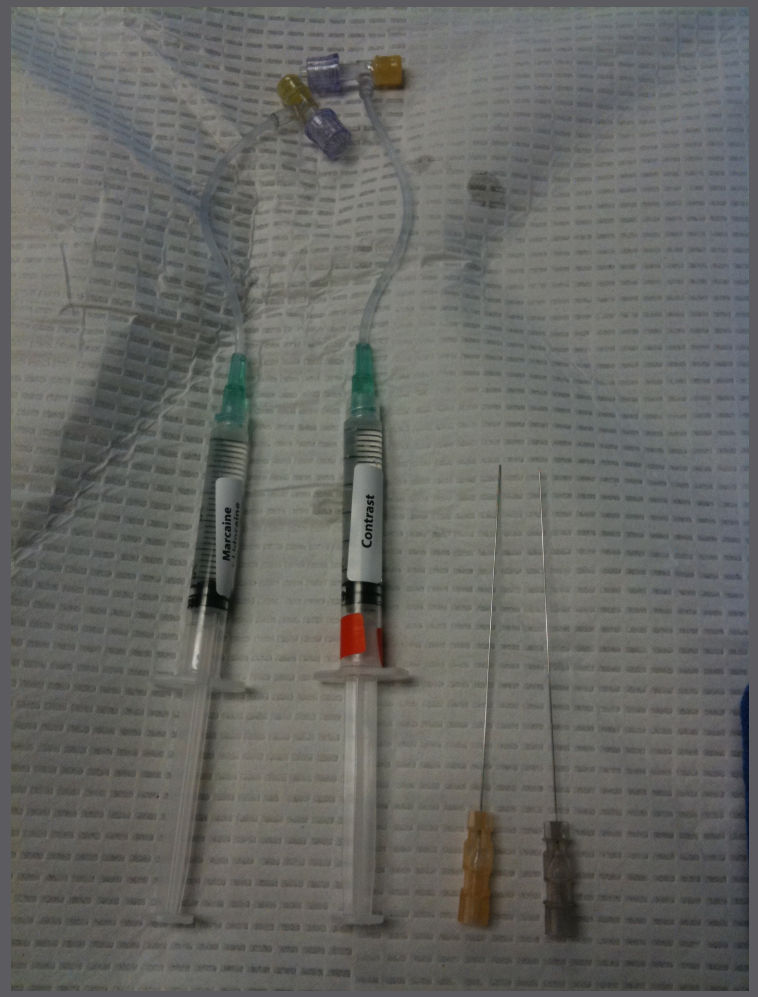
Diffusion from Nerve (Inadequate Block)

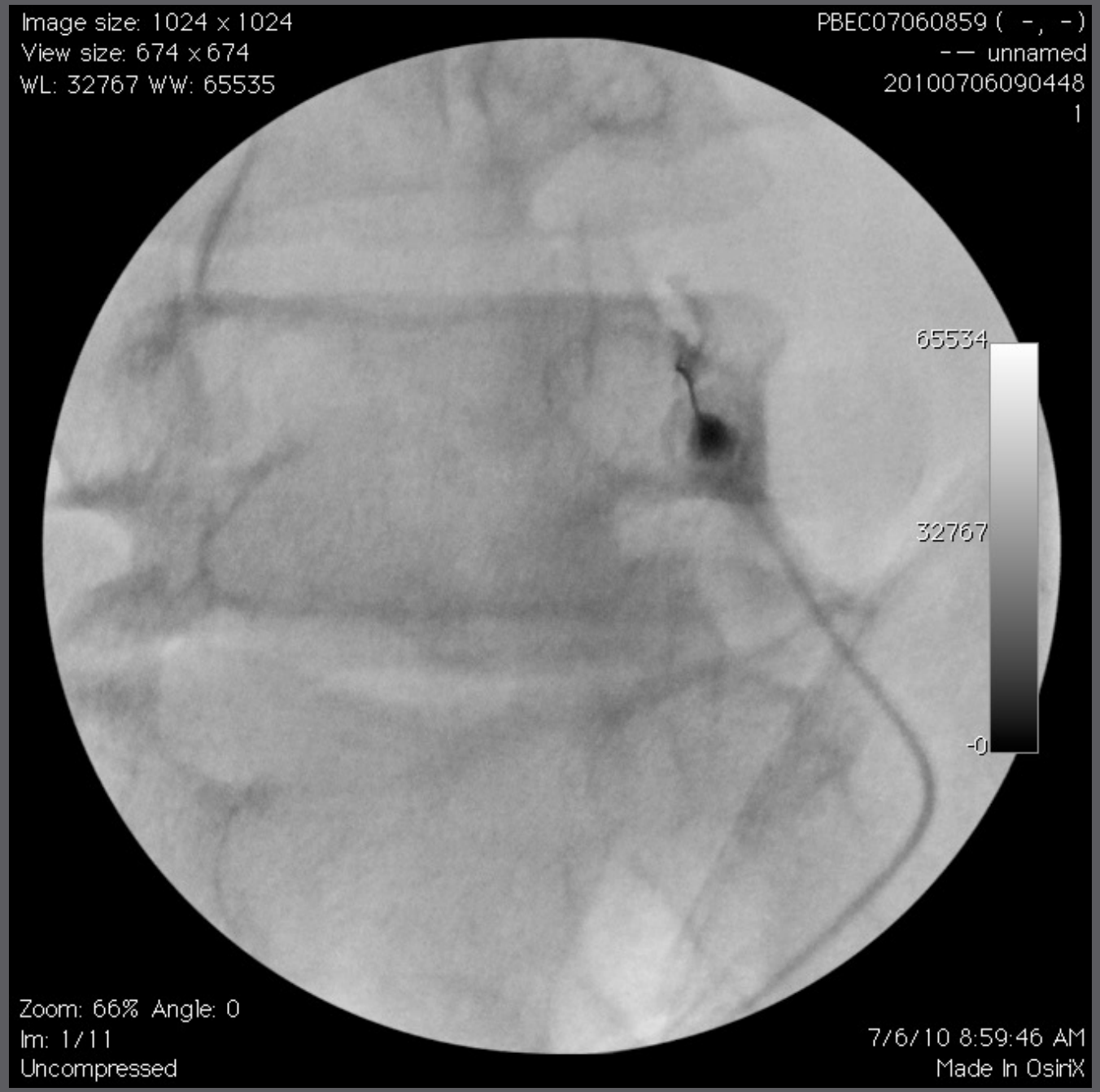
Contrast and local anesthetic with extension Tubing

LA: lidocaine or bupivacaine

Lidocaine: 1-4% (2%)
Bupivacaine: 0.25-0.75%
Use 0.5cc

Higher concentration
Desired due to low volumes

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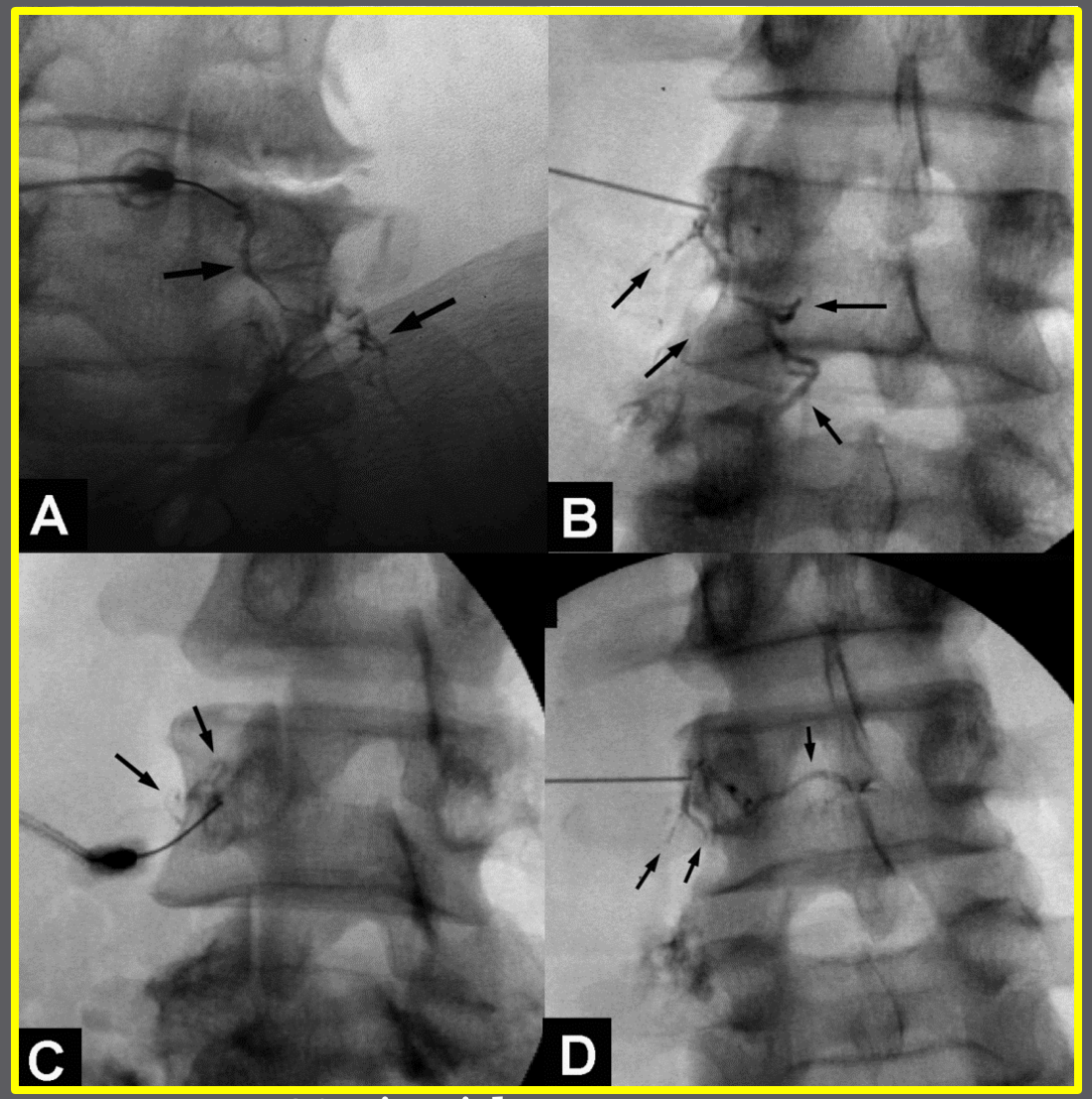


Venous Uptake: > False negative

Provided by Dr. Paul Dreyfuss

- 8% incidence (*Dreyfuss et al. Spine 1997;22:895-902*)
- 3.7% incidence (*Verrills. Spine 2008; 33: 174-177*)
- 6.1% incidence (*Lee et al. Anesth Analg 2008;106:1274-8*)

Medial Branch Radiofrequency Neurotomies (RFN) - Lumbar

- Medial branch block and RFN techniques described in:

- International Spine Intervention Society Practice Guidelines for Spinal Diagnostic and Treatment Procedures. 2nd Ed. Bogduk (SIS Standards Committee) 2013

- Lau P, et al. The surgical anatomy of lumbar medial branch neurotomy (facet denervation). Pain Med 2004

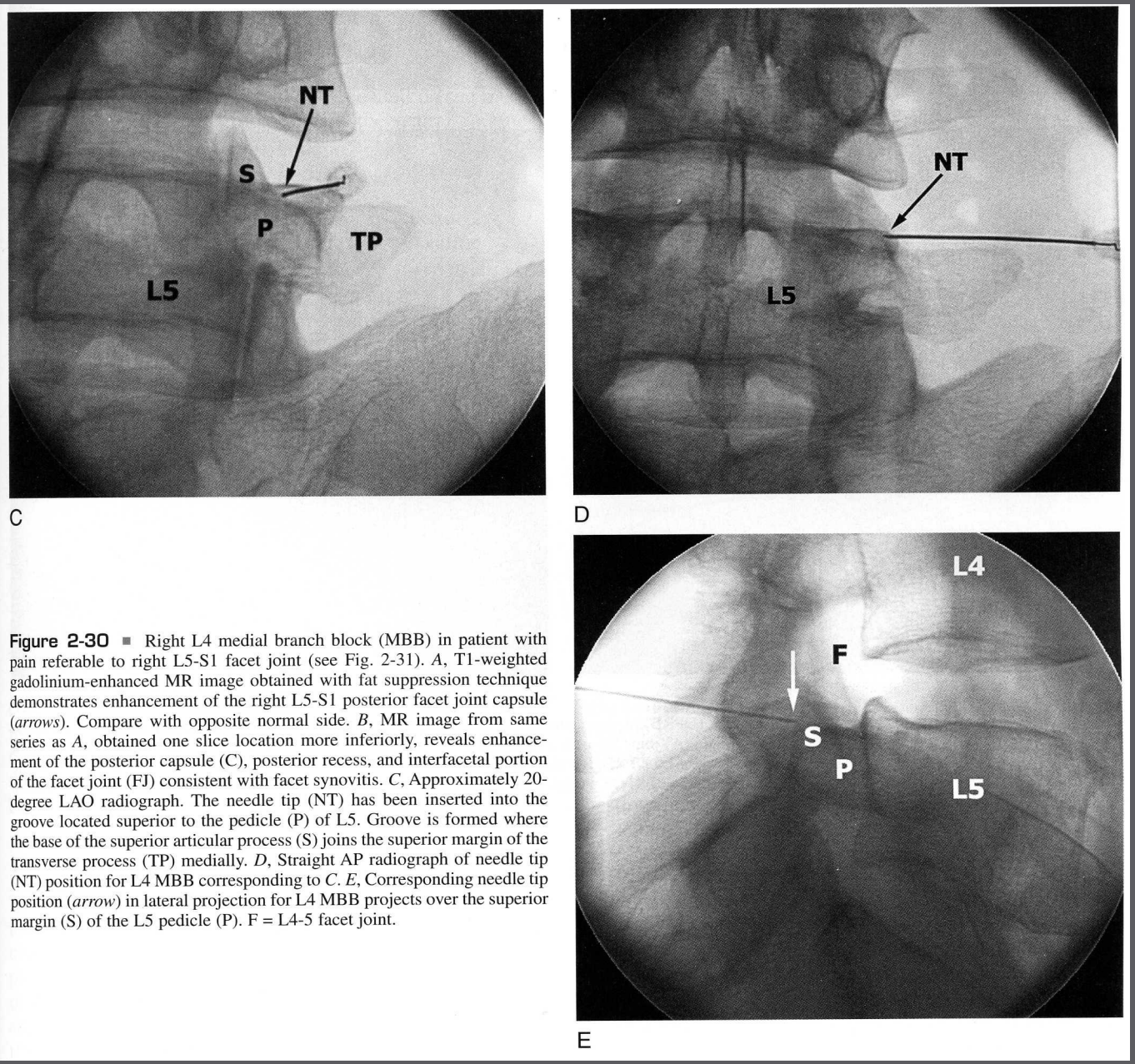


Figure 2-30 ■ Right L4 medial branch block (MBB) in patient with pain referable to right L5-S1 facet joint (see Fig. 2-31). *A*, T1-weighted gadolinium-enhanced MR image obtained with fat suppression technique demonstrates enhancement of the right L5-S1 posterior facet joint capsule (*arrows*). Compare with opposite normal side. *B*, MR image from same series as *A*, obtained one slice location more inferiorly, reveals enhancement of the posterior capsule (C), posterior recess, and interfacetal portion of the facet joint (FJ) consistent with facet synovitis. *C*, Approximately 20-degree LAO radiograph. The needle tip (NT) has been inserted into the groove located superior to the pedicle (P) of L5. Groove is formed where the base of the superior articular process (S) joins the superior margin of the transverse process (TP) medially. *D*, Straight AP radiograph of needle tip (NT) position for L4 MBB corresponding to *C*. *E*, Corresponding needle tip position (*arrow*) in lateral projection for L4 MBB projects over the superior margin (S) of the L5 pedicle (P). F = L4-5 facet joint.

Fenton, Cervionke 2003


GreenwoodSurgCntr
07/29/2008
8:06:11 AM
MBB BIL L45
39
49
99 kVp
4.47 mA
3
0.3 min
0.00000 mradcm2
OEC


GreenwoodSurgCntr
07/29/2008
8:06:45 AM
MBB BIL L45
42
49
89 kVp
3.85 mA
0.4 min
0.00000 mradcm2
OEC

L1-4 MBBs

Courtesy Paul Dreyfuss

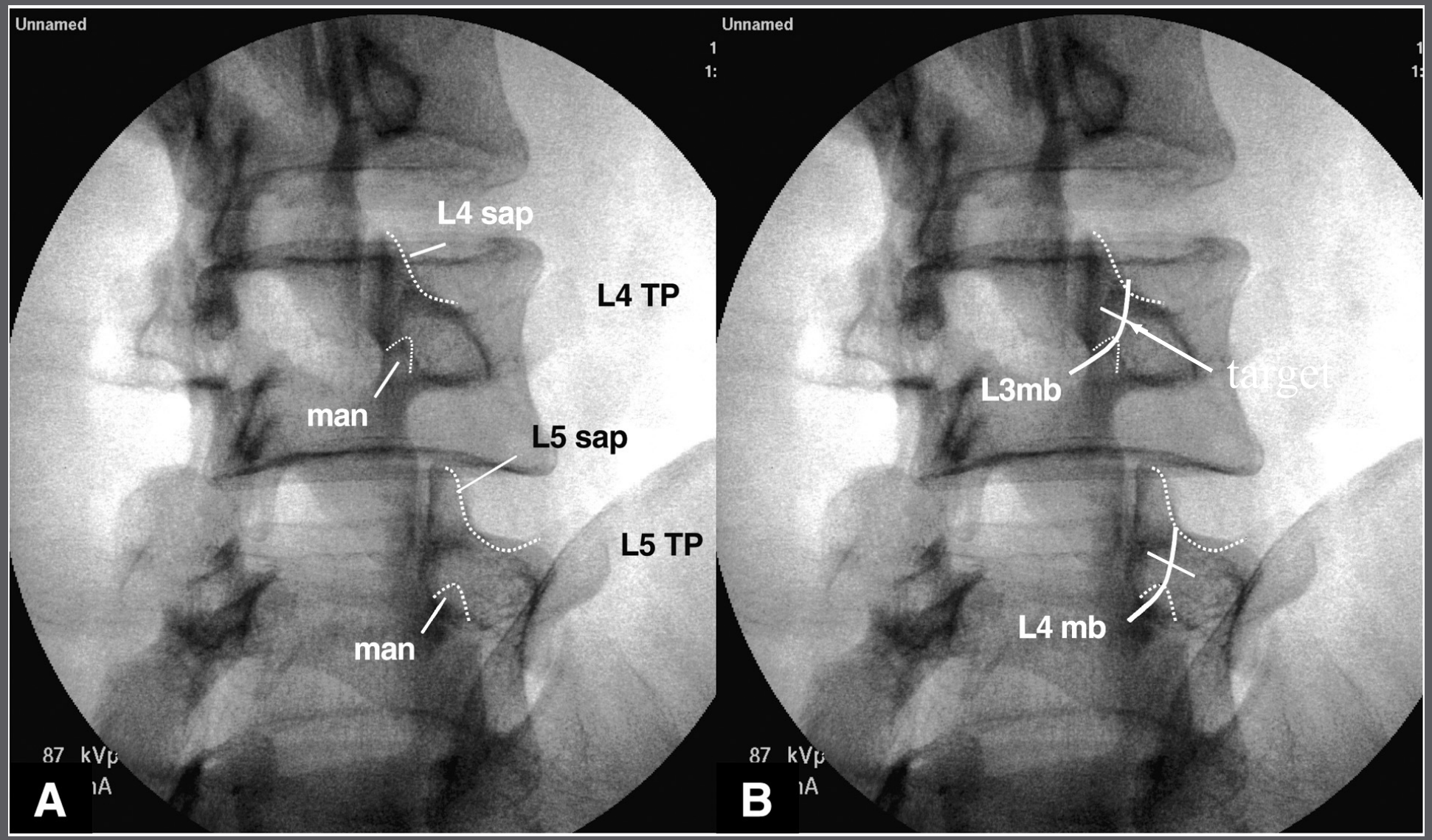


Image through the target disc space (segment)
Use approx. a 40^{O} oblique to be able place the needle in the target groove and not on the posterior aspect of the SAP

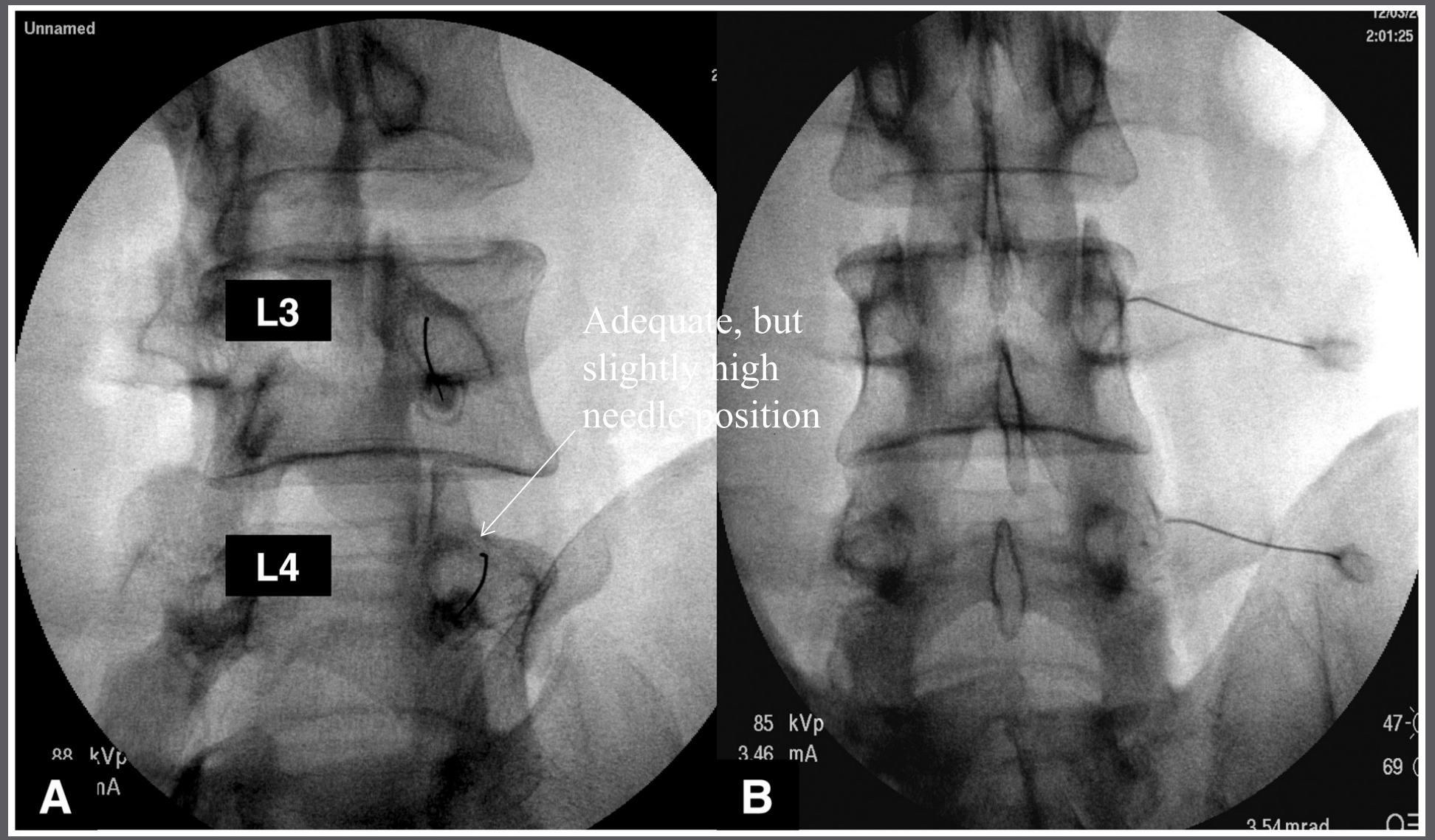
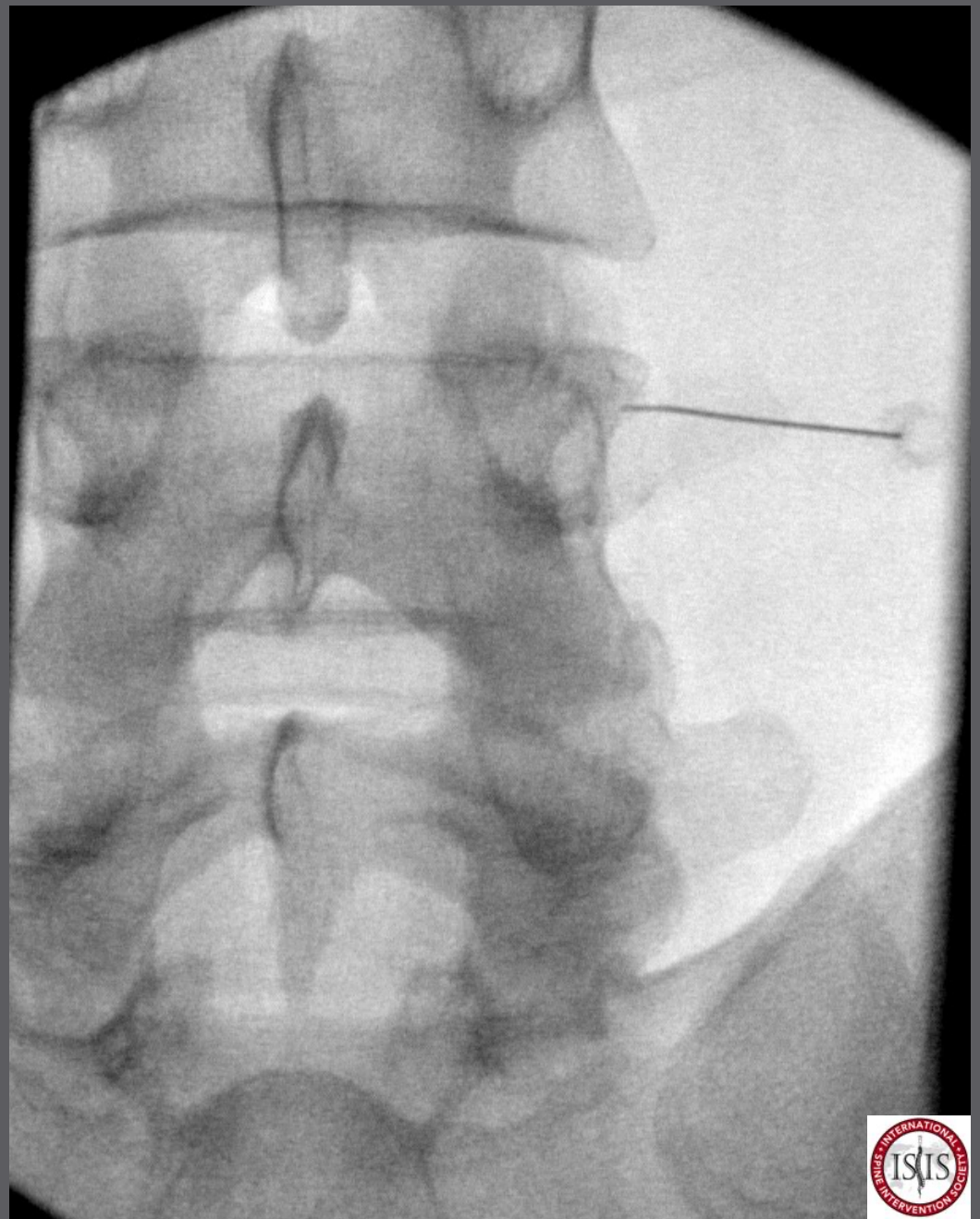


Image through the target disc space (segment)

40^{O} oblique

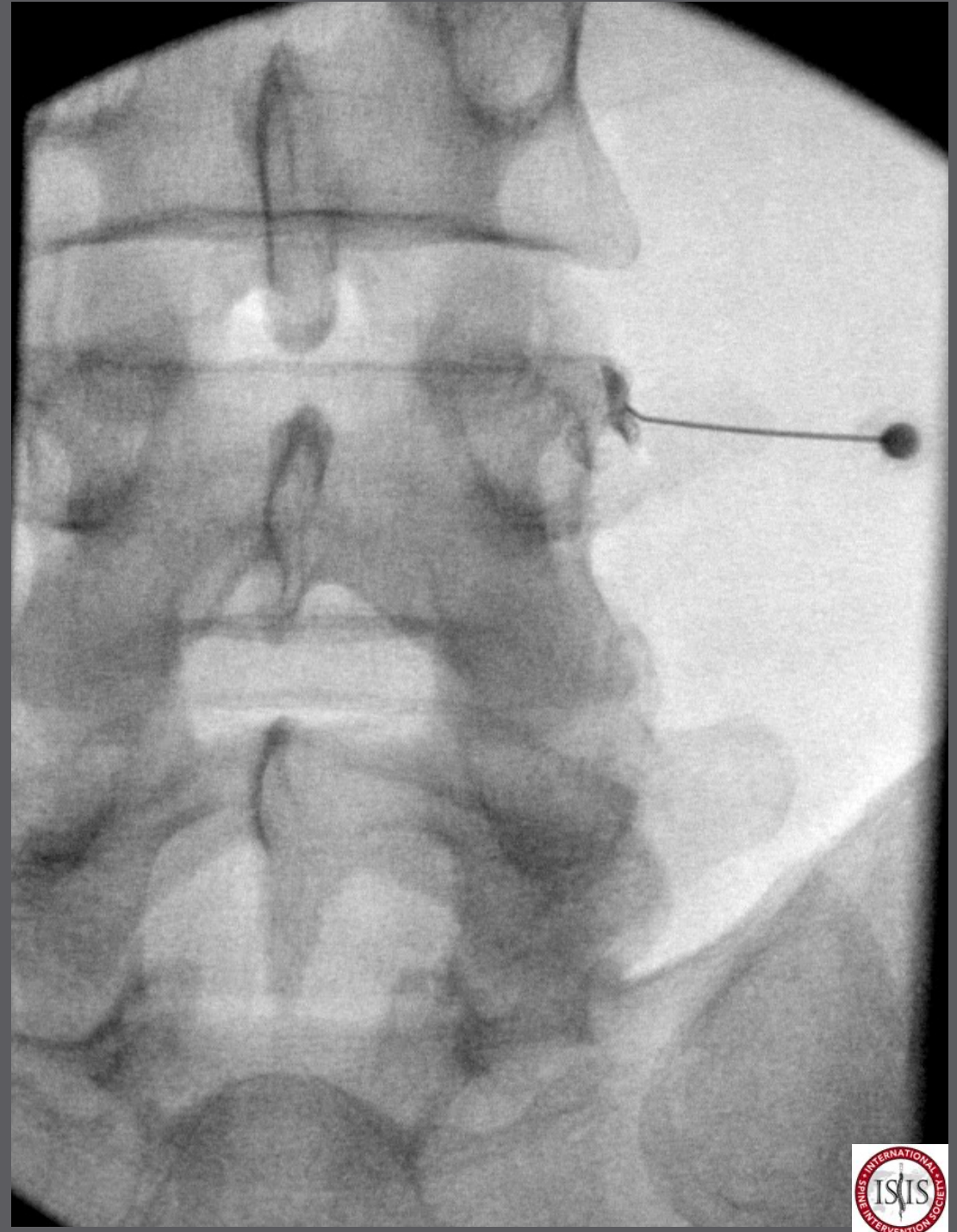
Ideal placement

Ideal placement inside lateral shadow of SAP



Ideal placement
and contrast flow

Ideal placement
and contrast flow



Ideal flow
In target
grove
between
SAP/TP

Ideal flow in target grove between SAP/TP

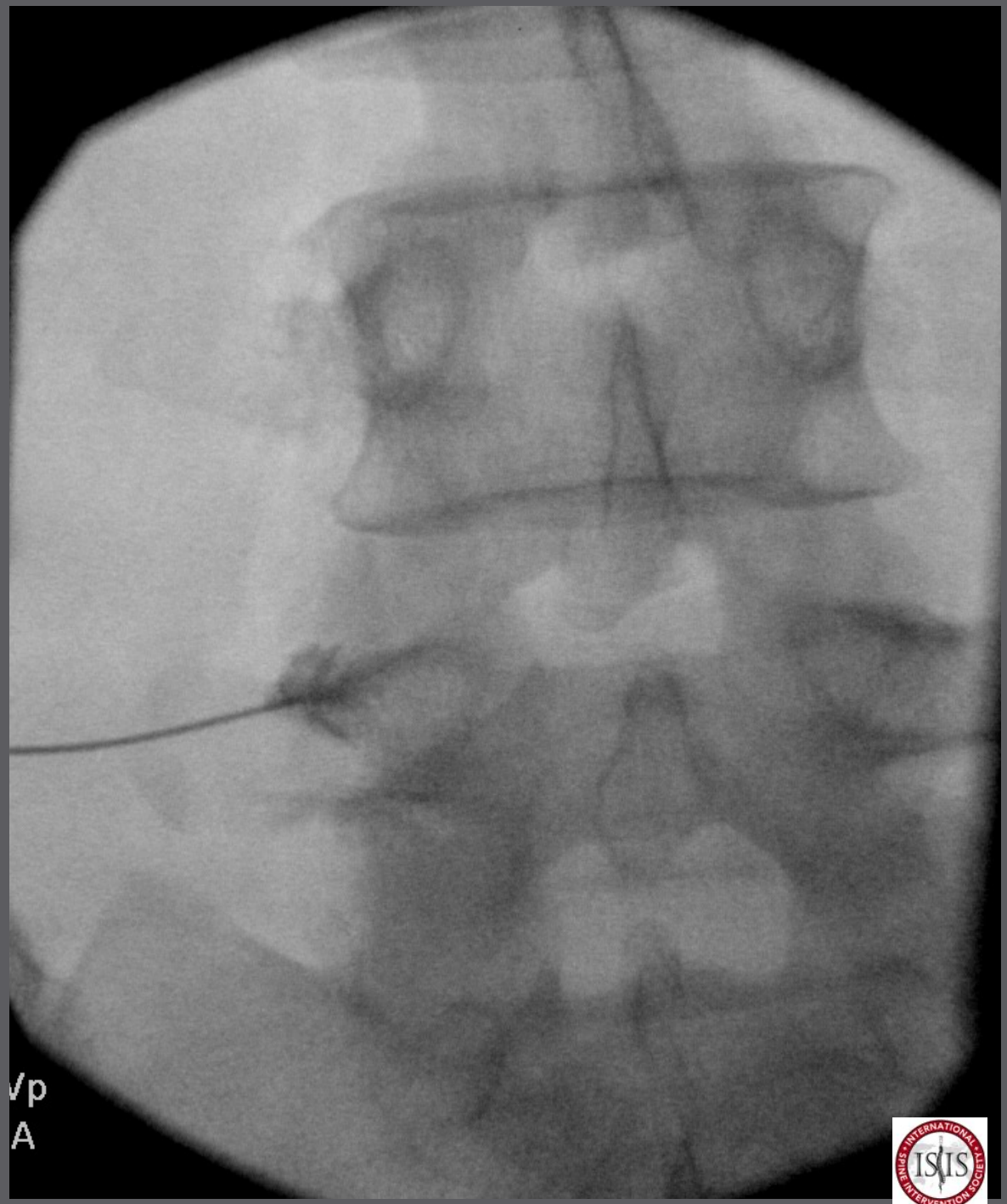
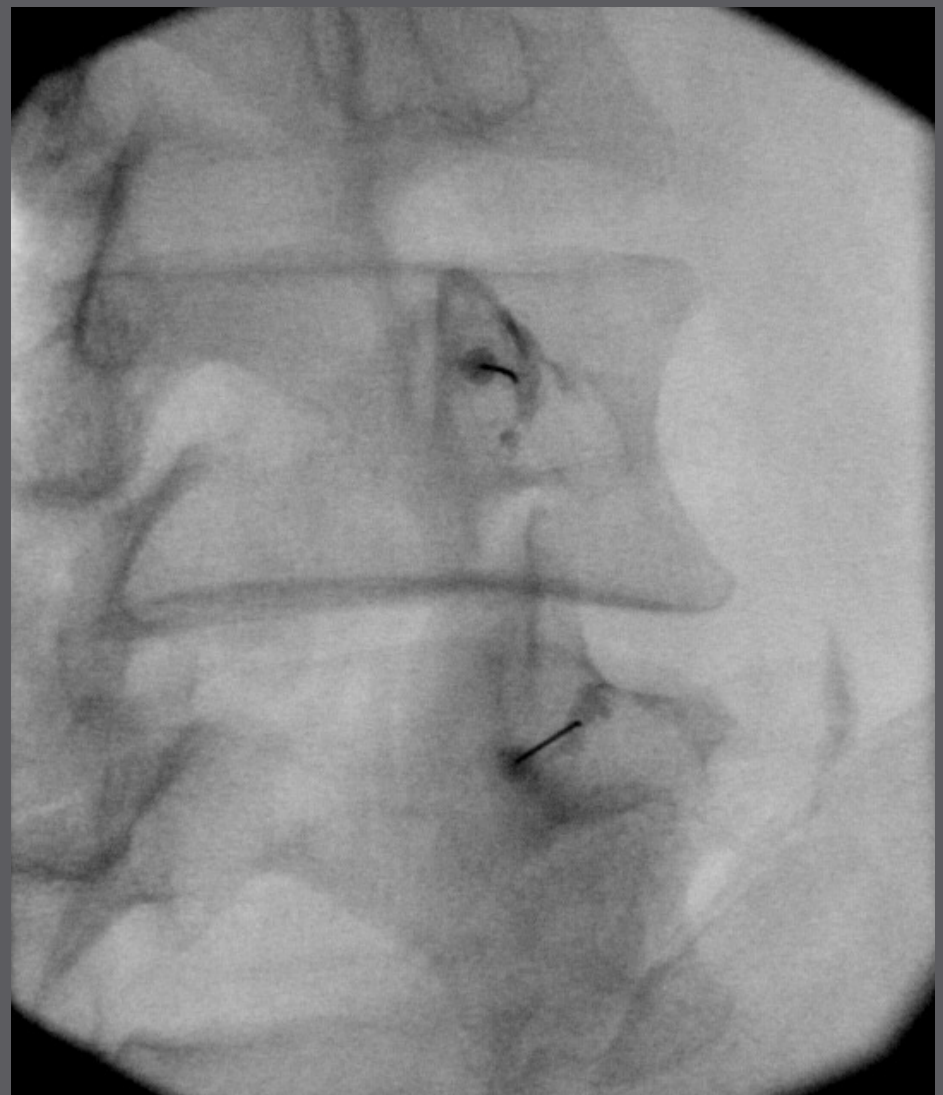
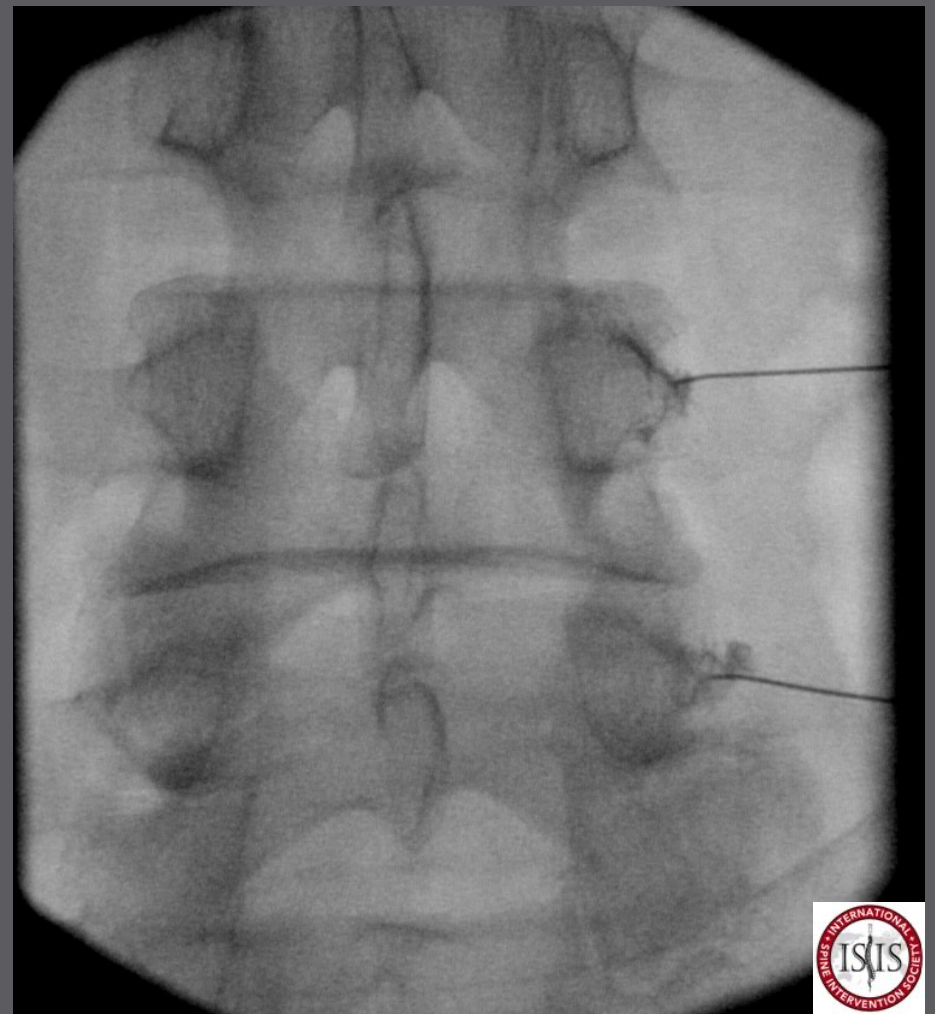


Image through the target disc space (segment)

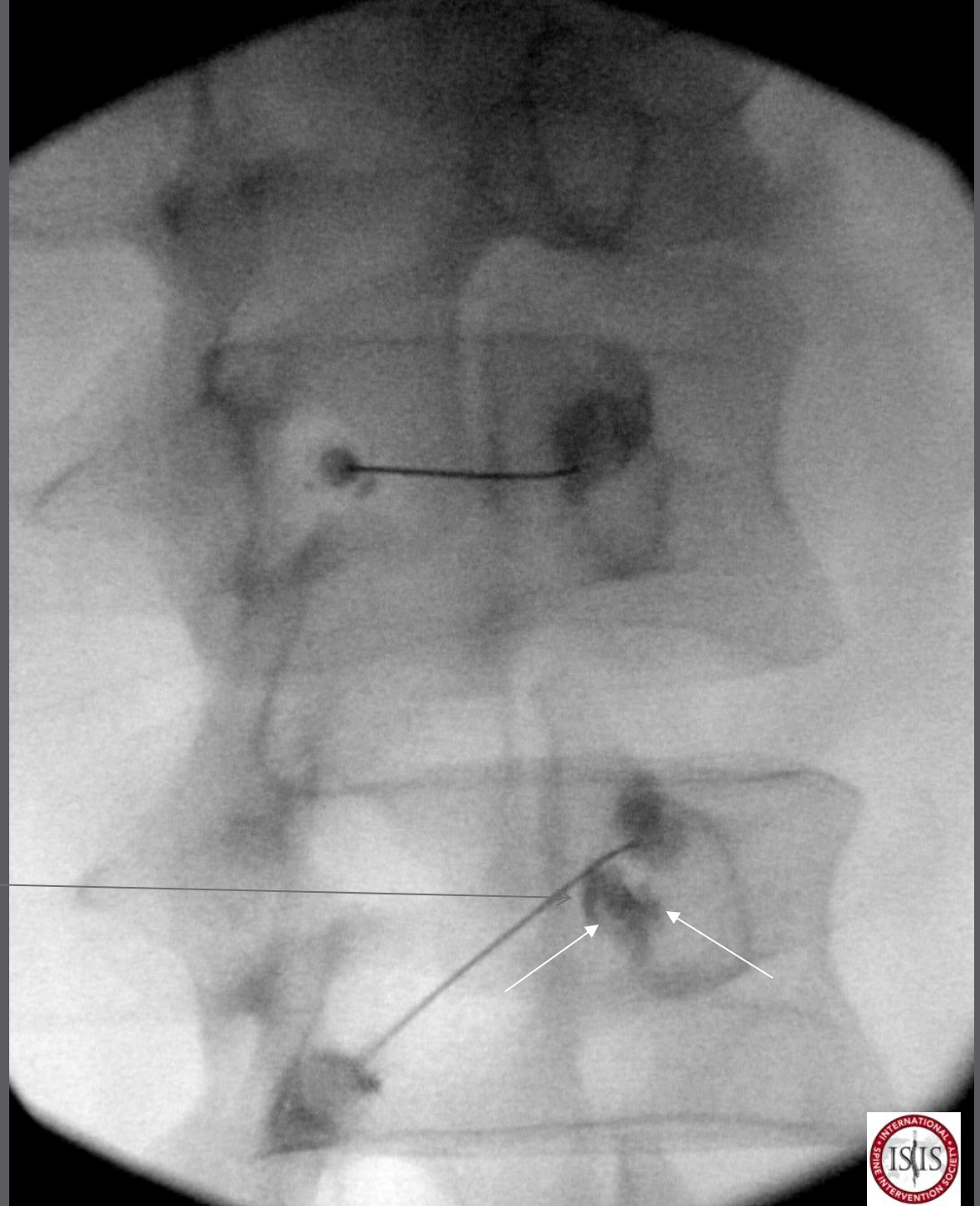
Ideal flow and target position



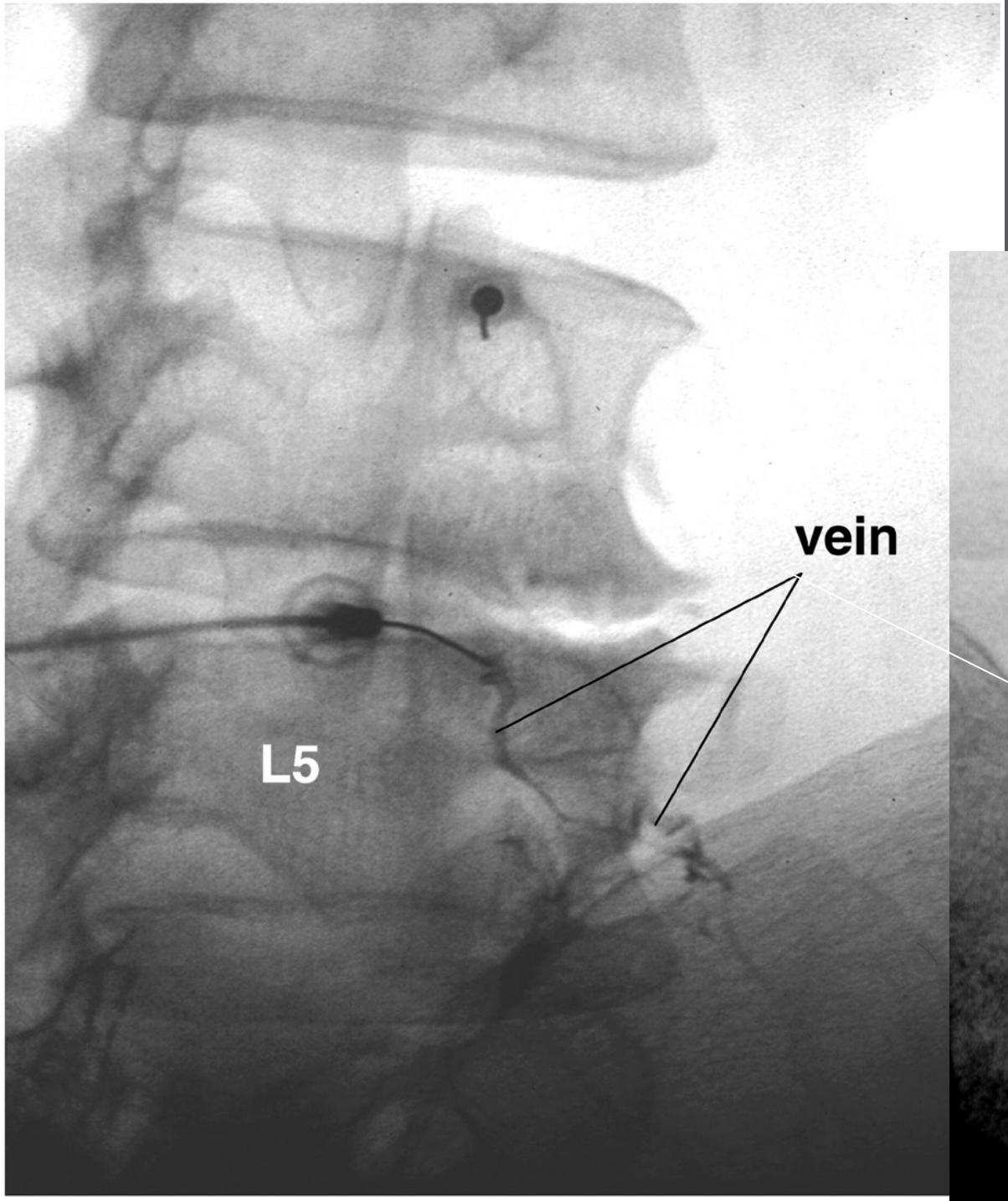


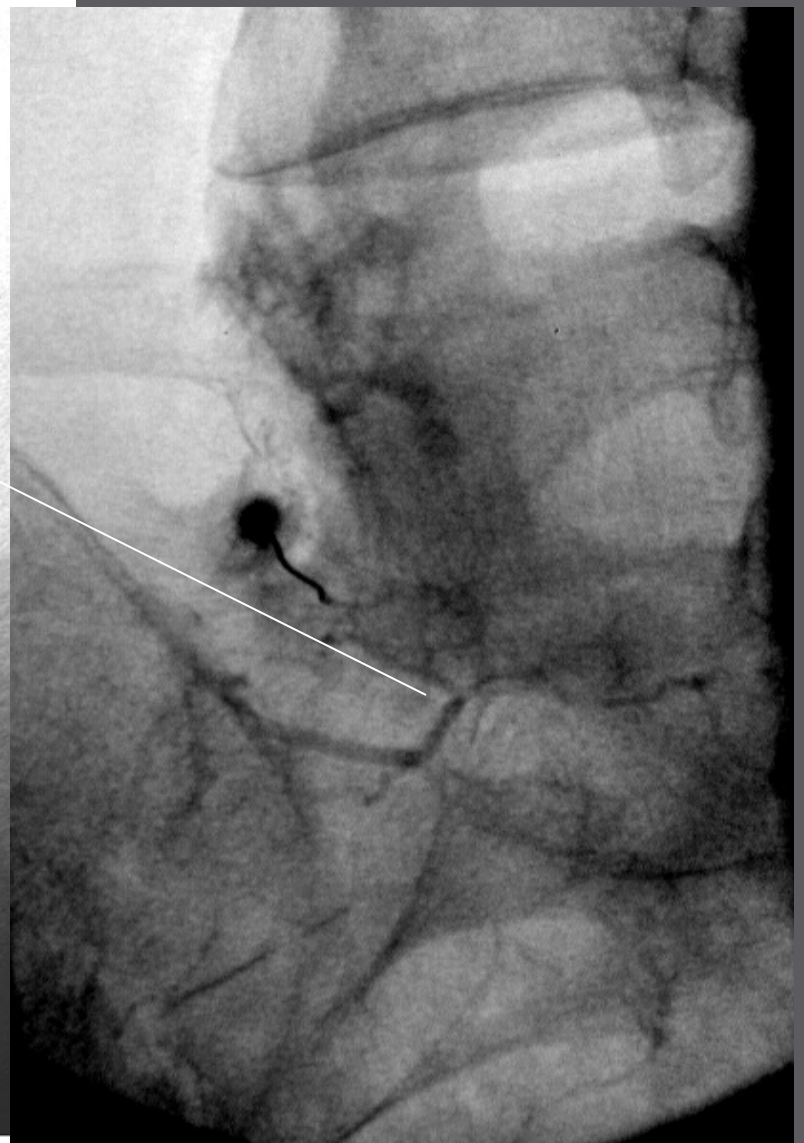
Try to avoid Contrast flow superio towards the IVF- consider re-positioning

Initial flow at MAL- needed to redirect



Venous uptake more common than in the cervical spine

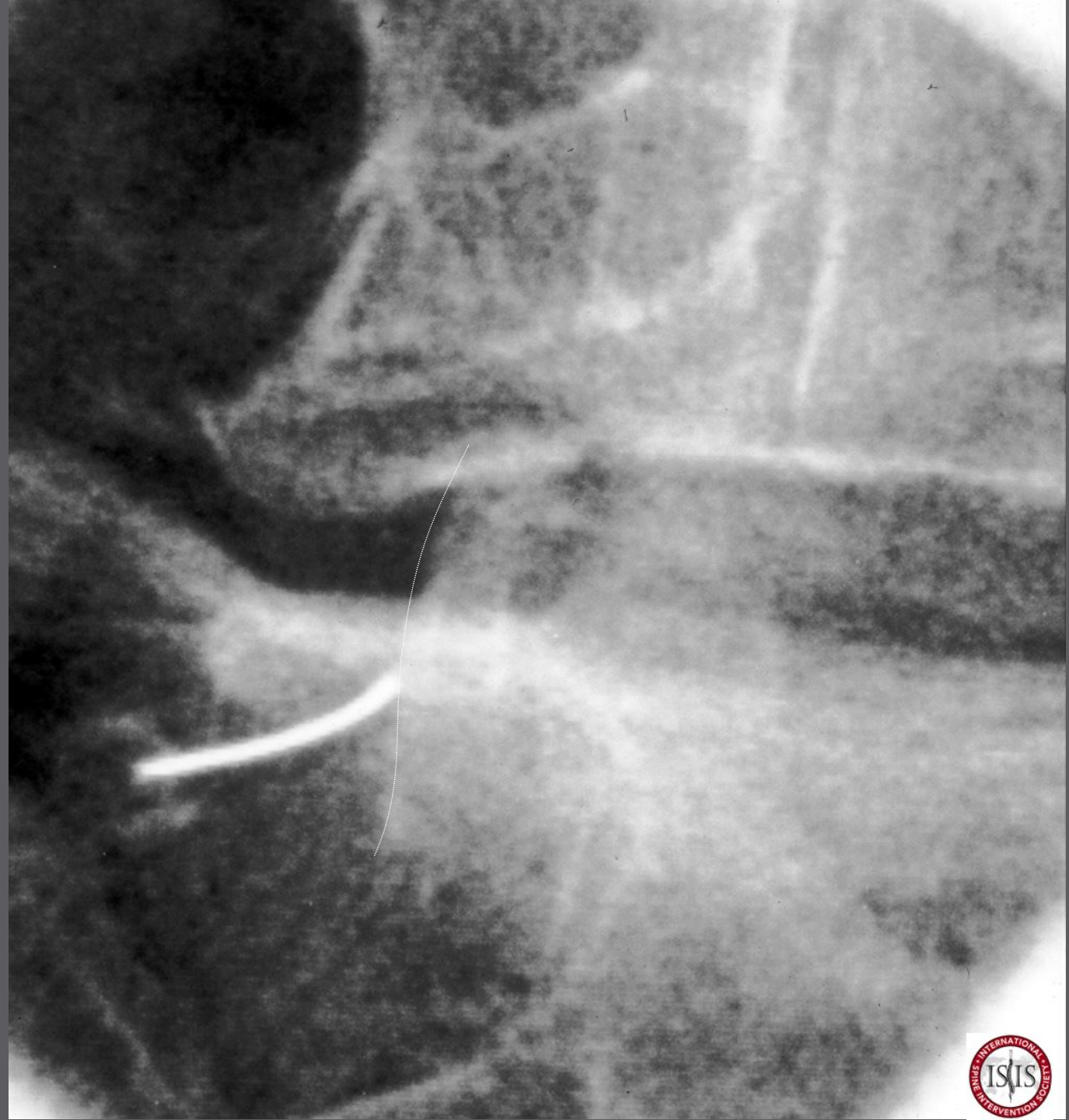




L5 DR Blocks

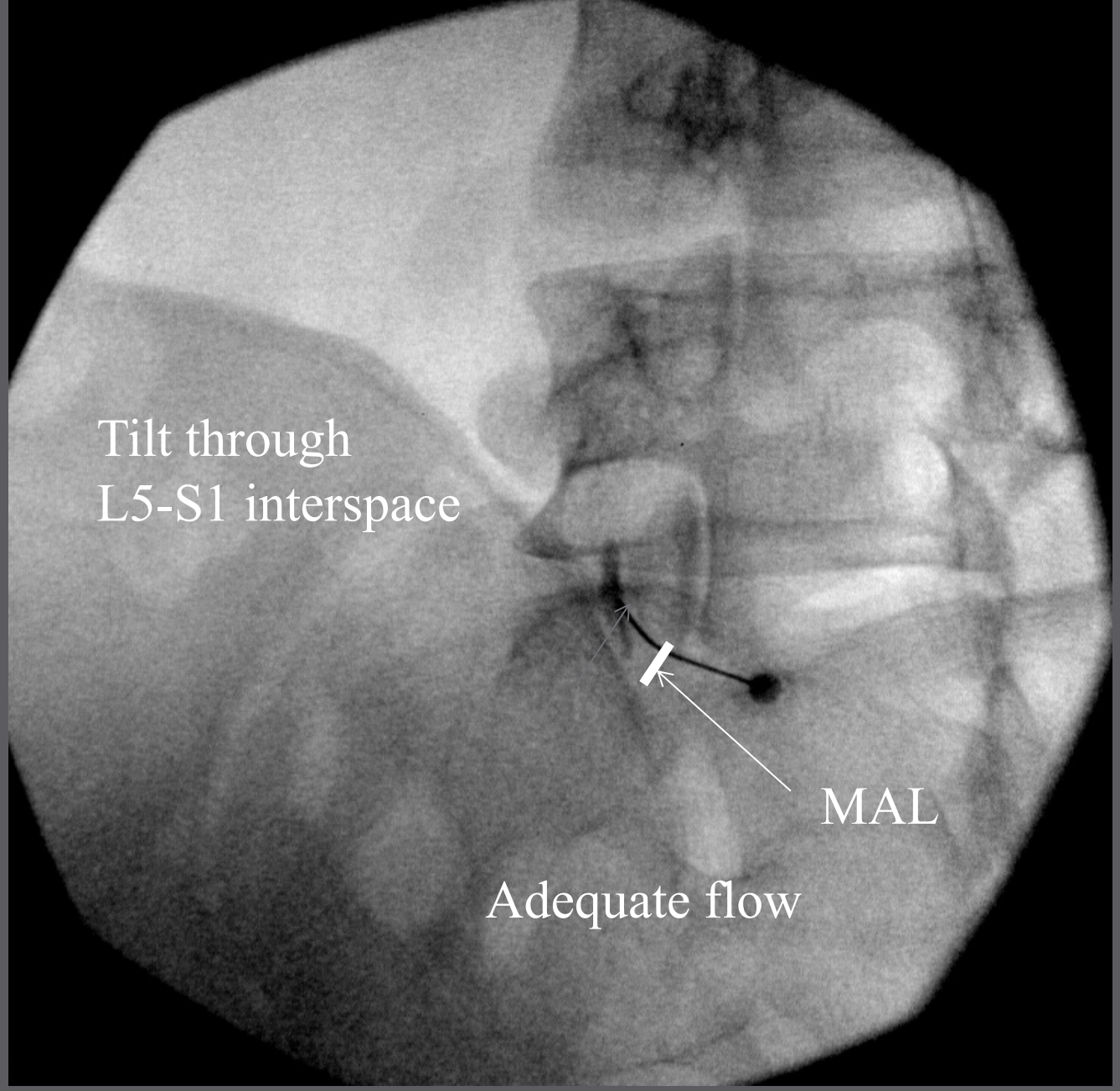
Courtesy Paul Dreyfuss

Image through L5-S1 disc space oblique until can clear the S1 SAP but within the PSIS



AP Image

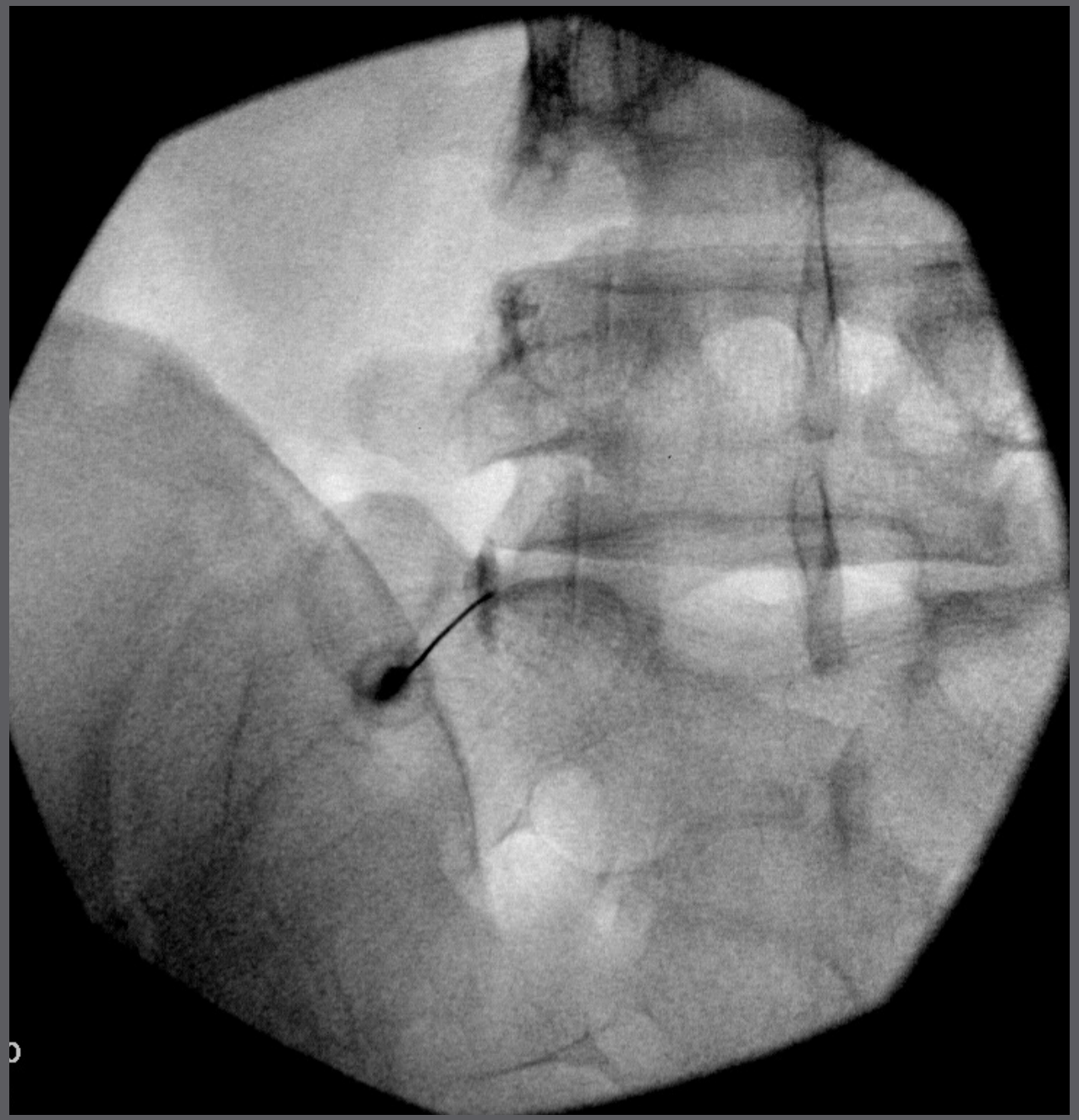
With an adequate oblique approach can get in the target groove (medial to the lateral silhouette of the S1 SAP)



L5 DR block

Usual 15-20^{O}
Oblique to see target groove and place the needle, but need to be inside the PSIS

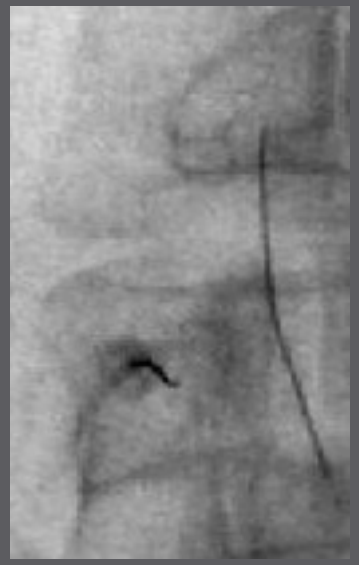
Block approx midway between the sup junction of S1 SAP/ala and MAL

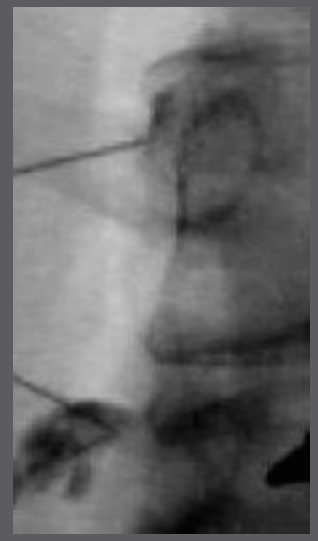


L5 DR block

Tilt through
L5-S1
Interspace

Adequate flow



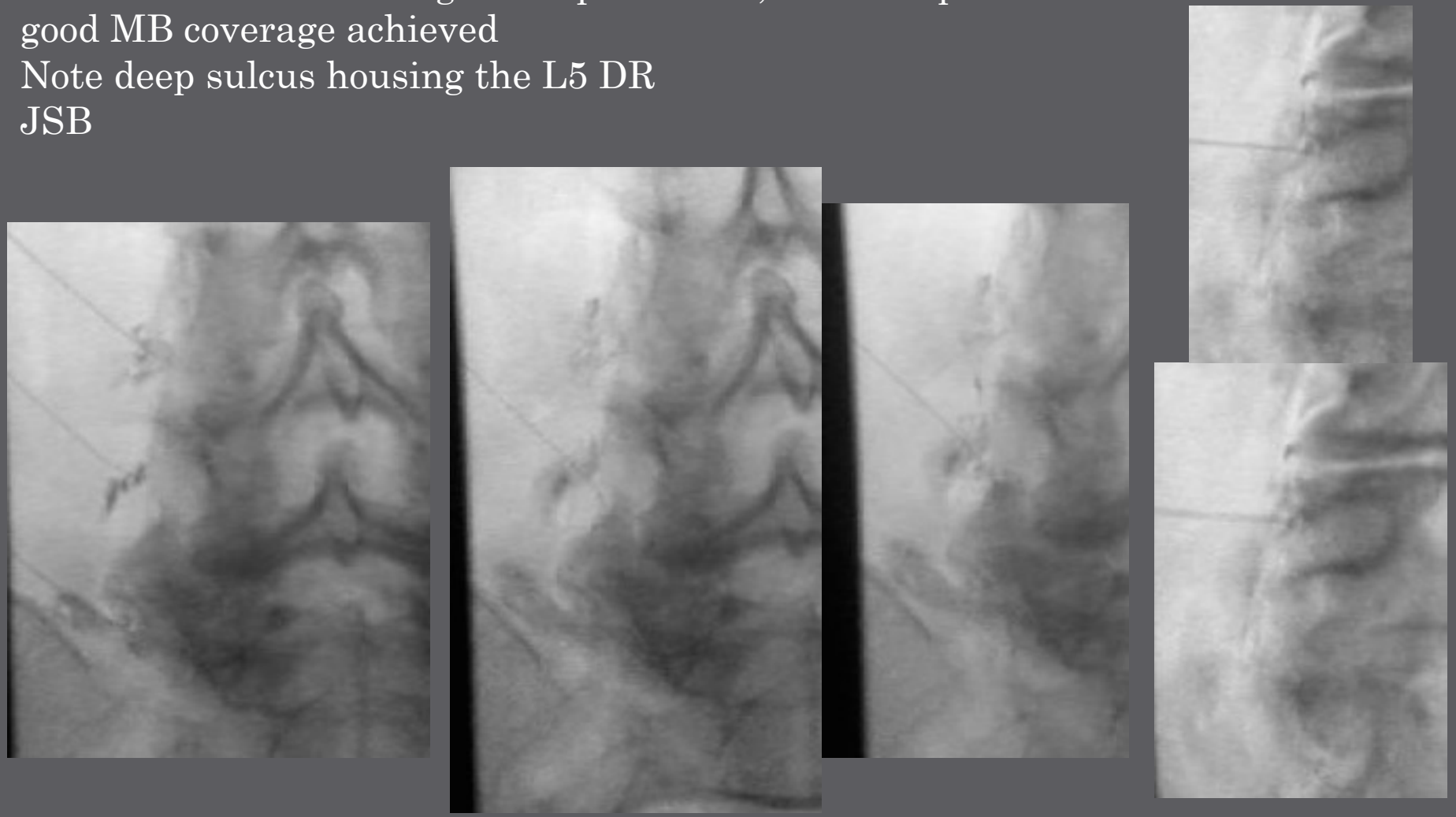


L3MBB w good position

L4MBB lateral contrast flow; Then, good flow after medial Repositioning

JSB

L4 MB missed due to high SAP placement; needle repositioned and good MB coverage achieved
Note deep sulcus housing the L5 DR
JSB



TESTING A TEST: VALIDITY

CRITERION STANDARD

TEST	+	-
+	a	b
-	c	d

Single MBB false positive
Rate = 25-45%
ISIS PG p.561

DIAGNOSTIC CONFIDENCE = a : b

(expressed as ODDs)

= (a / b) : 1

DIAGNOSTIC CONFIDENCE = PREVALENCE ODDS x LIKELIHOOD RATIO

chances that the condition is present

versus

chances that the condition is absent

How well the test works

True-positive rate

versus

False-positive rate

$$= \frac{\text{SENSITIVITY}}{1 - \text{SPECIFICITY}}$$

Medial Branch Blocks Validity - Cervical

- Diagnostic Confidence = Prevalence Odds X LR
- 50% is a reasonable approximation of Z-joint pain in patients with chronic axial neck pain
- Concordant criteria: diagnostic confidence = 82%
- Conc + discod criteria: diagnostic confidence = 74%
- Single blocks: diagnostic confidence = 48%
- Comparative MBB are a practical alterative to true placebo controlled blocks, and can attain a reasonable diagnostic confidence in part due to the *high prevalence* of Z joint pain

Lumbar Spine

Lower prevalence

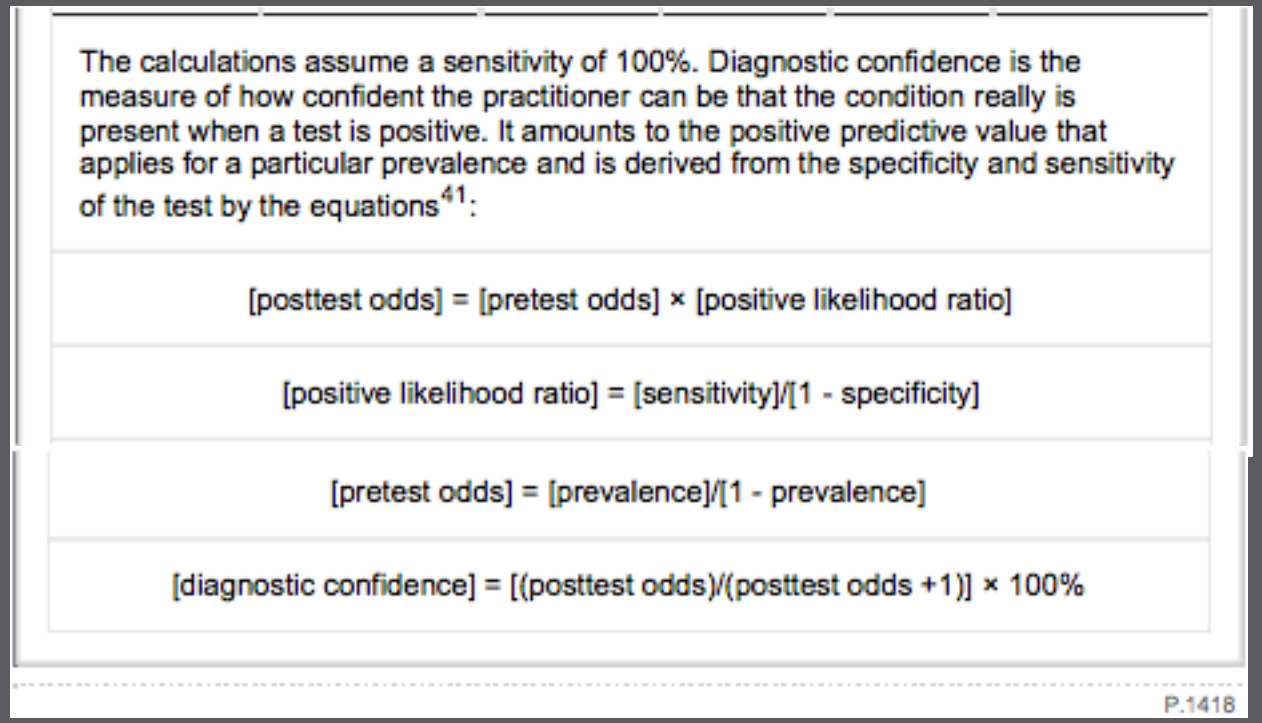
Lower diagnostic confidence

TABLE 97.3 CONTINGENCY TABLES SHOWING THE EFFECT ON DIAGNOSTIC CONFIDENCE OF DIFFERENT SPECIFICITIES OF A DIAGNOSTIC TEST AND DECREASING PREVALENCE RATES

			Condition		
Specificity	Prevalence	Blocks	Present	Absent	Diagnostic confidence
0.65	40%	Positive	400	210	66%
		Negative		528	
			400	600	
	15%	Positive	150	328	32%
		Negative		748	
			150	850	

Concordant and discordant responses with Sensitivity 1.00, Specificity of 0.65

Curatolo, Bonica's Management of Pain, 2010
SIS Practice Guidelines…pp560-566



The calculations assume a sensitivity of 100%. Diagnostic confidence is the measure of how confident the practitioner can be that the condition really is present when a test is positive. It amounts to the positive predictive value that applies for a particular prevalence and is derived from the specificity and sensitivity of the test by the equations[41]:

$$[\text{posttest odds}] = [\text{pretest odds}] \times [\text{positive likelihood ratio}]$$

$$[\text{positive likelihood ratio}] = [\text{sensitivity}]/[1 - \text{specificity}]$$

$$[\text{pretest odds}] = [\text{prevalence}]/[1 - \text{prevalence}]$$

$$[\text{diagnostic confidence}] = [(\text{posttest odds})/(\text{posttest odds} + 1)] \times 100\%$$

P.1418

Curatolo, Bonica's Management of Pain, 2010
SIS Practice Guidelines…pp560-566

Steps towards better LRF outcomes

- Select patients so that odds of having facet pain are high
- Meticulous medial branch block technique
- Select only diagnostic (>70-80% relief) MBB results
- Meticulous RF technique

LZJ - Clinical Diagnosis

- **Cannot Diagnose by any single indicator:**
  - History
  - Clinical exam
  - CT scan
  - SPECT scan is exception, but not a practical tool
- **Inc. Likelihood of ZJ Pain:**
  - Combine history, age, exam

Differentiating Axial LBP Source - Prevalence

Structure	Prevalence	Demographics
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Differentiating Sources of Axial LBP

Disc: increased Disc pressure

LZJ: lordosis and axial load

SIJ: shear and torsion

Structure	Image	History (P=pain)	Exam
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

Z-joint pain associated with paralumbar pain and local tenderness.

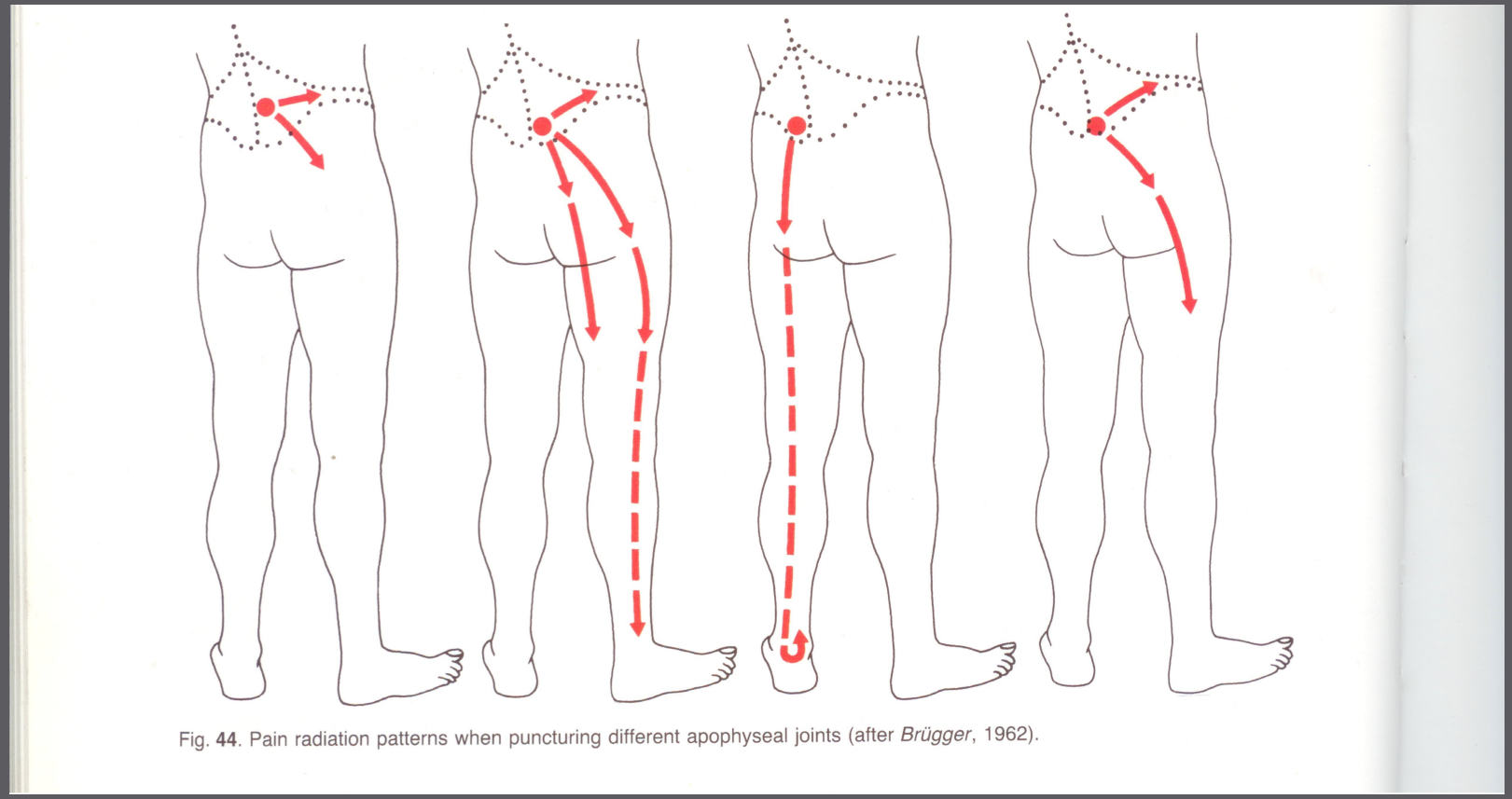
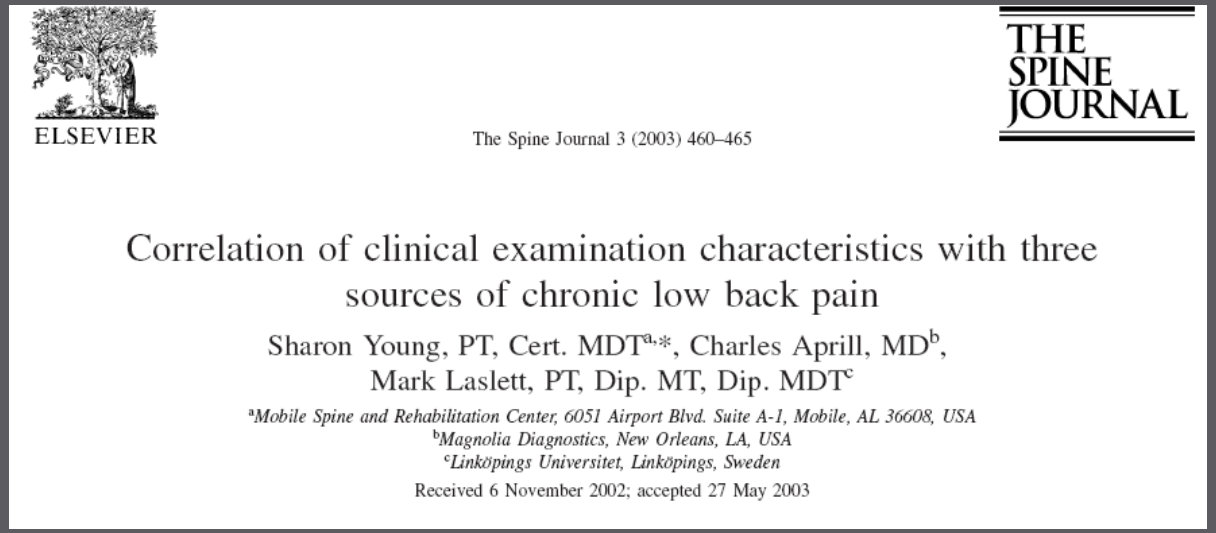


Fig. **44**. Pain radiation patterns when puncturing different apophyseal joints (after *Brügger*, 1962).

LZJ Clinical Diagnosis

- Jackson 1988 Volvo Award winner – Spine 1988
- 390 subjects with clinical history and exam who underwent facet blocks
- 29% relief
- Correlation with degree of relief:
  - older age,
  - prior history of low-back pain,
  - normal gait,
  - maximum pain on extension following forward flexion in the standing position
- Absence of leg pain, muscle spasm and aggravation of pain on Valsalva
- Greatest pain relief immediately after injection was seen with lumbar extension and rotation
- Could not predict who would respond to facet blocks



ELSEVIER

The Spine Journal 3 (2003) 460–465

THE SPINE JOURNAL

Correlation of clinical examination characteristics with three sources of chronic low back pain

Sharon Young, PT, Cert. MDT[a,*], Charles Aprill, MD[b], Mark Laslett, PT, Dip. MT, Dip. MDT[c]

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[b]*Magnolia Diagnostics, New Orleans, LA, USA*
[c]*Linköpings Universitet, Linköpings, Sweden*

Received 6 November 2002; accepted 27 May 2003

- Discogenic: Centralization w McKenzie method
  - Pain w rising from sitting
- Sacroiliac: Unilateral pain; No lumbar pain
  - Pain rising from sitting
  - 3/5 provocation tests: distraction, compression, sacral thrust, thigh thrust, Gaenslen's
- LZJ: no pain rising from sitting

ELSEVIER

The Spine Journal 6 (2006) 370–379

THE SPINE JOURNAL

Clinical predictors of screening lumbar zygapophyseal joint blocks: development of clinical prediction rules

Mark Laslett, PT, PhD[a,*], Barry McDonald, PhD[b], Charles N. Aprill, MD[c], Hans Tropp, MD, PhD[d], Birgitta Őberg, PhD[e]

[a]*PhysioSouth, Moorhouse Medical Centre, 3 Pilgrim Place, Christchurch, 8002, New Zealand*
[b]*Massey University, Institute of Information and Mathematical Sciences, Albany Campus, Auckland, New Zealand*
[c]*Magnolia Diagnostics, 2718 Cadiz St., New Orleans, LA 70115, USA*
[d]*Department of Orthopedics, Linköping University, Linköping, Sweden 5-581 83*
[e]*Department for Health and Society, Physiotherapy, Linköping University, Linköping, Sweden 5-581 83*

Received 10 December 2004; accepted 14 January 2006

RESULTS: At the 75% pain reduction standard, 24.5% responded to screening ZJ blocks and 10.8% responded at the 95% standard. The centralization phenomenon is not associated with pain reduction using any standard. No variables were useful predictors of post–ZJ block pain reduction of less than 90%. Seven clinical findings were associated with 95% pain reduction after blocks. Five useful clinical prediction rules (CPRs) were found for ruling out a 95% pain reduction (100% sensitivity), and one CPR had a likelihood ratio of 9.7, producing a fivefold improvement in posttest probability.

CONCLUSIONS: A negative extension rotation test, the centralization phenomenon, and four CPRs effectively rule out pain ablation after screening ZJ block. One CPR generates a fivefold improvement in posttest probability of a negative or positive response to ZJ block.

Clinical Prediction Rules Based on 7 Variables

- Age > 50
- Pain best when walking
- Pain best when sitting
- Onset of pain was paraspinal
- MSPQ score > 13 (somatization)
- Extension/Rotation test
- Absence of centrilization w repeated movement testing

Extension/Rotation Test

- If negative: very unlikely to have 95% pain reduction
- NPV = 100, PPV = 13
- Sensitivity = 100%
- Specificity = 22%

Clinical Predictive Rule (5)

- 3 or > of 5 clinical signs (age>50, best w walk, best w sit, paraspinal pain onset, extension/rot)
- Sensitivity 85
- Specificity 91
- PPV 55
- NPV 98
- +LR 9.7
- -LR 0.17

LZJ Clinical Diagnosis

- Three of five: age >50, sx. best walking, sx. best sitting, onset of pain paraspinal, pain worse with combined extension/rotation
  - Sensitivity 85%, specificity 91%, PPV 55, NPV 98
  - Laslett, et al, Spine J. 2006 Jul-Aug;6(4):370-9

Clinical Predictors of Pain Generators (Algorithm for LBP)

Nikolai Bogduk

ISIS Practice Guidelines…

First Edition

Algorithm Highlights

- L-MRI discs normal
  - Investigate synovial joints
- L-MRI abnormal
  - Young person – investigate discs
  - Older person – investigate synovial joints
- If pain below L5, unilateral
  - Investigate SIJ
- If pain above L5, bilateral
  - Investigate LZJs in stepwise fashion

MBB Response Interpretation Recommendations

- Set tone of objectivity (provider and patient)
- Baseline pain level adequate
  - 3/10 or >50% of maximum pain level or greater
- Activities and postures which are limited by pain identified prior to procedure and tracked afterwards (i.e. extension/rotation pain, standing tolerance)
- Assess response with provocative maneuvers
  - Response within 30 minutes
  - Track response over 6-8 hours
  - See ISIS Practice Guidelines…pp594-599

What are appropriate selection criteria for MB RF Neurotomy?

Intra-articular vs. MBBs

Single vs. Dual blocks

Percentage pain relief

PAIN MEDICINE

Anesthesiology 2010; 113:395–405

Multicenter, Randomized, Comparative Cost-effectiveness Study Comparing 0, 1, and 2 Diagnostic Medial Branch (Facet Joint Nerve) Block Treatment Paradigms before Lumbar Facet Radiofrequency Denervation

Steven P. Cohen, M.D.,* Kayode A. Williams, M.D., M.B.A.,† Connie Kurihara, R.N.,‡ Conner Nguyen, M.D.,§ Cynthia Shields, M.D.,‖ Peter Kim, M.D.,# Scott R. Griffith, M.D.,** Thomas M. Larkin, M.D.,†† Matthew Crooks, M.D.,‡‡ Necia Williams, M.D.,§§ Benny Morlando, R.N.,‖‖ Scott A. Strassels, Pharm.D., Ph.D.##

Conclusions: Using current reimbursement scales, these findings suggest that proceeding to radiofrequency denervation without a diagnostic block is the most cost-effective treatment paradigm.

What is the best selection method for optimal lumbar RFN outcomes?

Cohen 0, 1, 2 Block Cost-Effectiveness Study

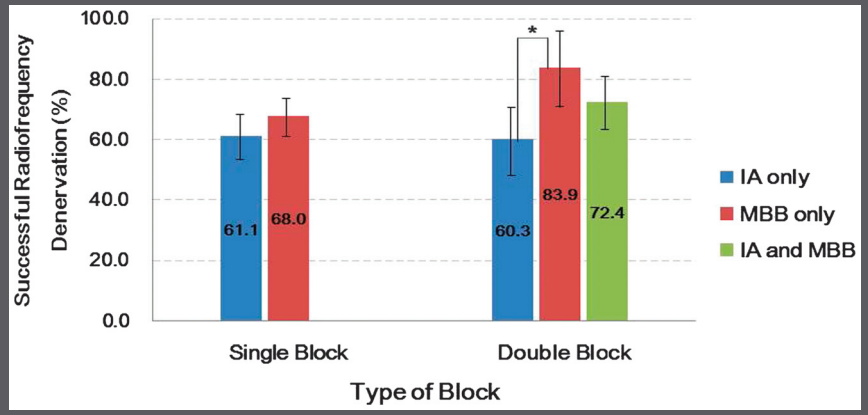
- Comparative Cost-Effectiveness of 0, 1, or 2 MBB before LZJ – RFN
- Cohen, et al. Anesthesiology 2010
- 151 screened and randomized to groups
- RFN of 51/51 of 0 block group; 19/50 of 1 block; 14/50 of 2 bl
- Parallel single lesion with 20 gauge/ 10mm active tip
- Denervation Success Rates (> 50% relief) at 3 months:
  - 0 mbb - 33% (more get better; costs less)
  - 1 mbb - 39%
  - 2 mbb - 64%

Dreyfuss LMB RFN Prospective Audit (Dreyfuss, et al. Spine 2000)

- 41 screened
- 15 passed comparative blocks >80% relief and enrolled
- 16 gauge RF needle placed parallel to MB
- Lesions confirmed with EMG
- Outcomes: VAS, McGill, Roland-Morris, SF-36, NASS treatment expectations, functional tests,
- Follow-up: 6 weeks, 3, 6, and 12 months

- 13/15 with 60% or > relief **(87% success)**;
- 60% w >80%relief

Dual MBB superior to IA block in predicting successful RF outcomes; Cohen, et al. 2015



(*Reg Anesth Pain Med* 2015;40: 376–383)

Optimal Selection = Optimal RF Outcomes
Dual Blocks with >80% Relief Best

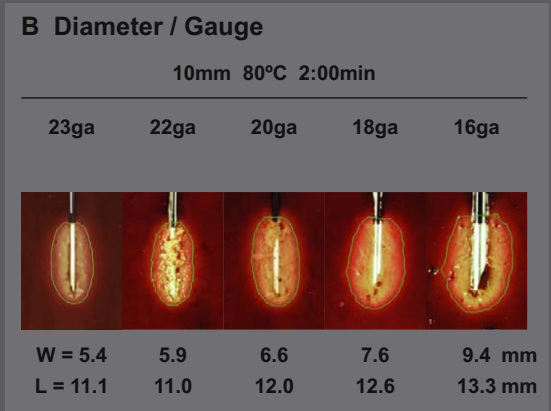
Study	Phys Exam (0 Block)	IA Block	Single Block	Controlled 2	Outcome >50% Relief
Reiz, Cohen	Yes				33% placebo
Leclaire, van Wijk		Yes - single			0-33% placebo
Cohen			>50%		39% at 3 months
Van Kleef, Burnham, Cohen 6 mo			>50% or >50 or 80% Cohen		20-56% at 6/12 months
Cohen				>50%	64% at 3 months
Dreyfuss, Reiz				>80% +/- placebo	83-87% at 12 months

Derby, et al Pain Medicine 2012

- Favorable outcomes with lumbar RF ablation:
- With dual blocks with >70% relief
- With single blocks with > 80% relief
- Cigna Colorado now will not allow 2nd block if first provides >80% relief

Lesion Size (Technique) Important

- *"Larger lesions mean a larger tolerance of errors in electrode placement and of the inevitable variation in the anatomic position of the medial branches."*



- *Lord, McDonald, Bogduk 1998*

Cosman 2014

Large and multiple lesions necessary

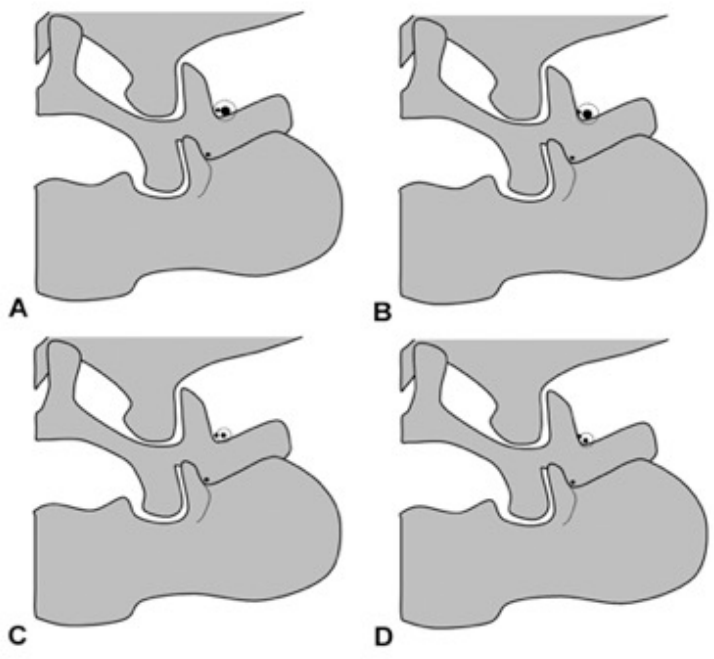
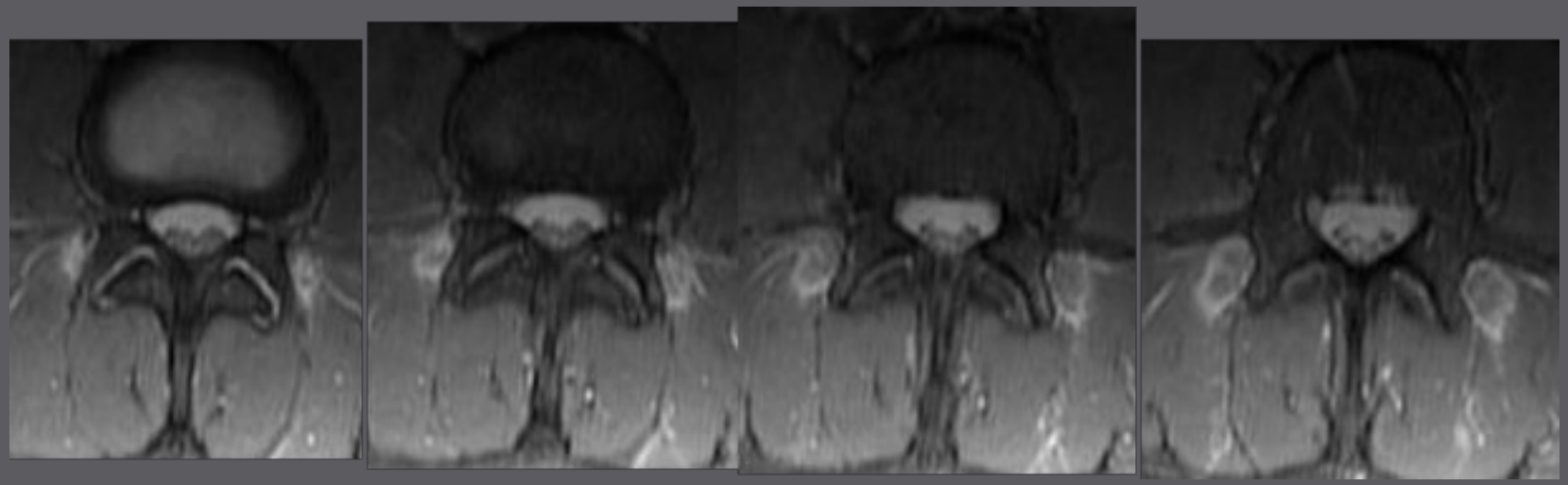
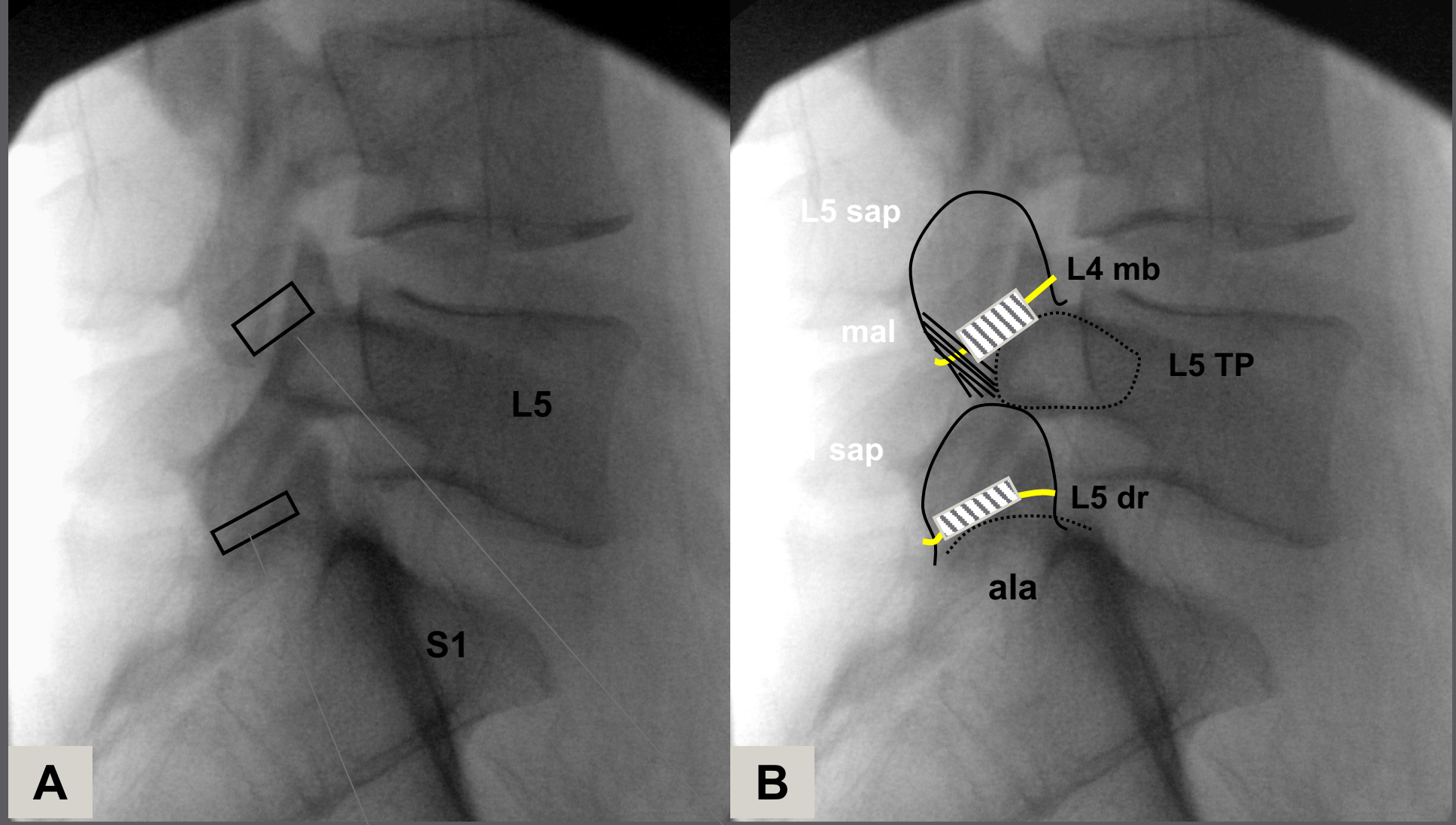


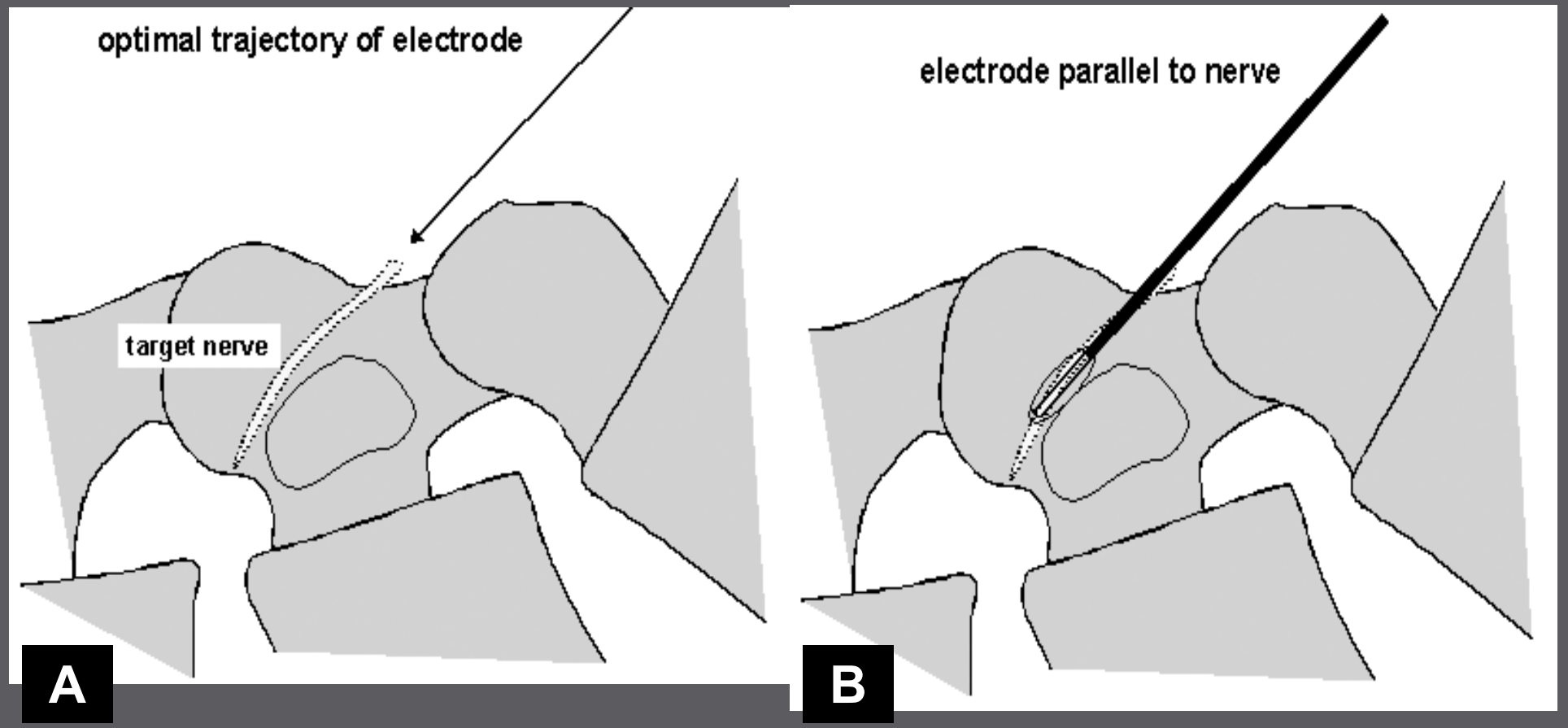
Figure 8. Tracings of a declined view of the lower lumbar spine illustrating the critical juxtapositioning of electrodes to nerves in low and high locations on the superior articular process. **A:** A large-gauge electrode is likely to capture a low-lying nerve. **B:** A large-gauge electrode is likely to capture a high-lying nerve, but the nerve may be at the limit of the effective radius of the electrode. **C:** A small-gauge electrode might just reach, or might fail to capture fully, a low-lying nerve. **D:** A small-gauge electrode may fail to capture a high-lying nerve. (Drawings kindly provided by Professor Nikolai Bogduk, Newcastle, Australia.)

RF Lesion of L3 MB at L4 SAP Goal of Coverage of Target Zone



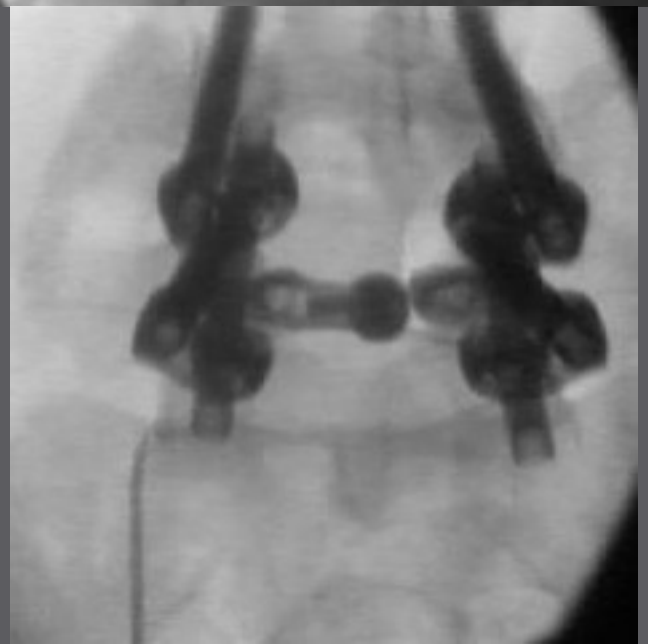


Lesion the middle 2/4^{ths} of the SAP for L1-4 MB RF
Lesion the mid and post 1/3 of the SAP for L5 DR RF


optimal trajectory of electrode
target nerve
A
electrode parallel to nerve
B

L5DR RF
16 guage
2 lesions

JSB



JSB

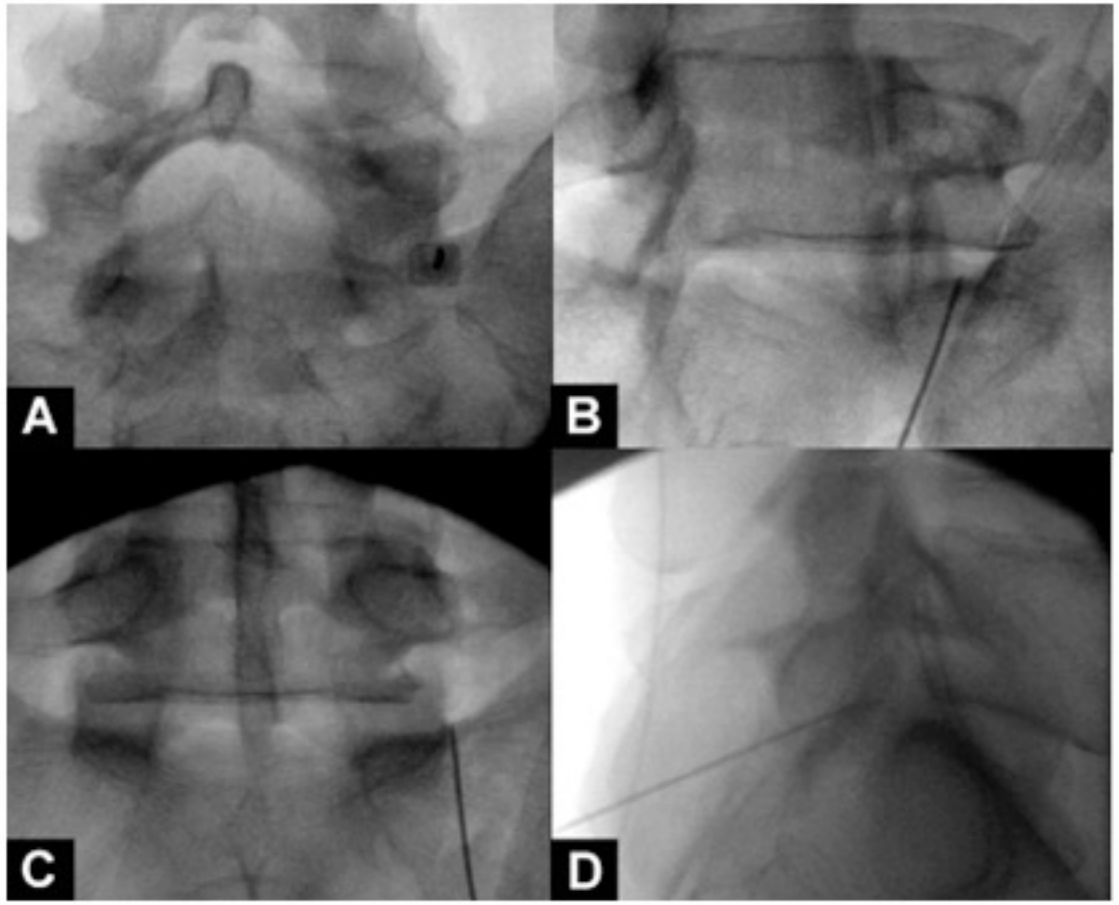


Figure 22. Various views of a cannula in place for the conduct of a right L5 dorsal ramus neurotomy. **A:** Declined view showing the cannula lateral to the neck of the S1 superior articular process. **B:** Oblique view showing the cannula passing across the sulcus for the L5 dorsal ramus. **C:** Antero-posterior view showing the cannula crossing the ala of the sacrum, and lying against the superior articular process of S1. **D:** Lateral view showing the cannula placed across the middle two-quarters of the neck of the superior articular process. (Images kindly provided by Dr Paul Dreyfuss, Seattle, Washington.)

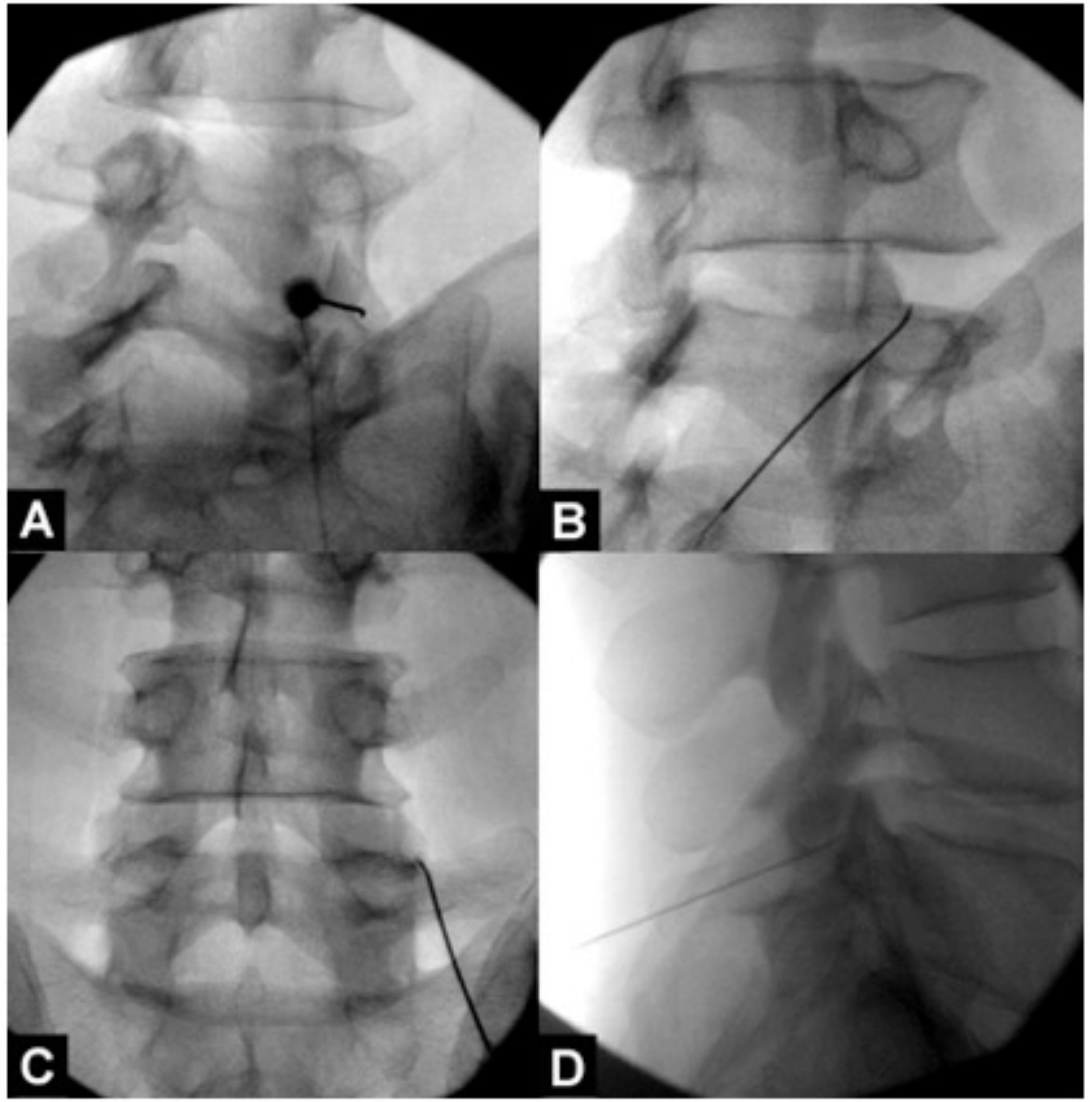


Figure 23. Various views of an electrode placed through a cannula in place for the conduct of a right L4 medial branch neurotomy. **A:** Declined and oblique view showing the cannula lateral to the neck of the L5 superior articular process, in the sulcus for the L4 medial branch. **B:** Oblique view showing the cannula passing across the sulcus for the L4 medial branch. **C:** Antero-posterior view showing the cannula crossing the ala of the sacrum, and lying against the superior articular process of L5. **D:** Lateral view showing the cannula placed across the middle two-quarters of the neck of the superior articular process. (Images kindly provided by Dr Paul Dreyfuss, Seattle, Washington.)

Optimal Technique = Optimal RF Outcomes

Study	Parallel Lesion?	Single/Multi Lesion	Needle Guage	Outcome
Leclaire, van Wijk	No		22	33%
Burnham, van Kleef	Yes/near	single/multi	22	55%
Cohen	yes	single	20	64%
Dreyfuss, Reiz, Gofeld	yes	multi	16-18	87%
McCormick 2015	yes	single	20	55% (pain/fx >50%)
MacVicar 2013	yes	multi	16	55% (complete relief)

Spine (Phila Pa 1976). 2014 Jun 15;39(14):E842-9. doi: 10.1097/BRS.0000000000000337.

Radiofrequency denervation for facet joint low back pain: a systematic review.

Poetscher AW[1], Gentil AF, Lenza M, Ferretti M.

Author information

Abstract

STUDY DESIGN: A systematic review and meta-analysis of randomized controlled trials.

OBJECTIVE: To assess treatment effects (benefits and harms) of radiofrequency denervation for patients with facet joint-related chronic low back pain.

SUMMARY OF BACKGROUND DATA: There is no consensus regarding the treatment efficacy of facet joint radiofrequency denervation (FJRD) and how it compares with nerve blockades and joint infiltration with anesthetics and/or corticosteroids.

METHODS: We searched the Cochrane Central Register of Controlled Trials, MEDLINE, EMBASE, and LILACS for randomized controlled trials that compared FJRD with blockades, infiltrations, or placebo. Primary outcomes were pain, functional status, and quality of life. Secondary outcomes were cost-effectiveness and complications.

RESULTS: Fifteen studies were selected and 9 were eligible. Overall quality of evidence was rated low to moderate. The evidence favored FJRD regarding pain control. There was no sufficient evidence for cost-effectiveness and complications.

CONCLUSION: The available evidence reviewed in this study should be interpreted with caution. The data indicate that FJRD is more effective than placebo in pain control and functional improvement and is also possibly more effective than steroid injections in pain control. Complications and adverse effects were not sufficiently reported to allow comparisons, and there was no evidence for cost-effectiveness. High-quality randomized controlled trials addressing pain, function, quality of life, complications, and cost-effectiveness are urgently needed.

LEVEL OF EVIDENCE: 1.

Comment in

Re: Poetscher AW, Gentil AF, Lenza M, et al. Radiofrequency denervation for facet joint low back pain: a systematic review. Spine (Phila Pa 1976) 2014;39:E842-9. [Spine (Phila Pa 1976). 2014]

In response. [Spine (Phila Pa 1976). 2014]

PMID: 24732848 DOI: 10.1097/BRS.0000000000000337

Conclusions:
Steps towards better LRF outcomes

- Select patients so that odds of having facet pain are high
- Meticulous medial branch block technique
- Select only diagnostic (>70-80% relief) MBB results
- Meticulous RF technique

Study your art!

...and know your anatomy.

Photo by Paul Dreyfuss

Lumbar Facet Pain: IA steroid injections

- Two new trials exist. Both studies rated by Spectrum as having a “moderate quality of evidence” with a “low risk of bias”
- “Significantly greater improvement in pain and function following IA facet injections vs IM steroid injections in the short-term” (Ribeiro. Spine 2013)
- “No difference in pain or function in those receiving IA facet injections vs. radiofrequency neurotomy (HCA covered procedure) in the intermediate term” (Lakemeier. Anesth Analg 2013)

Lumbar Facet Pain: IA steroid injections

- Three prospective trials (2 randomized) evaluated IA facet injections in subjects with physiological evidence of facet joint inflammation (+ SPECT)
  - *Excluded by Spectrum*. See appendix for details.
- Collectively, these trials showed benefit for IA facet injections in 151 pts, with benefit maintained at 3 months
  - Ackerman. Pain relief with intraarticular or medial branch nerve blocks in patients with positive lumbar facet joint SPECT imaging: a 12-week outcome study. South Med J. 2008 Sep;101(9):931-4.
  - Dolan. The value of SPECT scans in identifying back pain likely to benefit from facet joint injection. Br J Rheumatol. 1996 Dec;35(12):1269-73.
  - Pneumaticos. Low back pain: prediction of short-term outcome of facet joint injection with bone scintigraphy. Radiology. 2006 Feb;238(2):693-8.