Diagnosis and Treatment of Back Pain;
X - ray imaging increases precision in pain medicine

Robert Rapcan
R – Clinic
Slovakia

R - Clinic

- **1482 minimally invasive spine procedures (2010)**
- **1378 minimally invasive spine procedures (2011, 9 months period)**
- **523 median branch blocks, cervical, thoracic, lumbar (2010)**
- **37 RF procedures, cervical, thoracic, lumbar (2010) *?reimbursement?***
- **79 RF procedures, cervical, thoracic, lumbar (2011, 9 months period)**
- **SCS – 33 conventional (2010), 34 conventional (2011), 6 non – conventional (2011)**
- **PRT (periradicular therapy) - 587 (2011)**
- **SI Joint Denervation or Biaculoplasty (only in Sweden and UK)**


THE PAIN STARTS IN MY HUSBAND'S LOWER BACK,
THEN IT TRAVELS UP HIS SPINE TO HIS NECK,
THEN IT COMES OUT HIS MOUTH AND INTO MY EARS.
AND THAT'S WHY I GET THESE HEADACHES.
CHIROPRACTOR
GIASBERGEN
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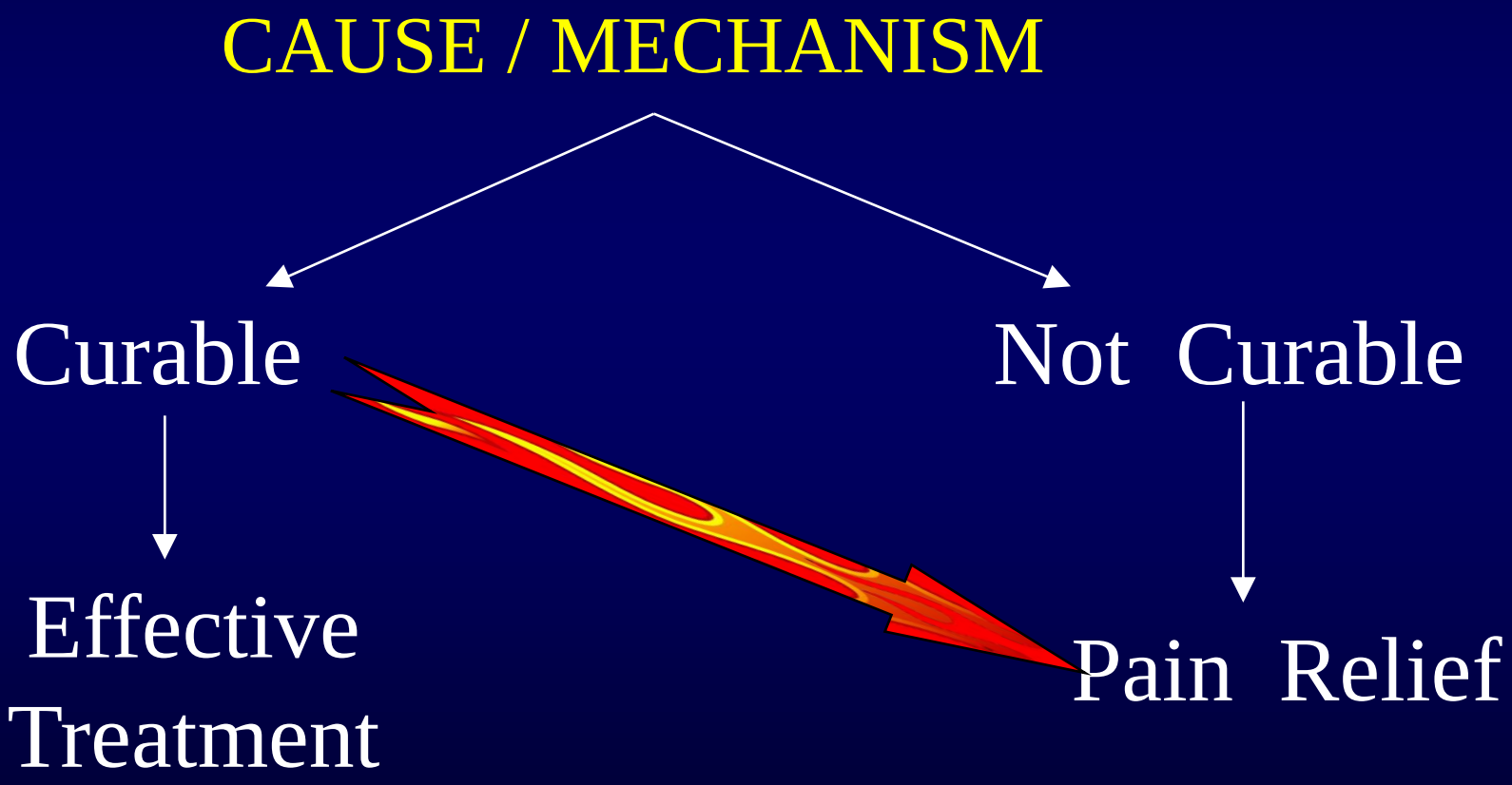
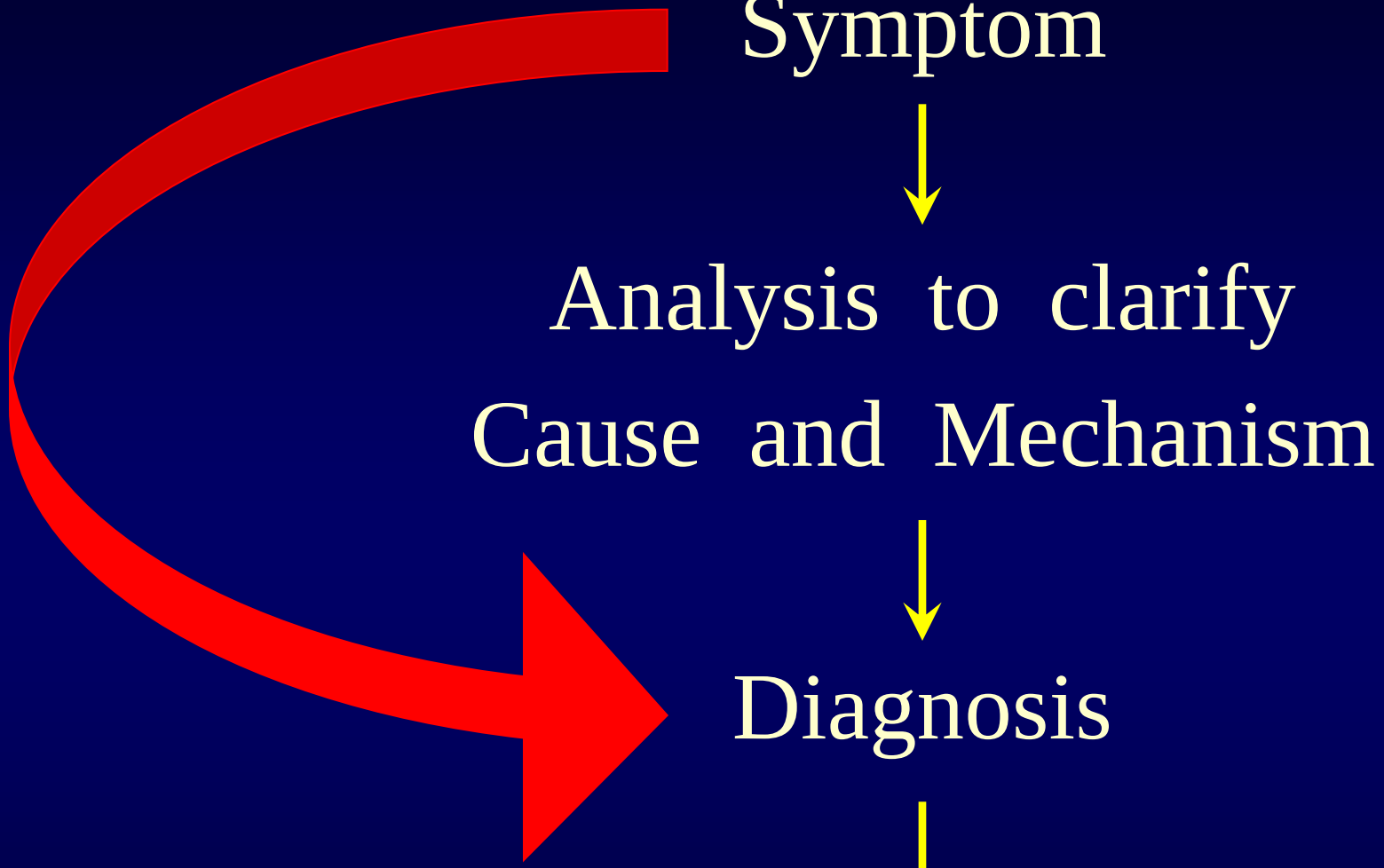
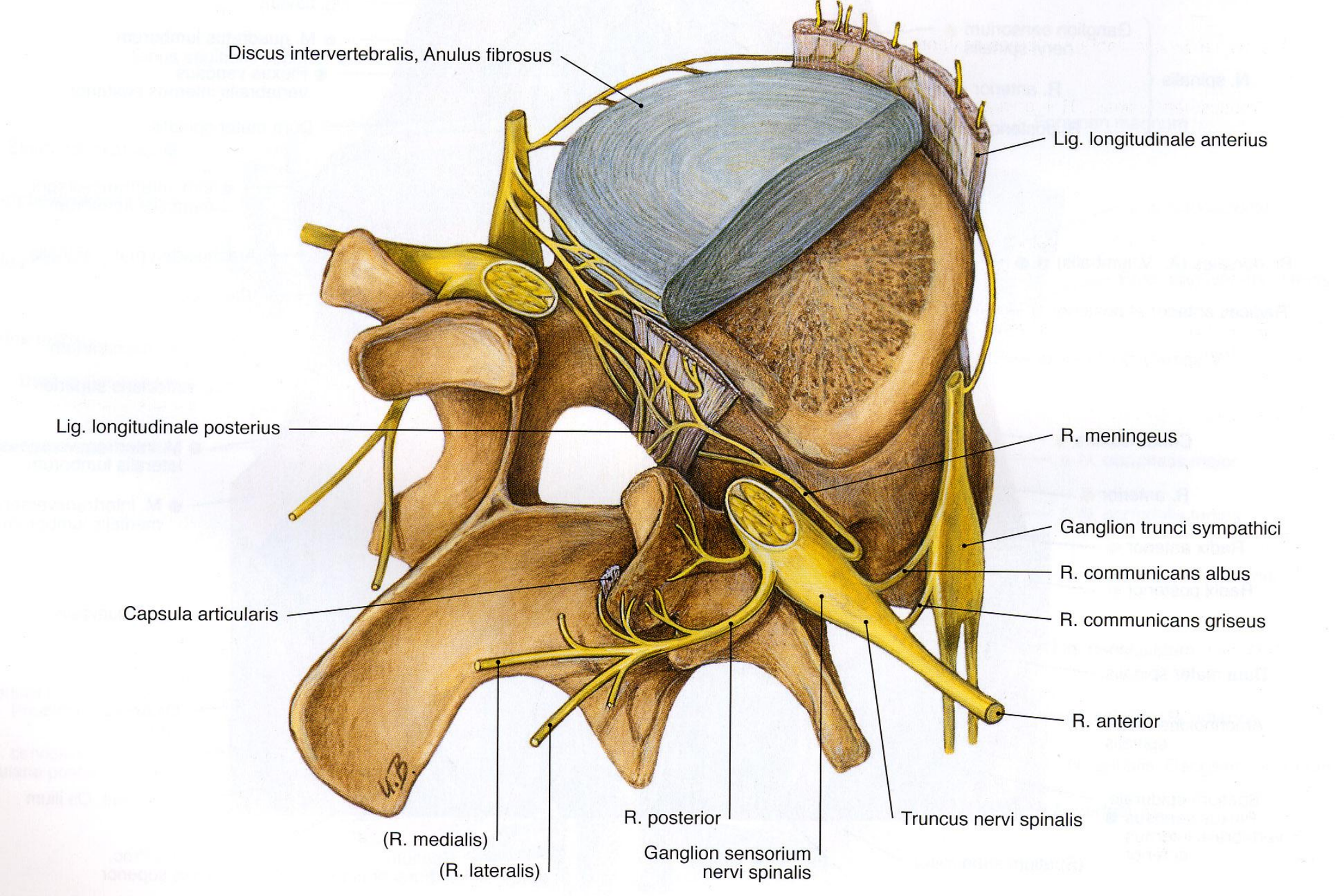
Examination.
Red and Yellow flags.
Clinical strategy.
Exclusion.
Referral to another specialist.
Pharmacological management
And/or rehabilitation
Diagnostic interventions
Therapeutic interventions

Diagnosis of Pain problem




Symptom
Analysis to clarify
Cause and Mechanism
Diagnosis
Treatment


Discus intervertebralis, Anulus fibrosus
Lig. longitudinale anterius
Lig. longitudinale posterius
R. meningeus
Ganglion trunci sympathici
R. communicans albus
Capsula articularis
R. communicans griseus
R. anterior
(R. medialis)
(R. lateralis)
R. posterior
Ganglion sensorium
nervi spinalis
Truncus nervi spinalis

We need to shift the Emphasis from the Treatment to the Diagnosis.

Pain Analysis

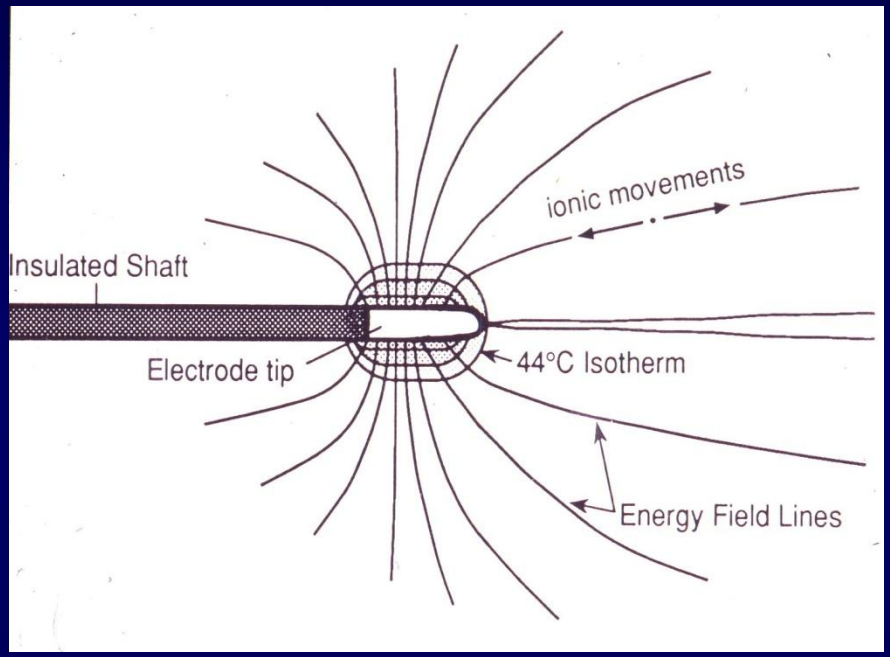
Using

Precision Diagnostics.

Poor correlation between CT / MRI and Cause of Pain.

- Grubb SA, et al: Spine 12:292-286, 1987
- Lane JL, et al: Am J Neuroradiol 15:1317-25,1994
- Schwarzer AC, et al: Spine 20:907-12, 1995
- Boos N, et al: Spine 20:2613-25, 1995
- Schwarzer AC, et al: Spine 20:1878-83, 1995
- Tapio Videman, MD, PhD, et al: Spine 28: 582–588, 2003
- Eugene Carragee, MD, et al: The Spine Journal 6, 624–635 2006

Radiofrequency procedures, first introduced in 1975 (Shealy 1975), involve the application of current flow from an active electrode to a dispersive ground plate. The body's tissue completes the circuit, creating an electrical field. This electrical field and ionic motion leads to the creation of frictional heat dissipation, causing local tissue heating.



The rationale for the use of radiofrequency (RF) procedures and also for intradiscal electrothermal therapy in low back pain is the assumption that these treatments can relieve pain by destroying the nerves innervating the relevant structures causing the pain (joints and discs, or the spinal ganglion itself).

Possible Causes of Back Pain
Potential Radiofrequency Targets

- Discs
- Nerves
- Joints
  - Facets or Z-joints
  - Sacro Iliac joint

There is limited evidence (Level II-3) for radiofrequency neurotomy of facet joints.

ASIPP – IPM Guidelines, Pain Physician 2009; 12:699-802 • ISSN 1533-3159

Previous studies of percutaneous radio-frequency neurotomy have been hampered by poor selection of patients, inaccurate techniques, poor outcome measures, and the lack of controls.

SUSAN M. LORD, B.MED., PH.D., LESLIE BARNSLEY, B.MED., PHD., BARBARA J. WALLIS, B.SC.,GREGORYJ. MCDONALD, M.B., B.S.,AND NIKOLAI BOGDUK M.D., PHD.

The New England Journal of Medicine (1996)

Zygapophysial Joint Denervation

- Indications
- Technique
- Results
- Failure Drill
- Complications

Radiofrequency (RF) neurotomy procedural guidelines for treatment of LBP

Patient selection criteria for a diagnostic medial branch block
LBP relieved by recumbency plus any four of the following including age >65 years or LBP not exacerbated by either cough, hyperextension, forward flexion, rising from flexion, or extension-rotation

Diagnostic medial branch block
Needle position between upper border transverse process and mamillo-accessory ligament, confirmed with fluoroscopy and contrast medium. Comparative Lidocaine 2% 0.5 mL, bupivacaine 0.5% 0.5 mL, subjects blind to injectate

Assessment of pain response Pain assessment 30 minutes following block and hourly for 6 hours, ≥ 80% pain relief for at least 1 hour following lidocaine and 3 hours following bupivacaine block

RF parameters
Needle position L1–L4; electrode tip at superior aspect of groove formed by junction of transverse process and superior articular process L5; electrode tip at groove between ala of sacrum and superior articular process. Positions confirmed with fluoroscopy. Electrode size 18-gauge, 1-cm exposed tip Lesioning parameters 120-second duration at 80 C

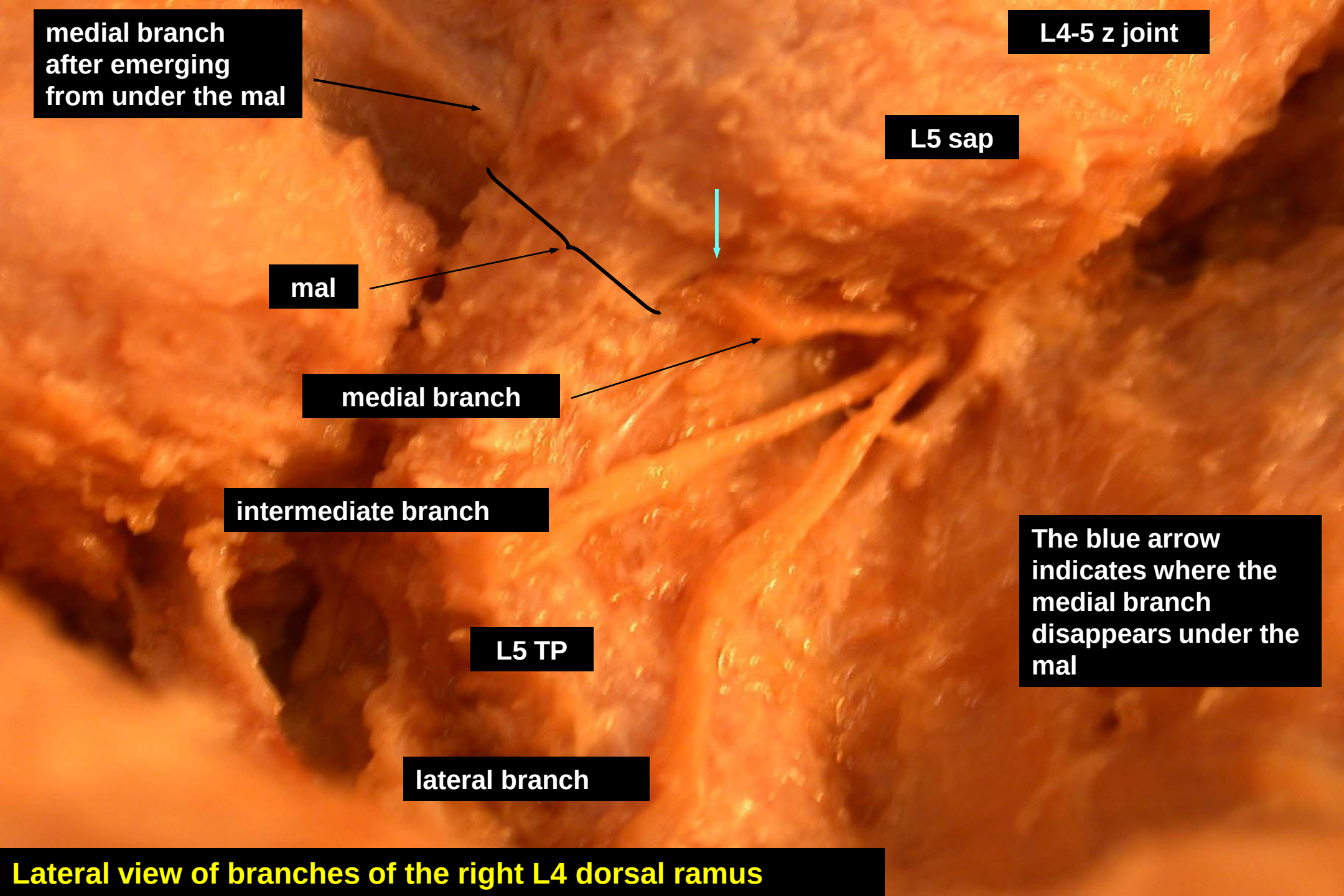
Facet joints are innervated by the medial branch of the Dorsal Ramus and anaesthesia of these, establishes the diagnosis

- Bogduk, N., Journal of Anatomy (1982) 388-397.
- Bogduk, N., Spine, 8 (1983) 286-93.
- Dreyfuss, P. et al., Spine, 22 (1997) 895-902.
- Kaplan, M. et al., Spine, 23 (1998) 1847-52.

Analysis showed that **comparative medial branch blocks**, rather than single blocks, must be used before RF neurotomy.

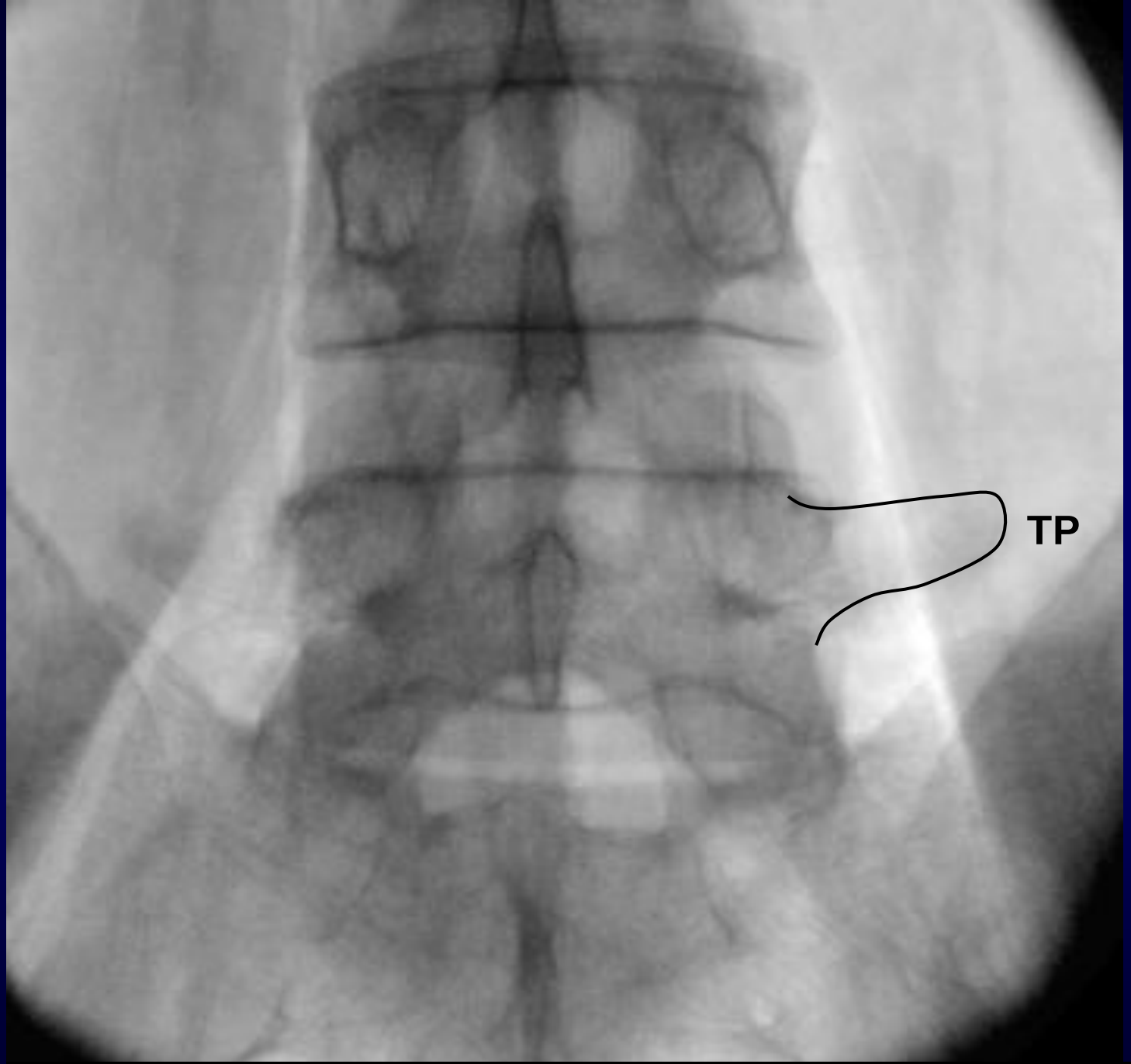
Anatomical studies demonstrated that the shorter distal compared with the circumferential radius of the RF lesion necessitates **placement of the electrode parallel to the course of the nerve along the base of the superior articular process.**

W. Michael Hooten, MD,†David P. Martin, MD, PhD, and Marc A. Huntoon, MD, **PAIN MEDICINE,** Volume 6, Number 2, 2005

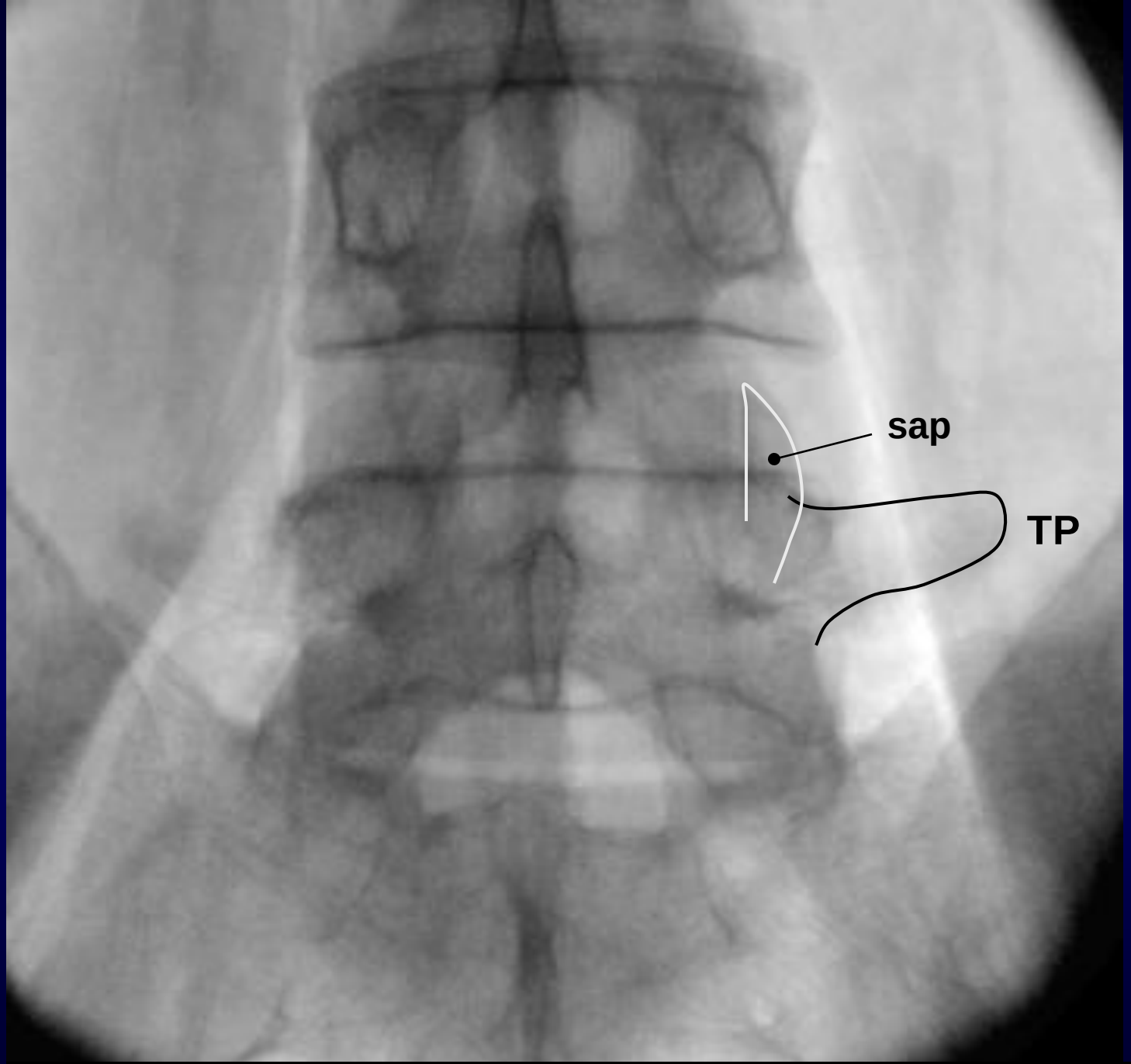


Lateral view of branches of the right L4 dorsal ramus

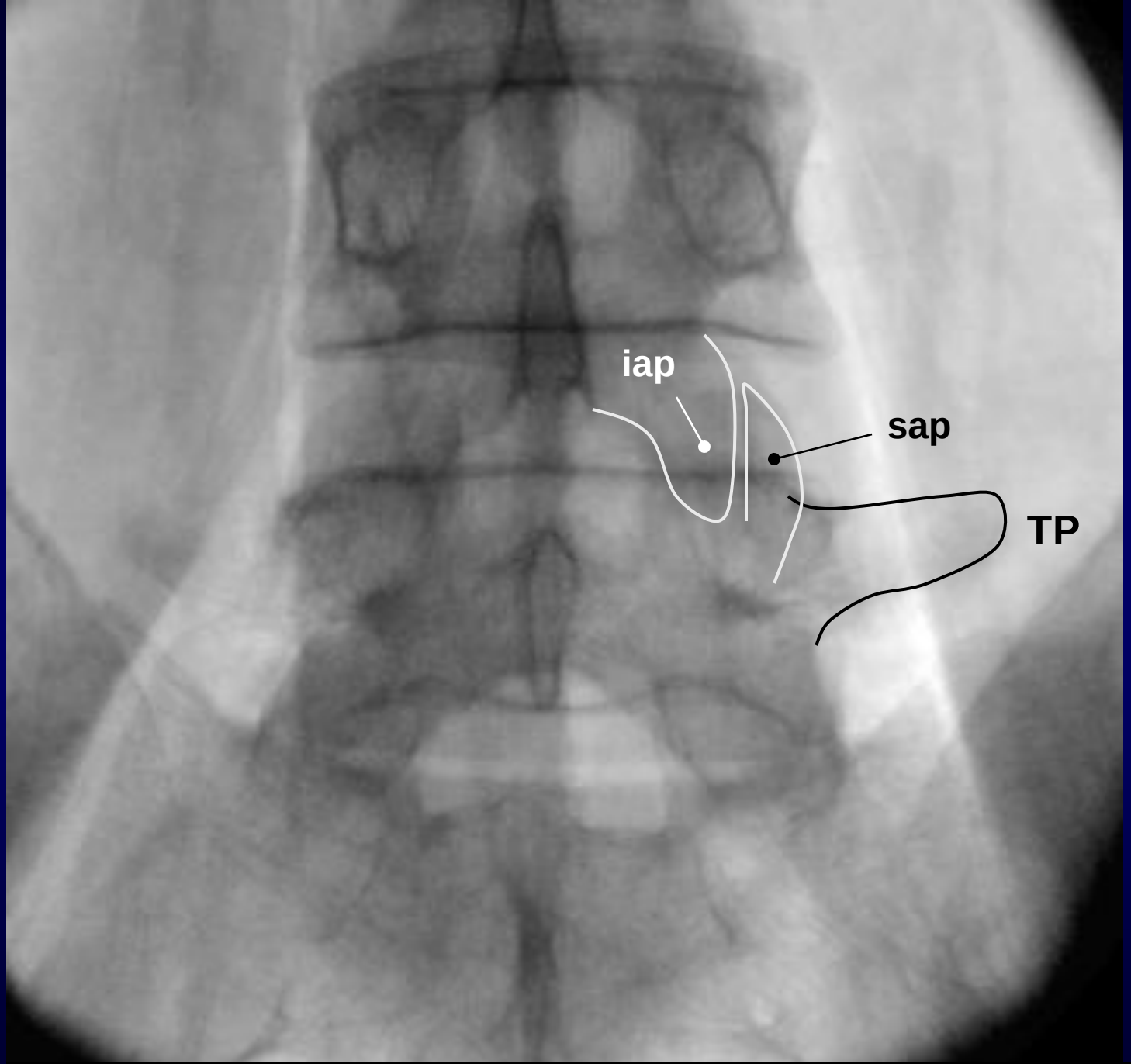
AP VIEW: L5 vertebra for L4 medial branch neurotomy



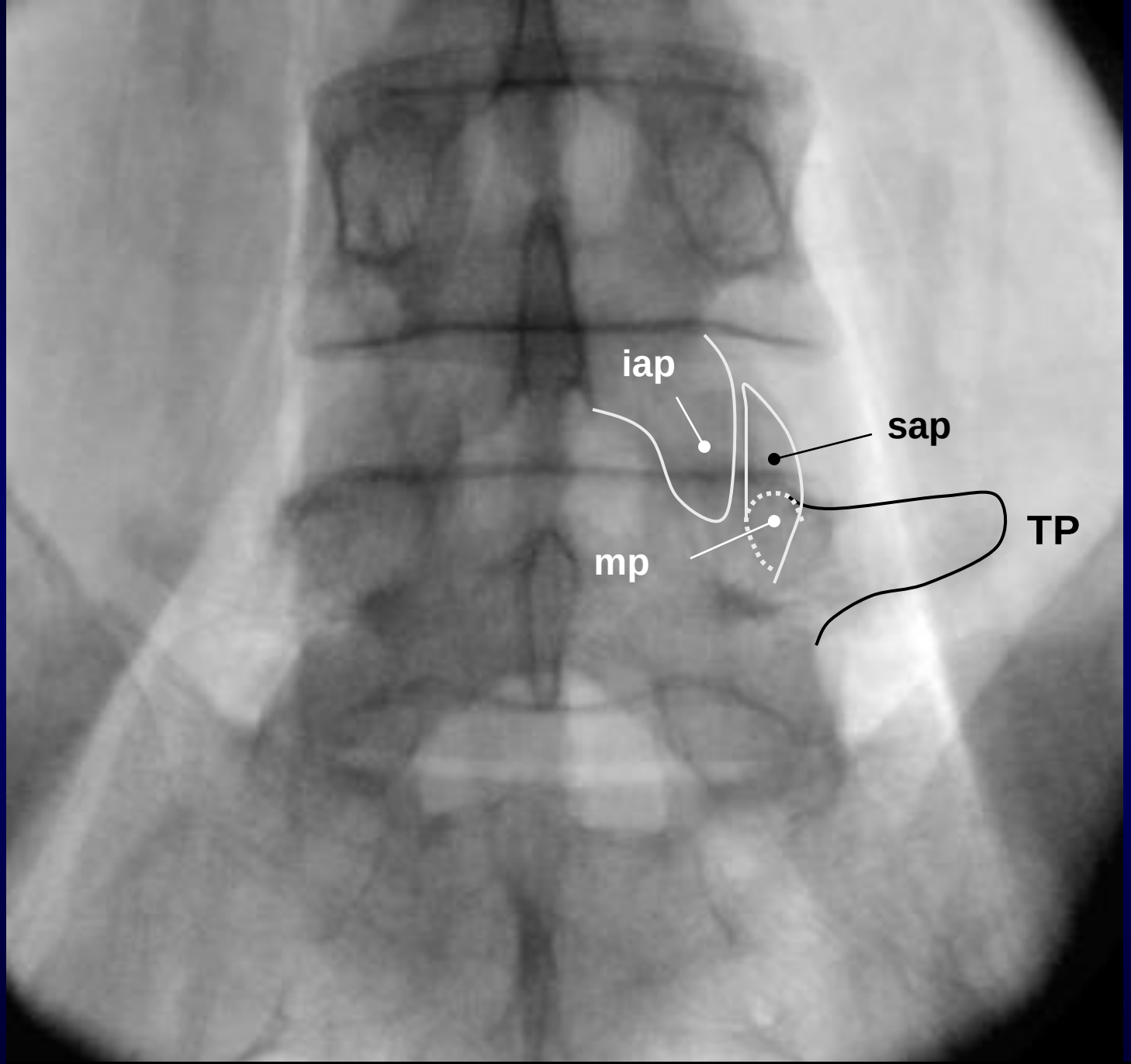
AP VIEW: L5 vertebra for L4 medial branch neurotomy



AP VIEW: L5 vertebra for L4 medial branch neurotomy



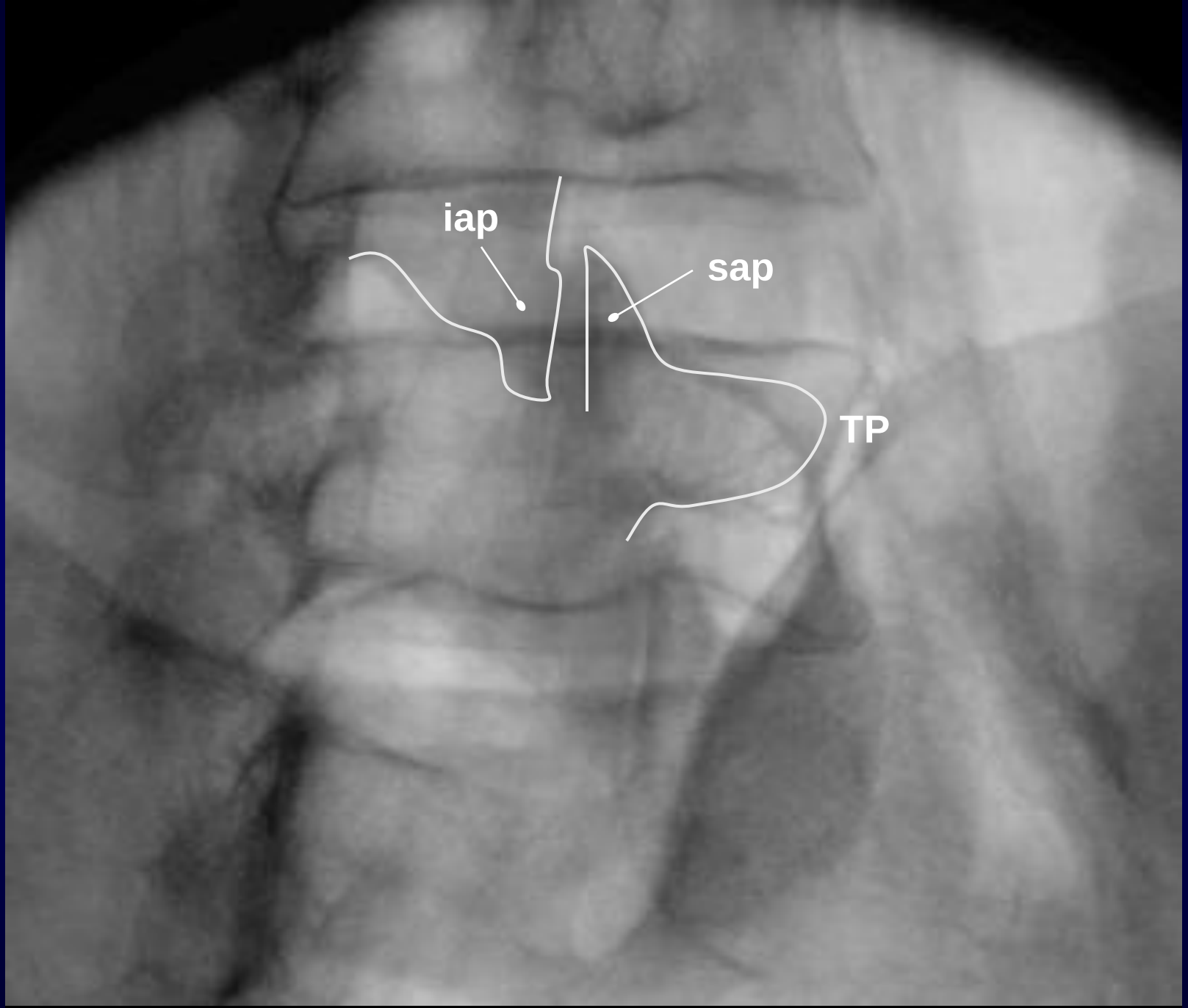
AP VIEW: L5 vertebra for L4 medial branch neurotomy



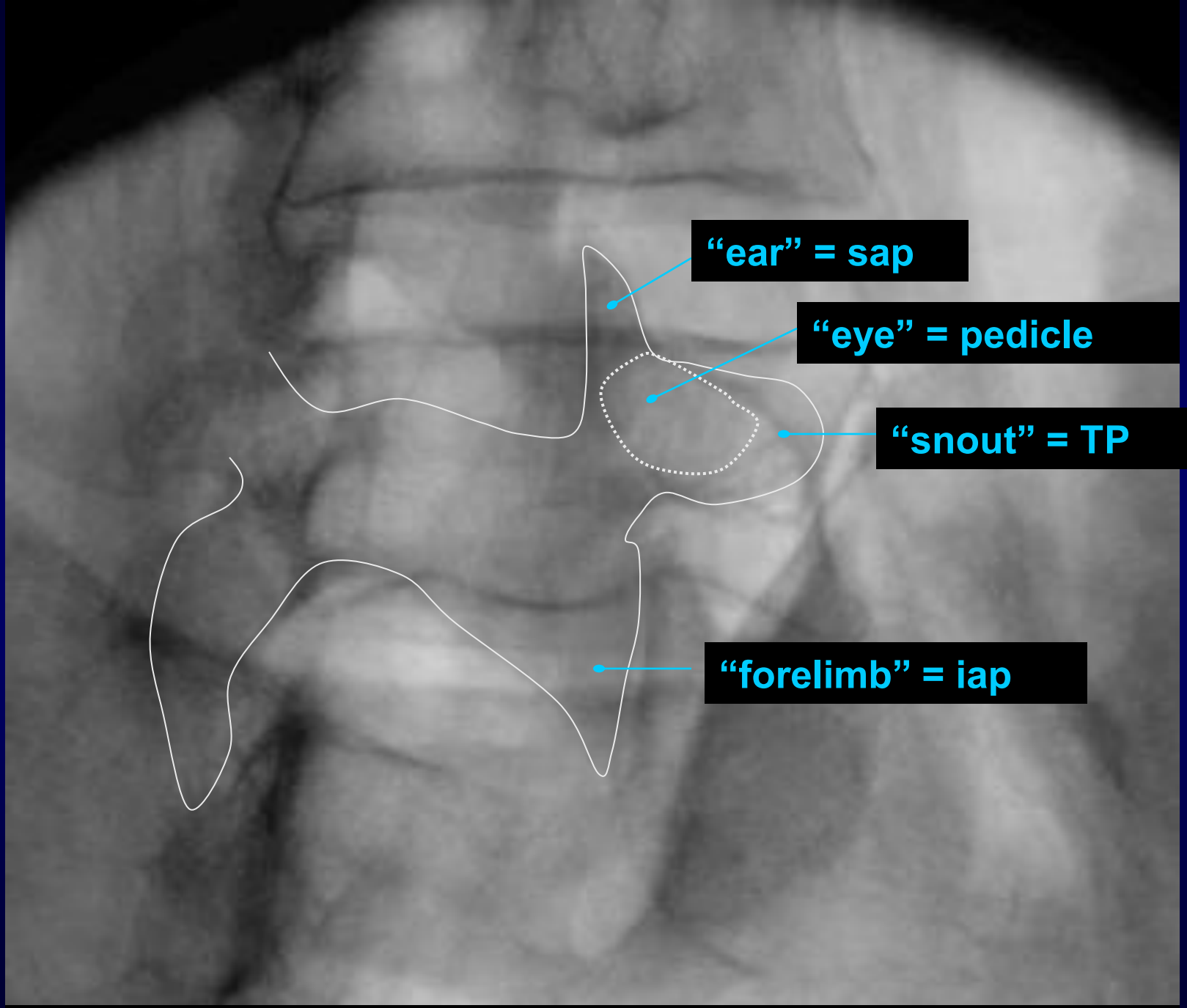
AP VIEW: L5 vertebra for L4 medial branch neurotomy

Practitioners should be able to locate and identify:

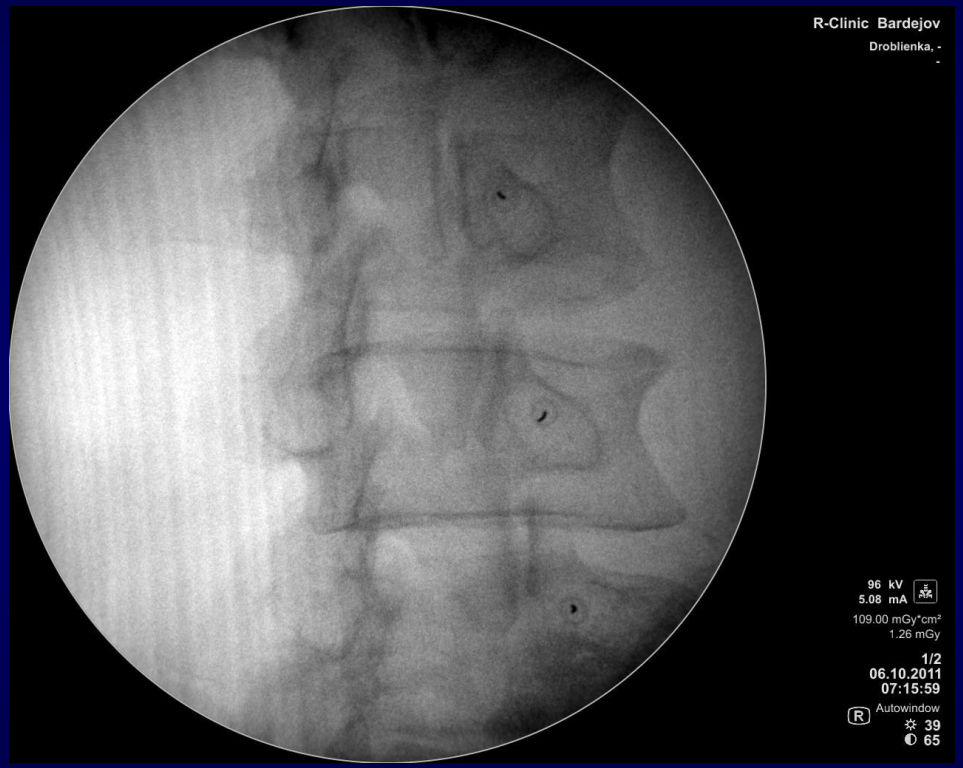
- the superior articular process (sap)
- the inferior articular process (iap)
- the transverse process (TP)
- the mamillary process

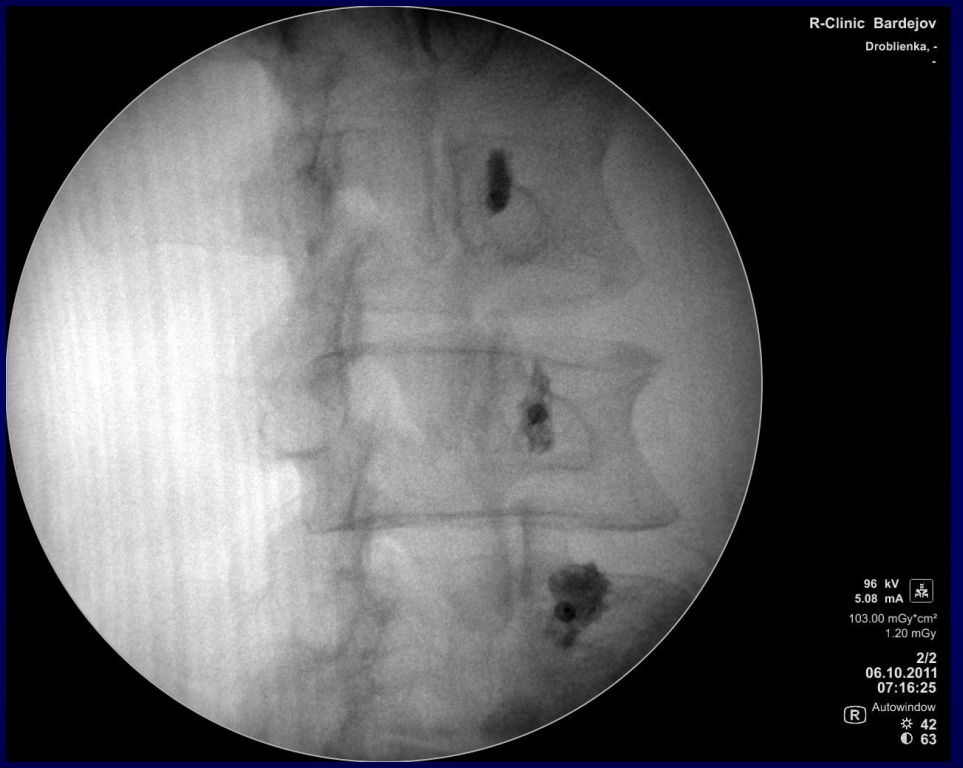


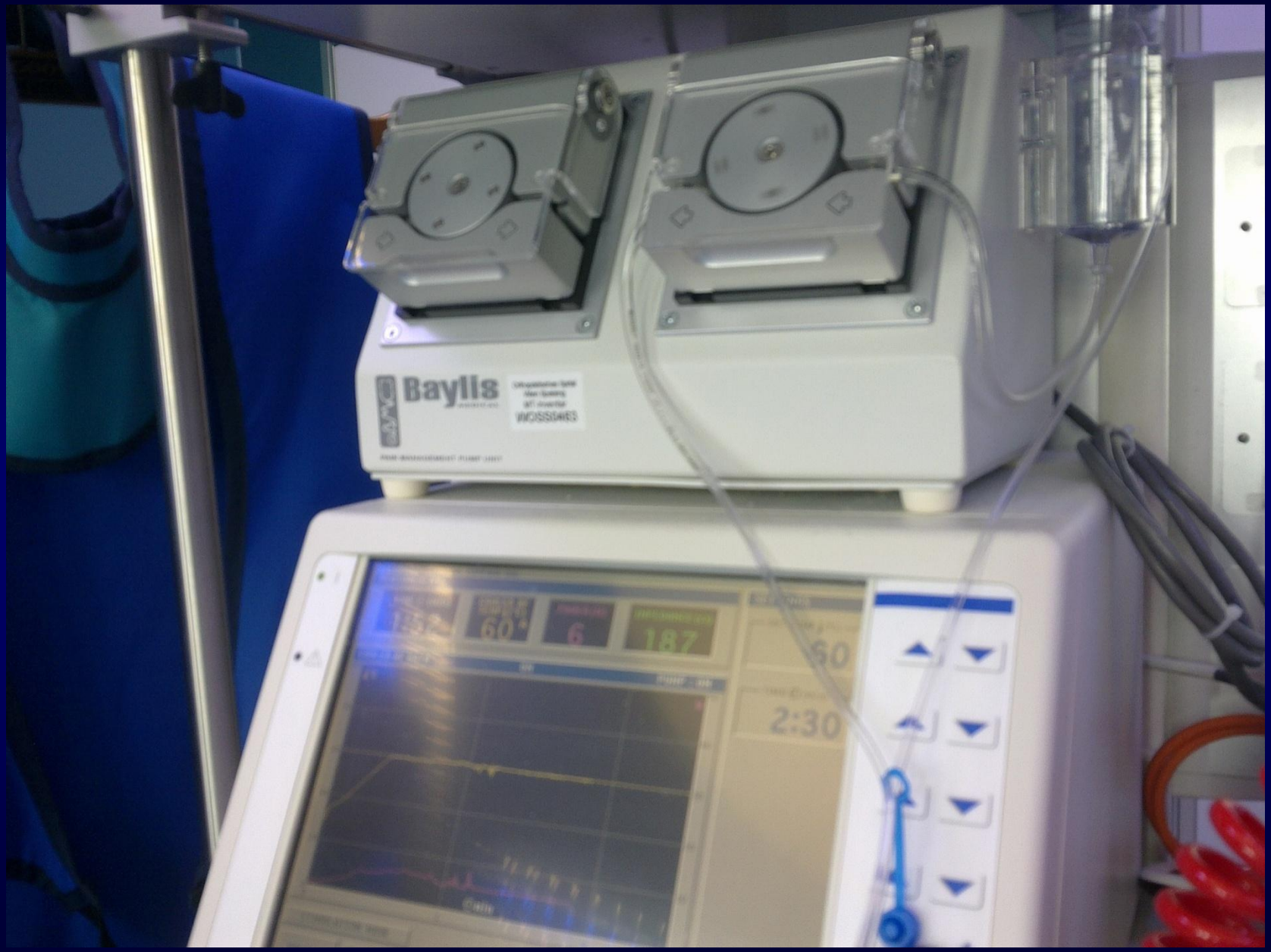
OBLIQUE VIEW: L5 vertebra for L4 medial branch neurotomy

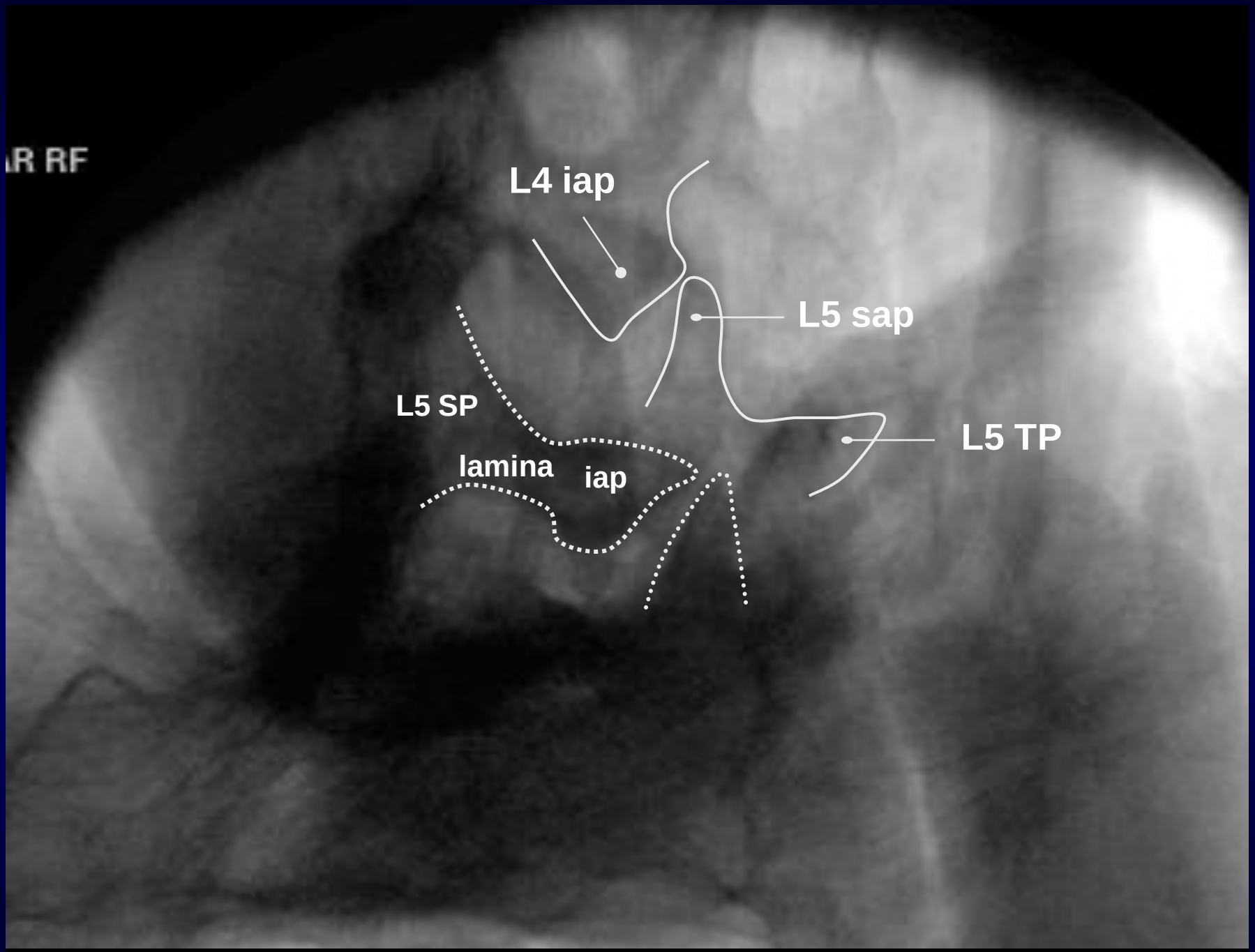


OBLIQUE VIEW: Scotty dog silhouette


R-Clinic Bardejov
Droblienka, -
-
96 kV
5.08 mA
109.00 mGy*cm²
1.26 mGy
1/2
06.10.2011
07:15:59
R
Autowindow
39
65


R-Clinic Bardejov
Droblienka, -
-
96 kV
5.08 mA
103.00 mGy*cm²
1.20 mGy
2/2
06.10.2011
07:16:25
R
Autowindow
42
63

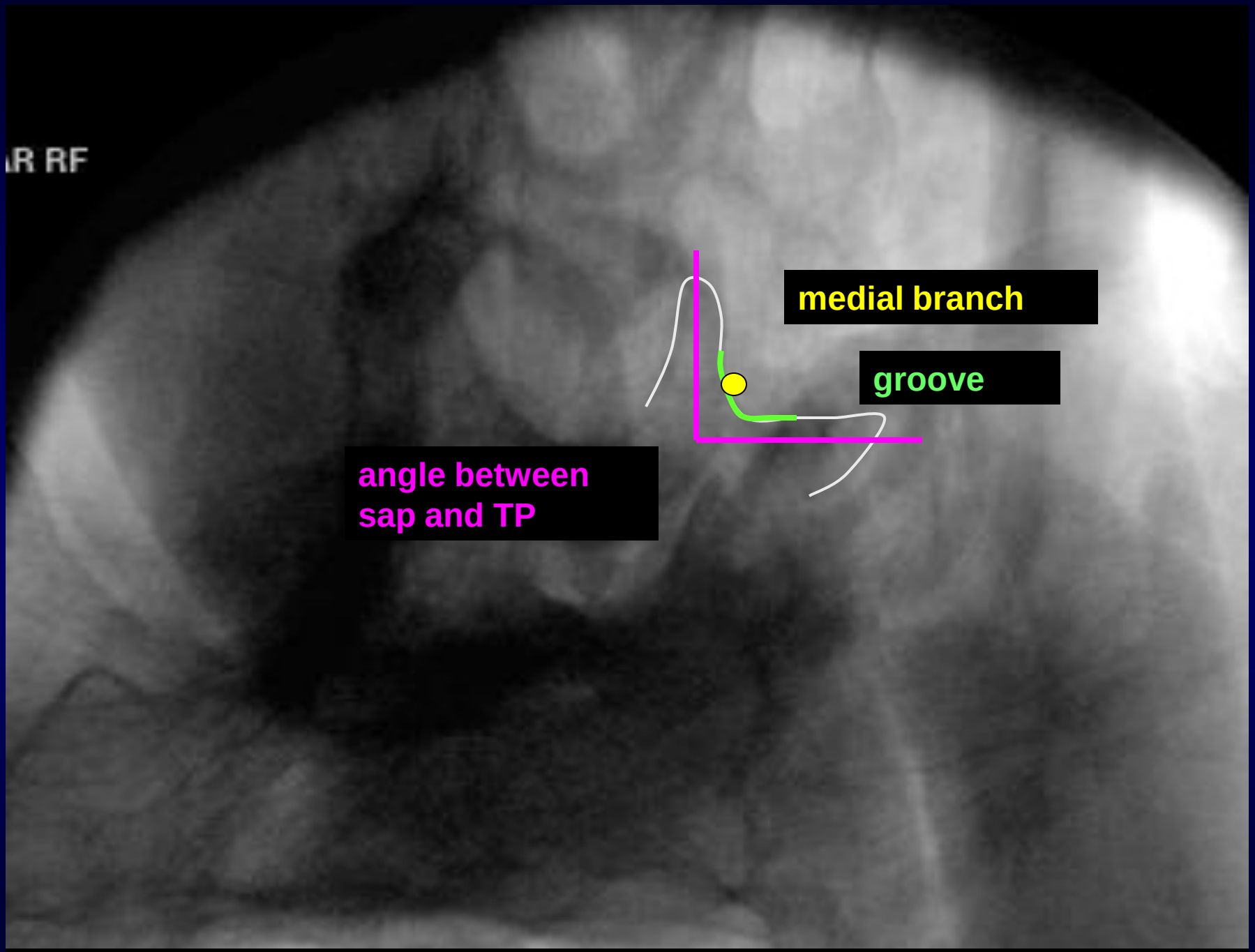

Baylis
60
6
187
2:30



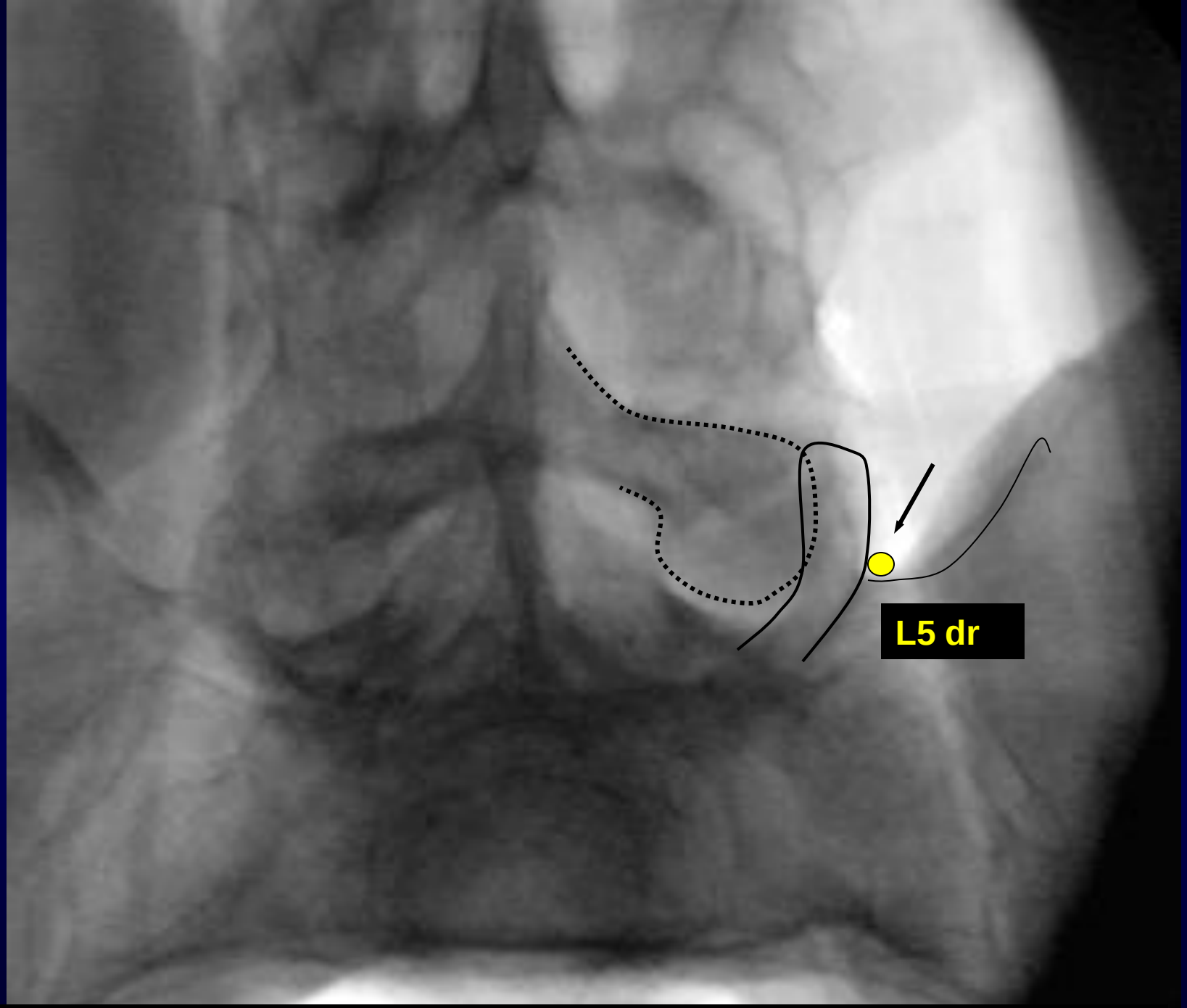
PILLAR VIEW: L5 vertebra for L4 medial branch neurotomy

The pillar view is the view along which electrodes will be inserted

- **Starting with the AP**
- **rotating the X-ray beam ipsilaterally by about 20°;**
- **and then slowly declining the X-ray beam caudally, so at to look at the target level from behind and from below**

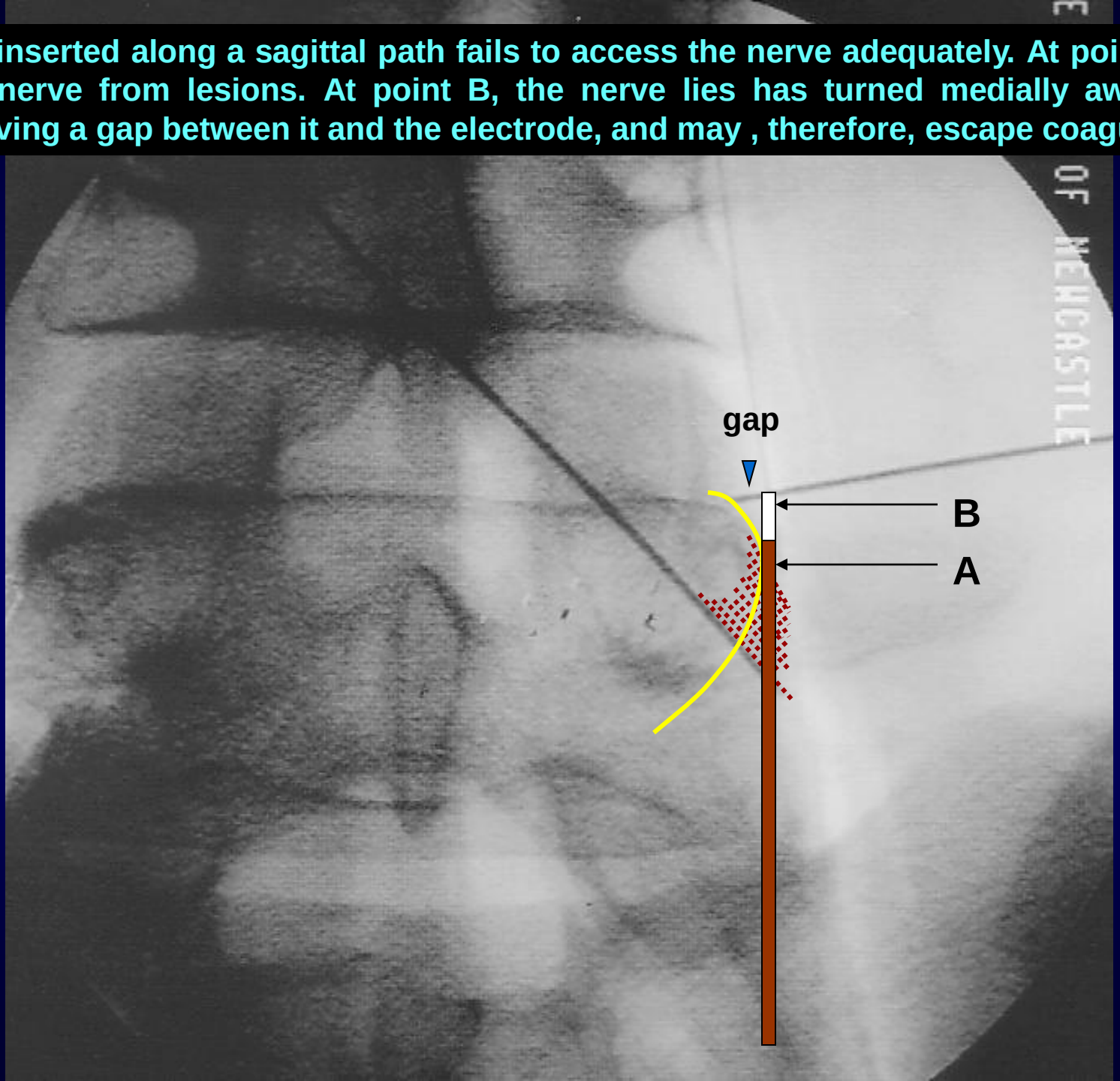


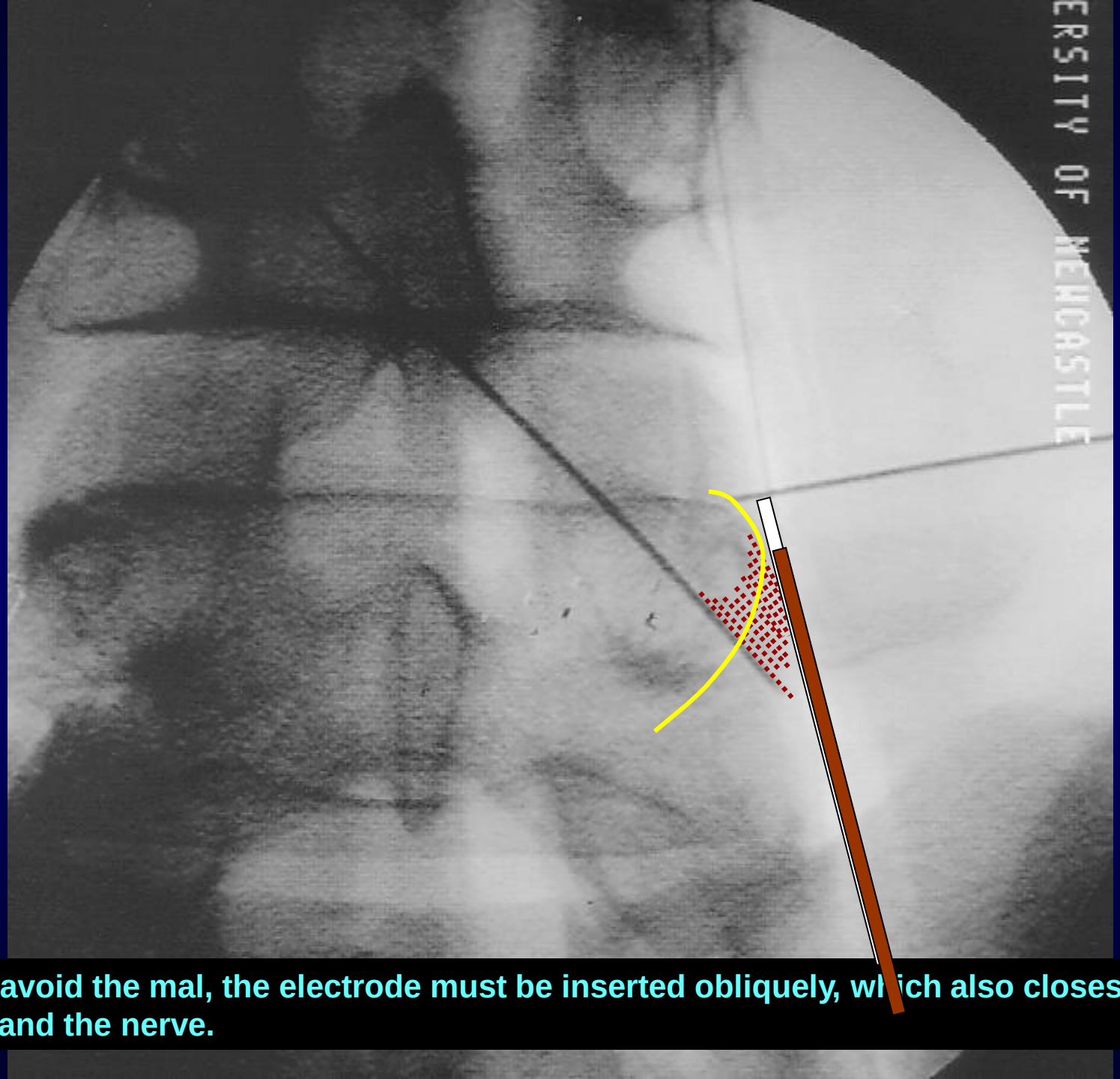
PILLAR VIEW: L5 vertebra for L4 medial branch neurotomy



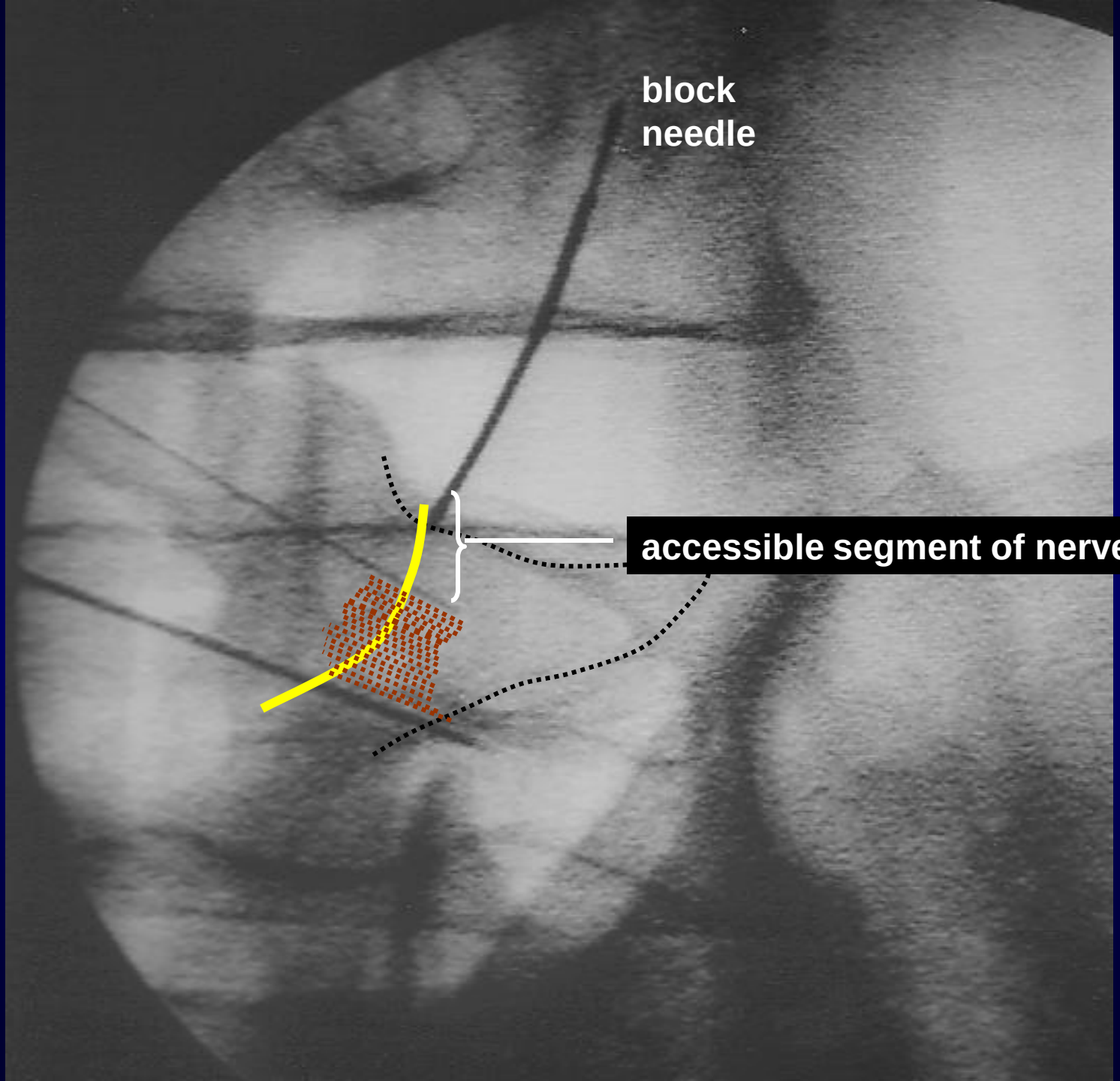
PILLAR VIEW: S1 vertebra for L5 medial branch neurotomy

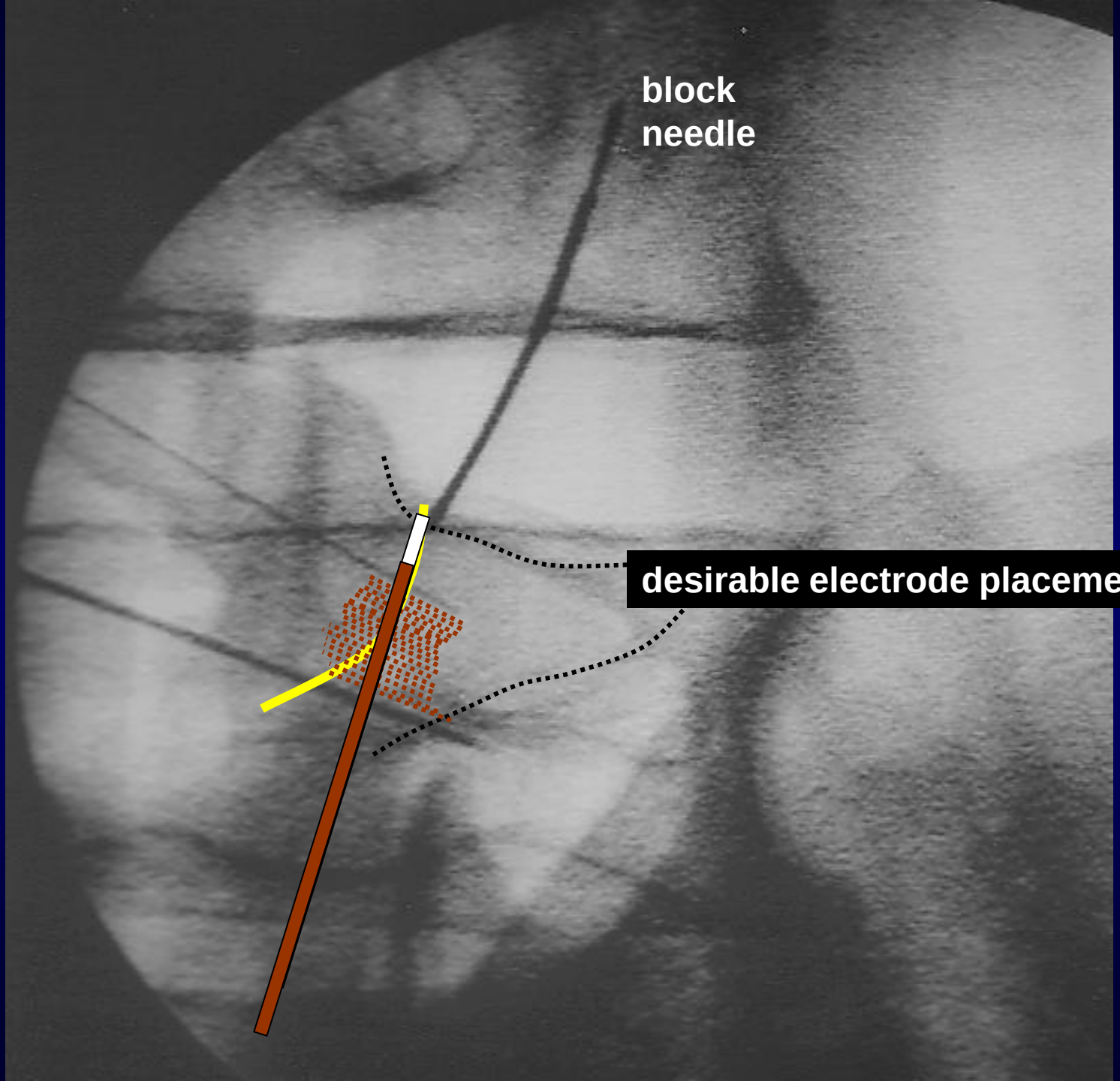
An electrode inserted along a sagittal path fails to access the nerve adequately. At point A, the mal protects the nerve from lesions. At point B, the nerve lies has turned medially away from the electrode, leaving a gap between it and the electrode, and may , therefore, escape coagulation.

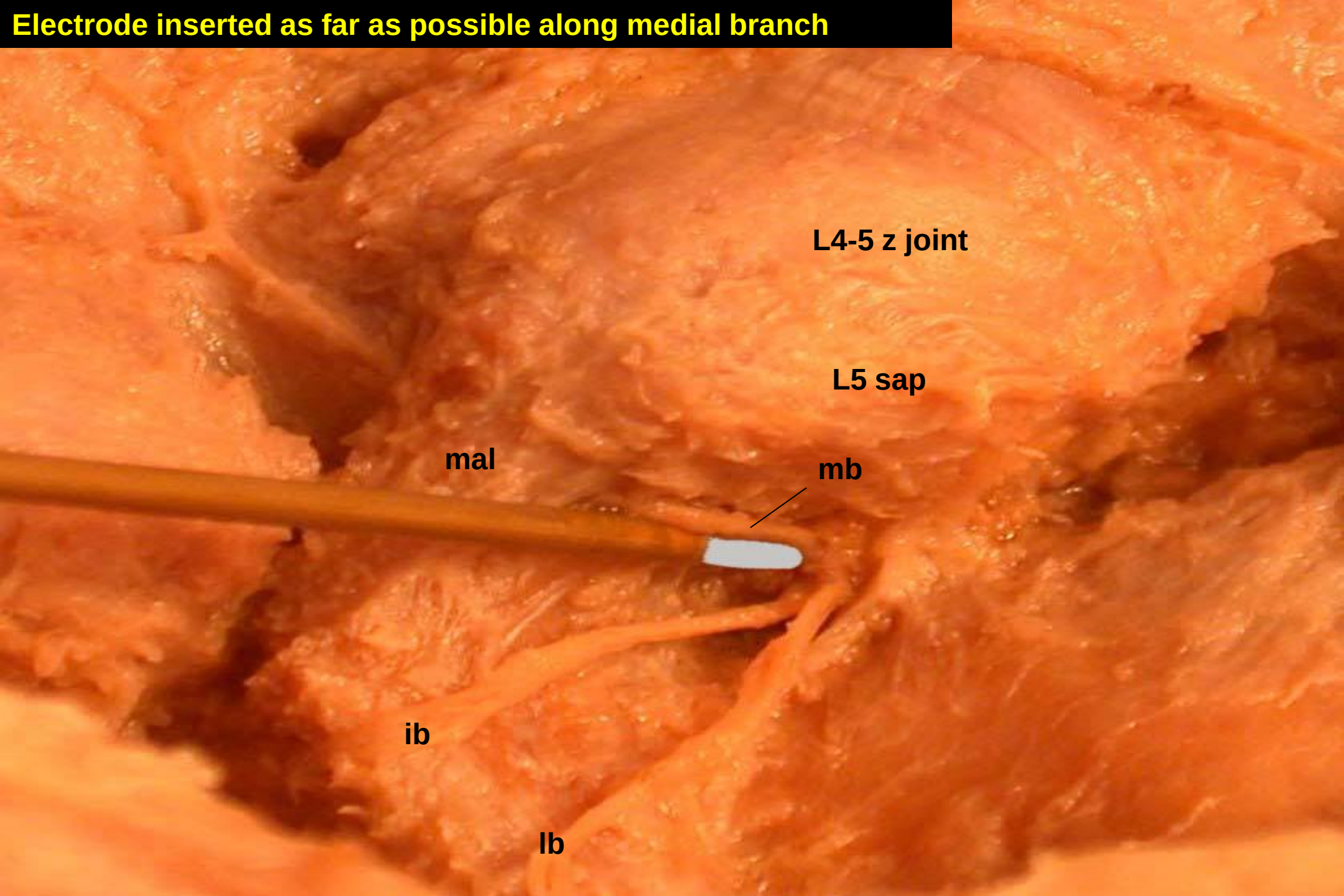


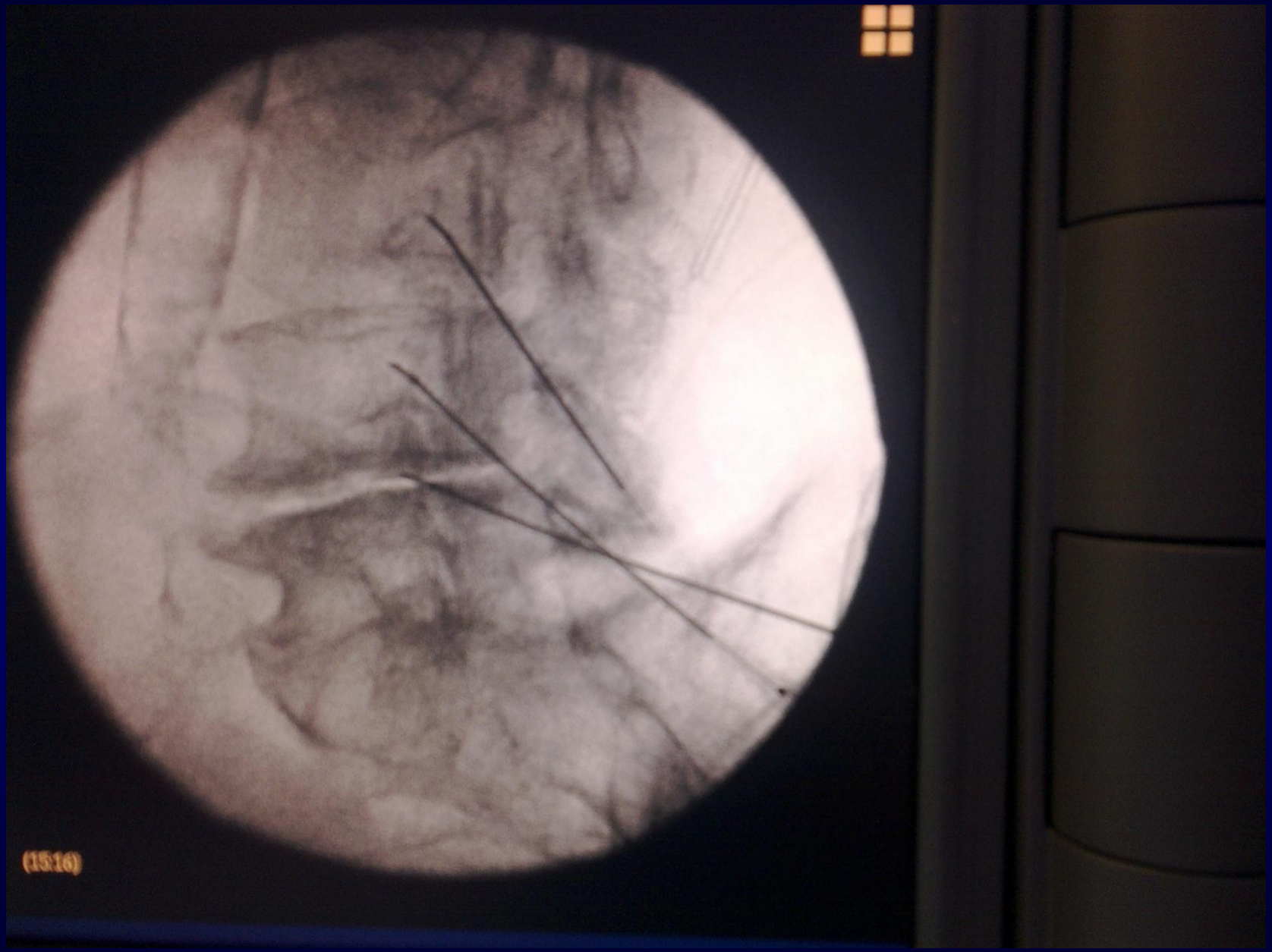


In order to avoid the mal, the electrode must be inserted obliquely, which also closes the gap between it and the nerve.

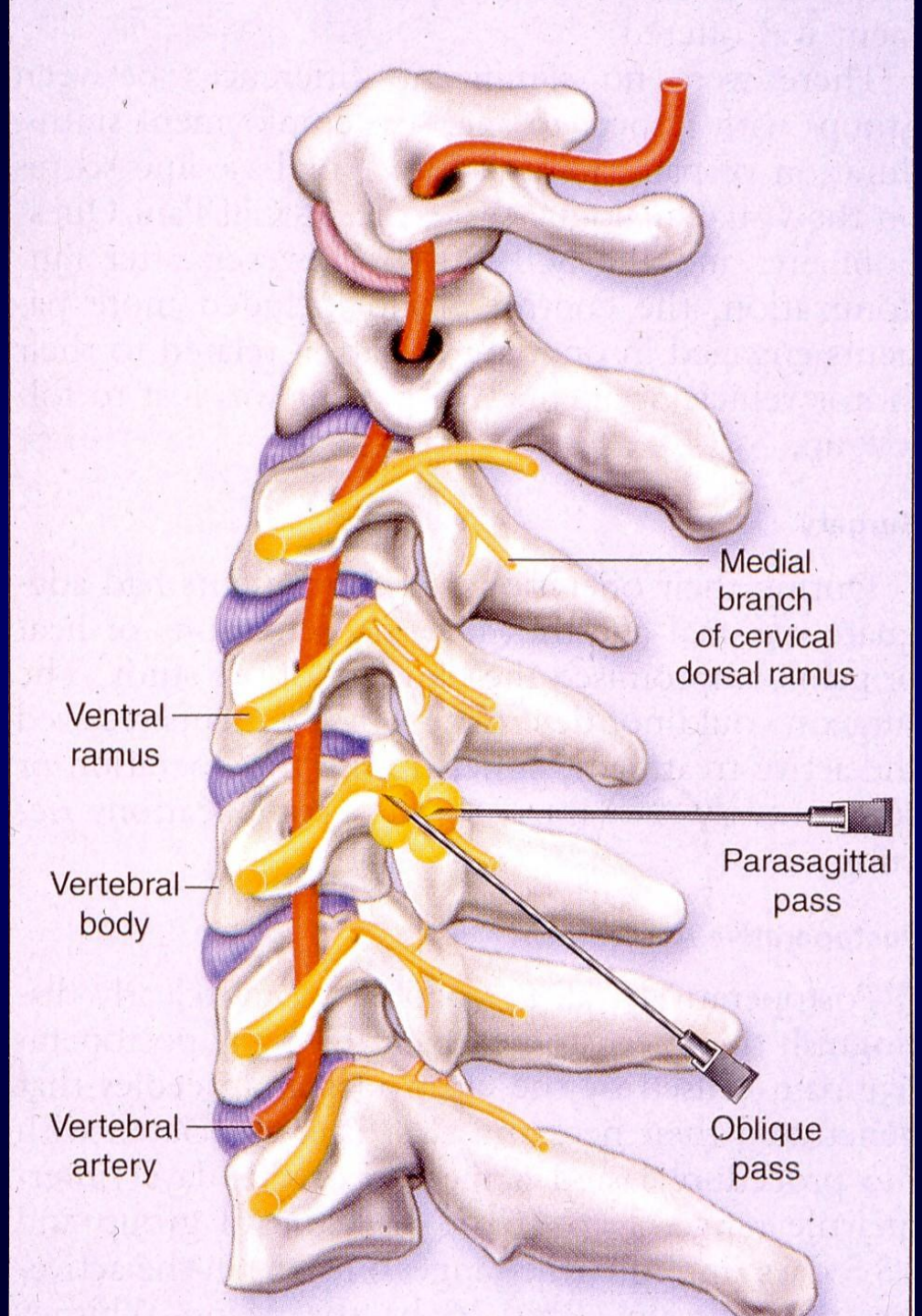

block
needle
accessible segment of nerve


block
needle
desirable electrode placement


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


(15:16)

Are you still there ?


Medial branch of cervical dorsal ramus
Ventral ramus
Parasagittal pass
Vertebral body
Oblique pass
Vertebral artery


[redacted]
Smärtkliniken
Nacke
2007-03-21 09:58
7
1
PHILIPS BV Pulsera


[redacted]
Smärtkliniken
Nacke
2007-03-21 09:59
8
1
PHILIPS BV Pulsera


[redacted]
Smärtkliniken
Nacke
2007-03-21 10:01
9
1
PHILIPS BV Pulsera

Randomised controlled trial of cervical radiofrequency lesions as a treatment for cervicogenic headache

Haspeslagh SR, Van Suijlekom HA, Lame IE, Kessels AG, van Kleef M, Weber WE.
BMC Anesthesiol. 2006 feb 16; 6:1

Radiofrequency denervation of facet joints C2-C6 in cervicogenic headache: a randomized, double-blind, sham-controlled study.

Stovner LJ, Kolstad F, Helde G.Cephalalgia. 2004 Oct;24(10):821-30.

Sacroiliac joint

- **6.4.2.5 Level of Evidence**

  Based on the available literature and the USPSTF criteria, the indicated evidence is Level II - 3 (limited)for radiofrequency neurotomy of sacroiliac joint nerve supply.

ASIPP – IPM Guidelines, Pain Physician 2009; 12:699-802 • ISSN 1533-3159

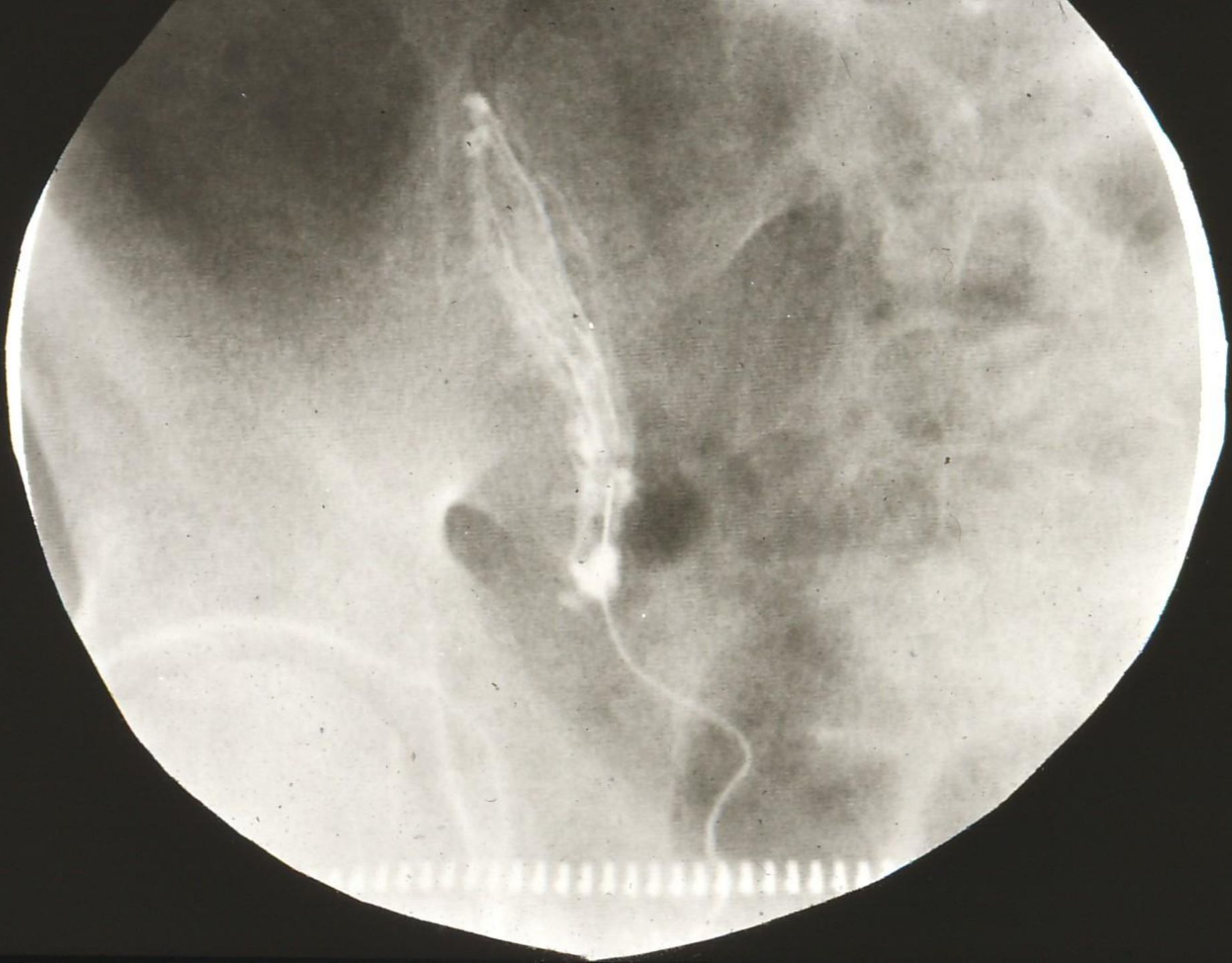
Use of Cooled Radiofrequency Lateral Branch Neurotomy for the Treatment of Sacroiliac Joint Mediated Low Back Pain: A Large Case Series (126 cases)

Presented at the European Society of Regional Anesthesia September 2011

W. Stelzer, Med. Zentrum SchmerzLOS Linz und Baden/Wien – Austria; H. Wagner, JK Universität Linz,; M. Aiglesberger, D. Stelzer,; V. Stelzer, Med. Zentrum SchmerzLOS Linz / Baden/ Wien – Austria

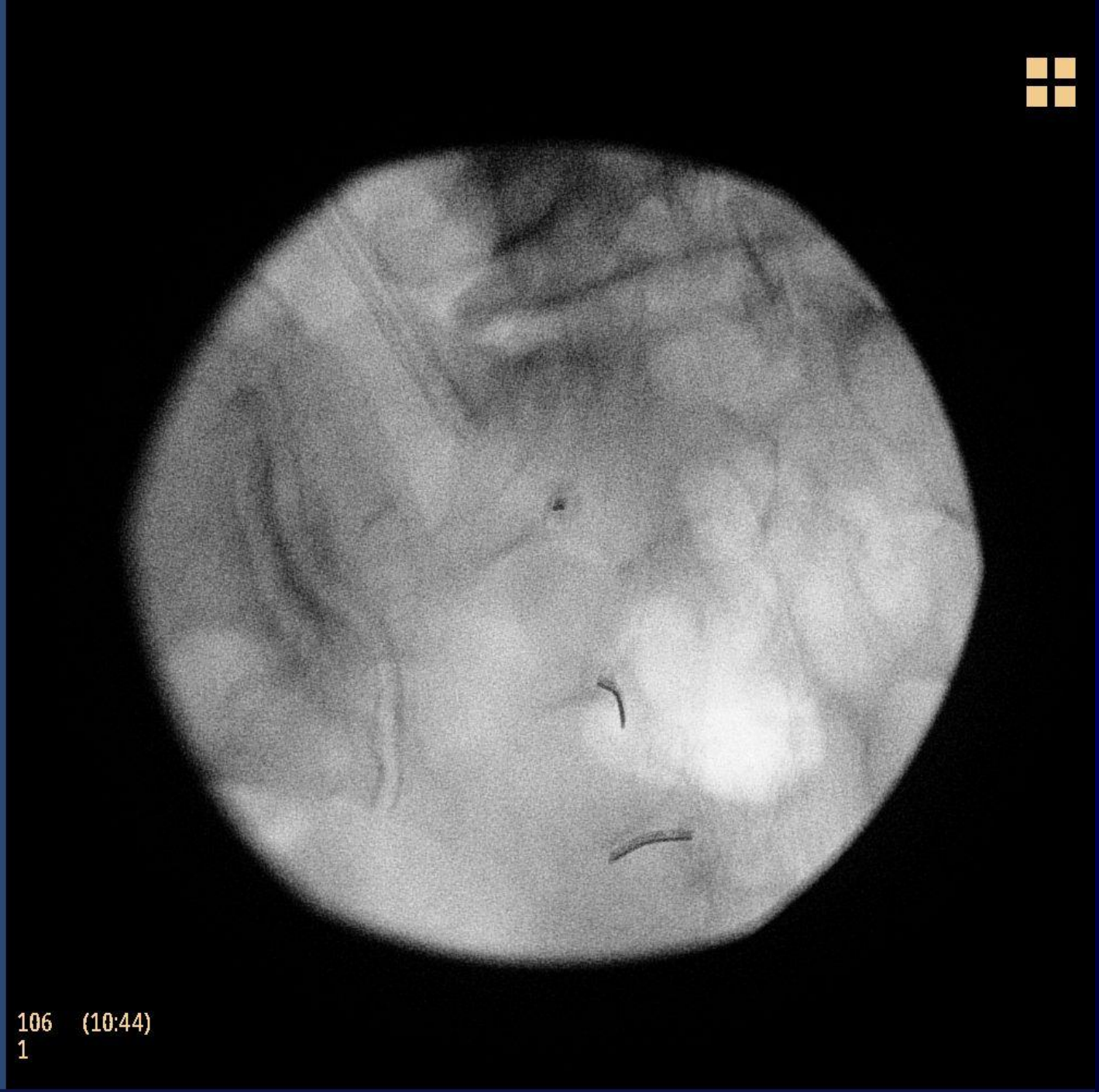
Results

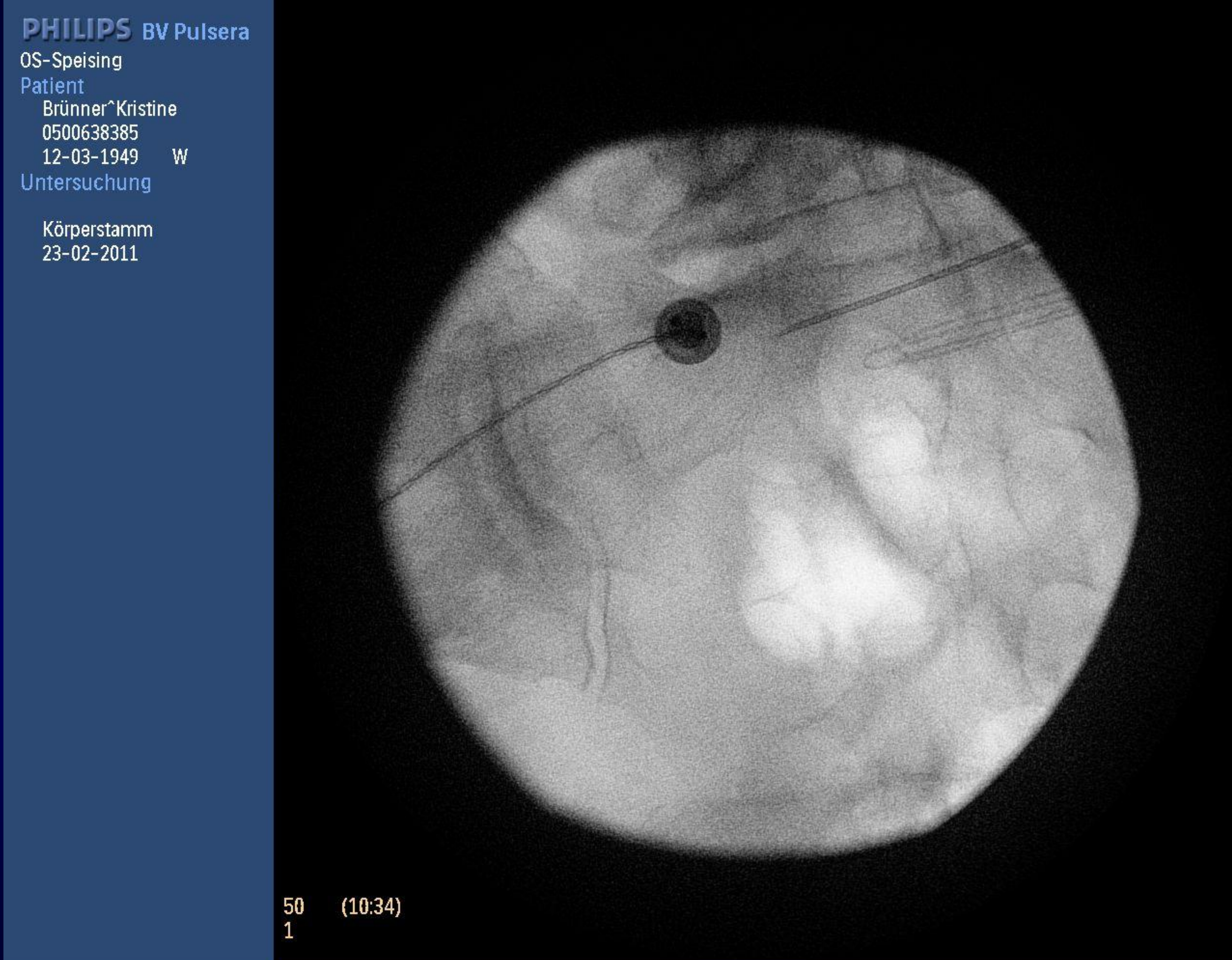
When stratified by time to final follow-up (4-6 months, 6-12 months, >12 months, respectively): 86%, 71% and 48% of subjects experienced ≥50% reduction in VAS pain scores; 96%, 93%, and 85% reported their quality of life as Much Improved or Improved; and, 100%, 62%, and 67% of opioid users stopped or decreased use of opioids.



PHILIPS BV Pulsera
OS-Speising
Patient
Brünner^Kristine
0500638385
12-03-1949 W
Untersuchung

Körperstamm
23-02-2011

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OS-Speising
Patient
Brünner^Kristine
0500638385
12-03-1949 W
Untersuchung
Körperstamm
23-02-2011
50 (10:34)
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PHILIPS BV Pulsera
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Patient
Brünner^Kristine
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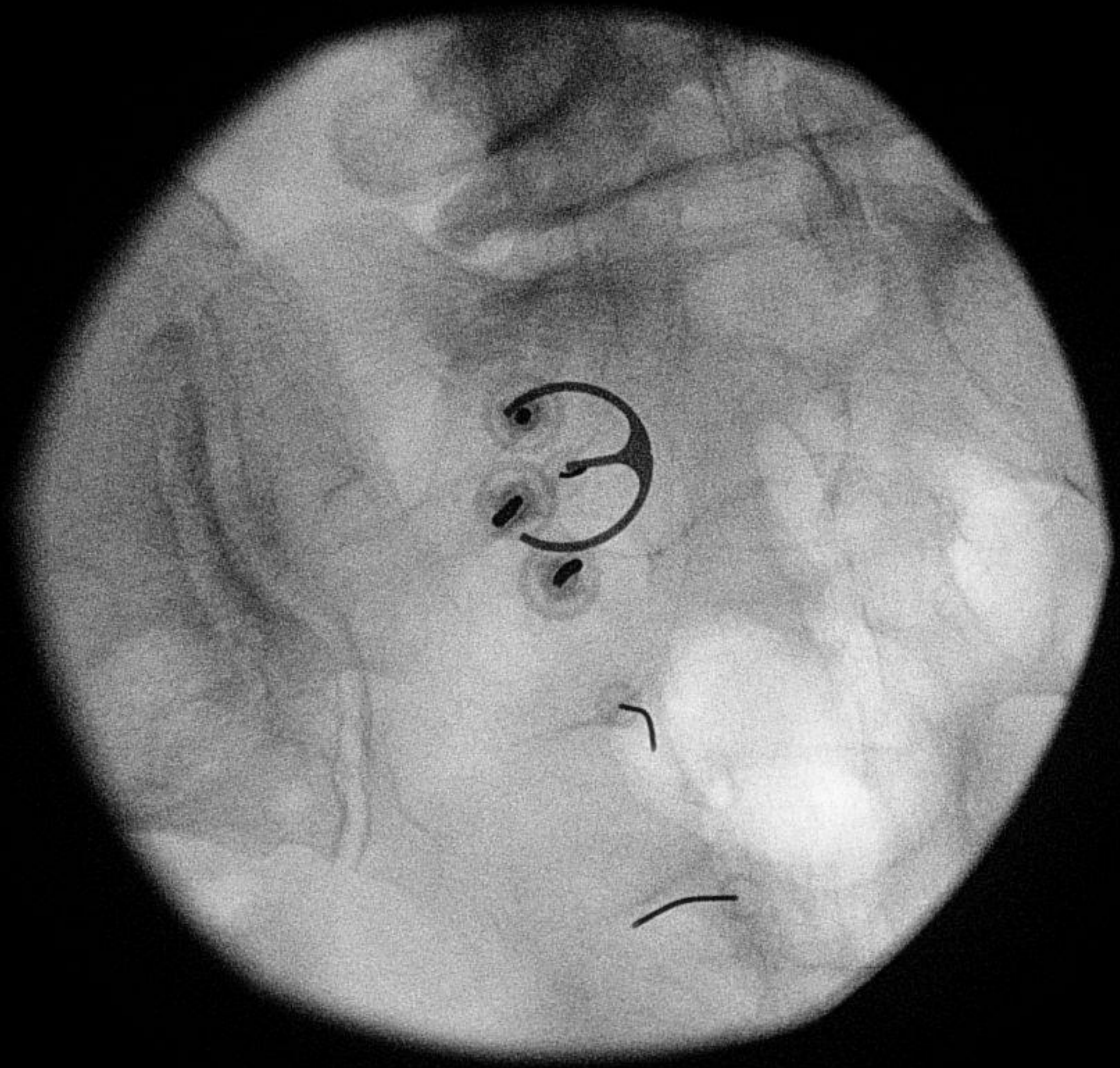
12-03-1949 W
Untersuchung

Körperstamm
23-02-2011



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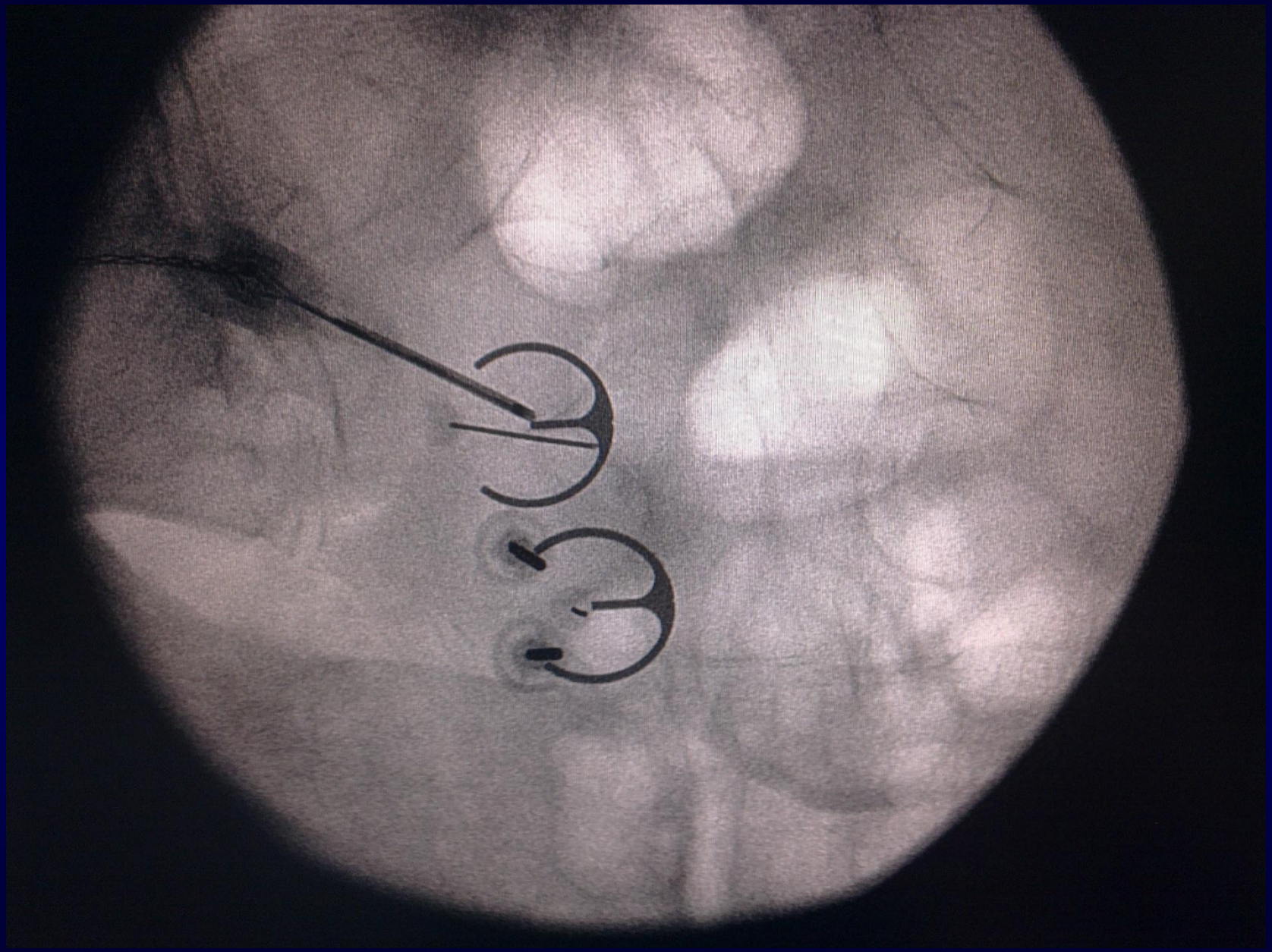

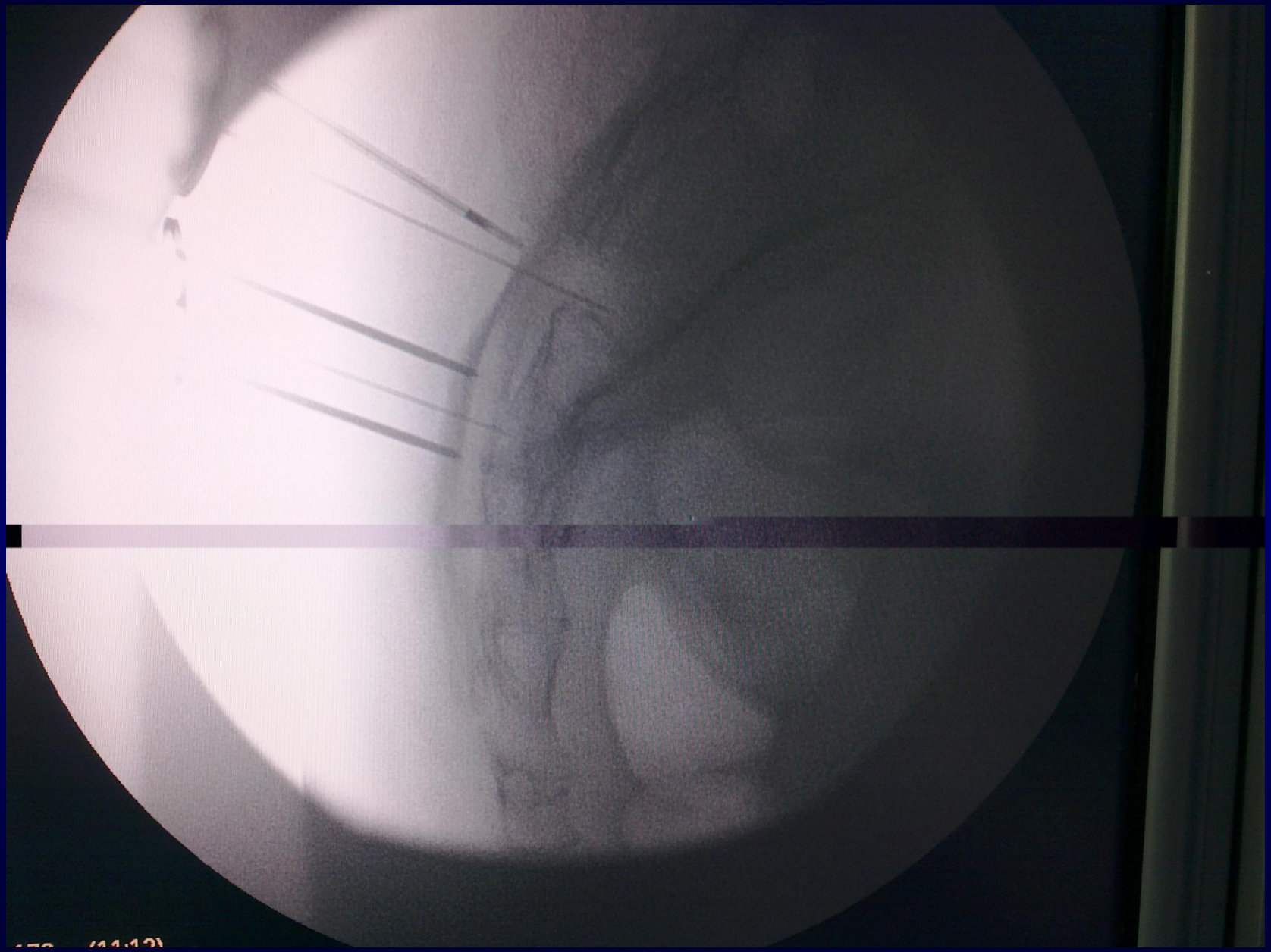

RF annuloplasty

6.5.3.3 Level of Evidence

The indicated level of evidence for radiofrequency annuloplasty is II-3 based on USPSTF criteria.

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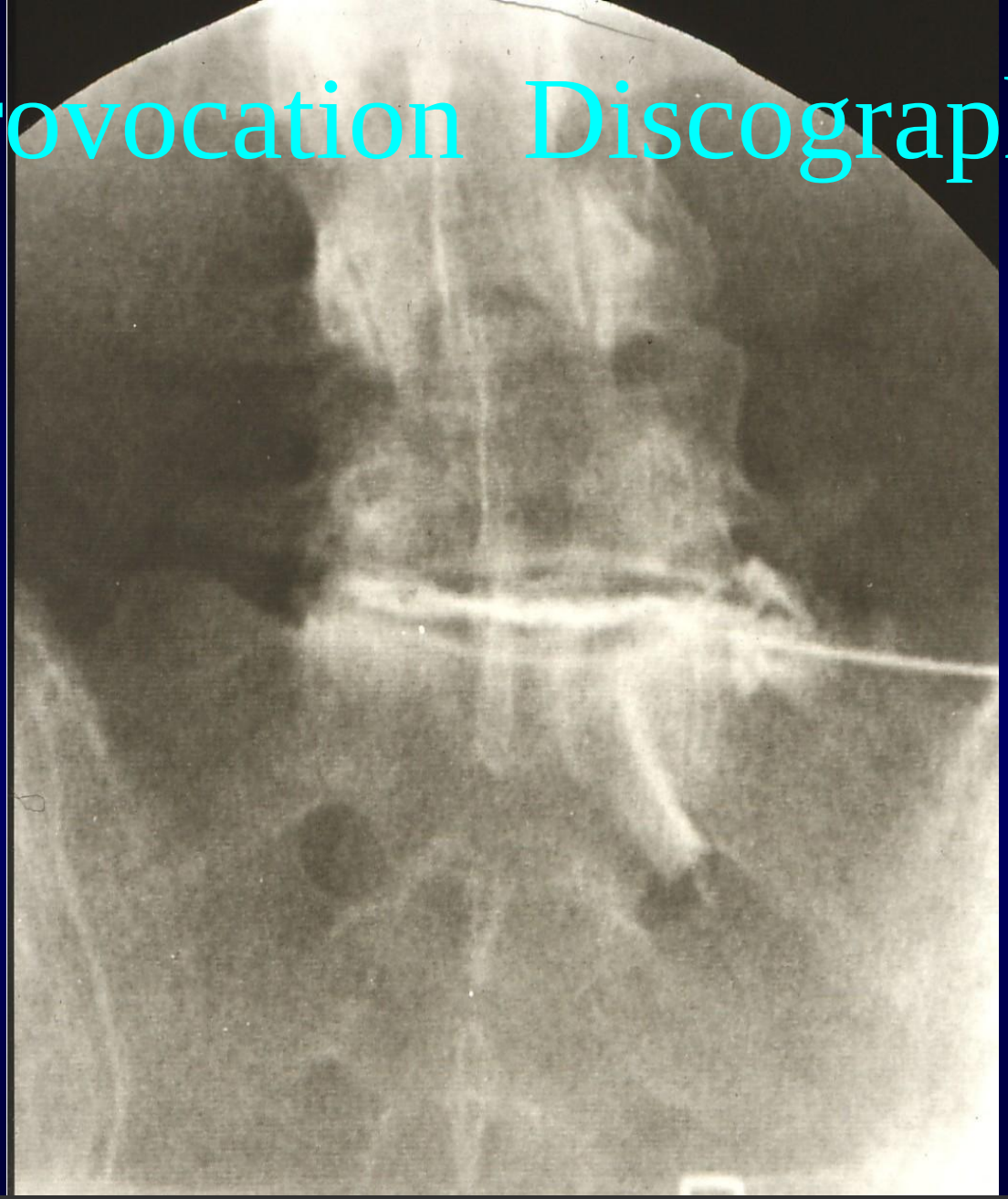
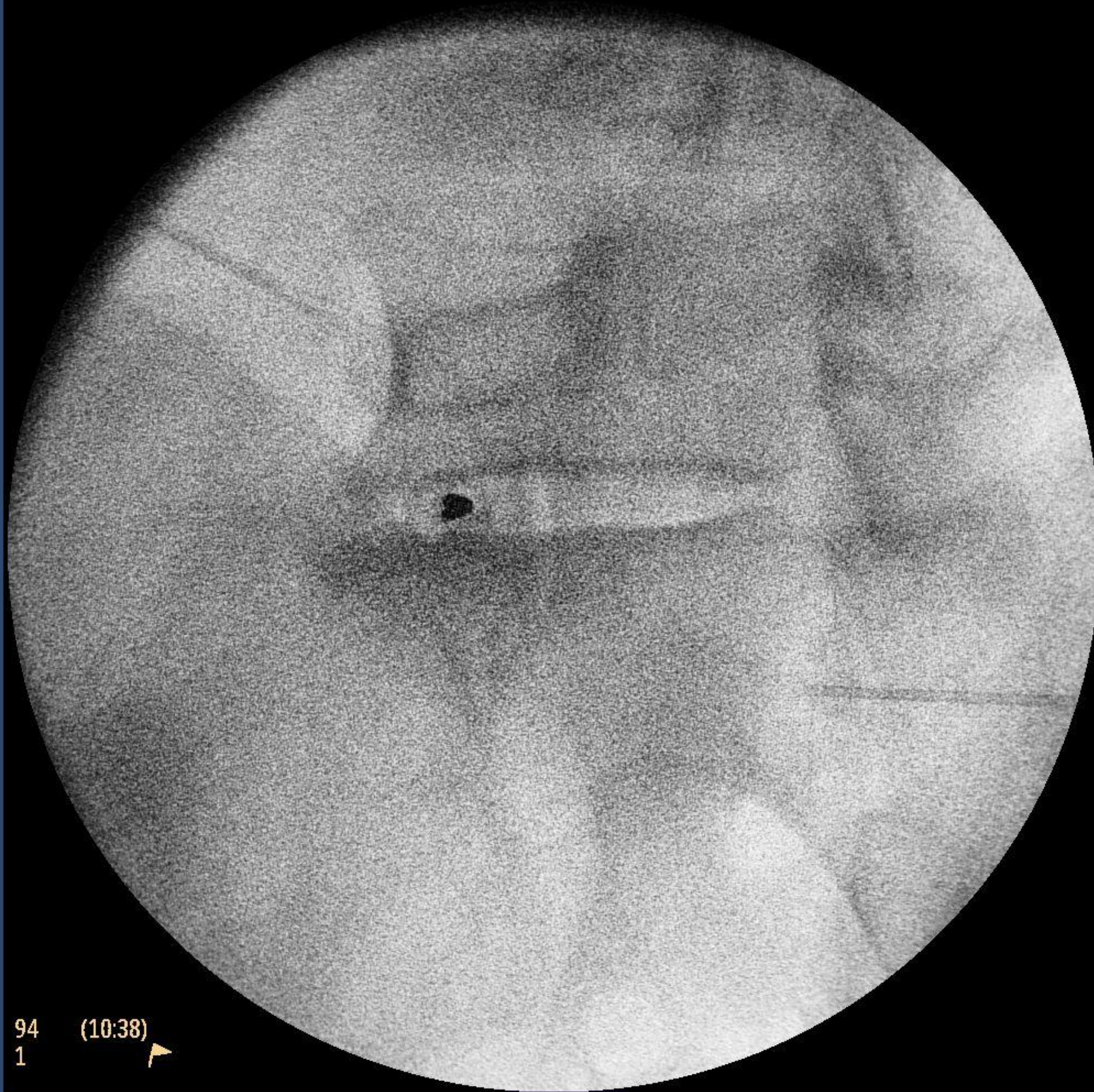
Provocation Discography



Leakage Nucleus Pulposus onto S1 root

PHILIPS BV Pulsera
OS-Speising
Patient
Moritz^Monika
0500184759
07-01-1969 W
Untersuchung

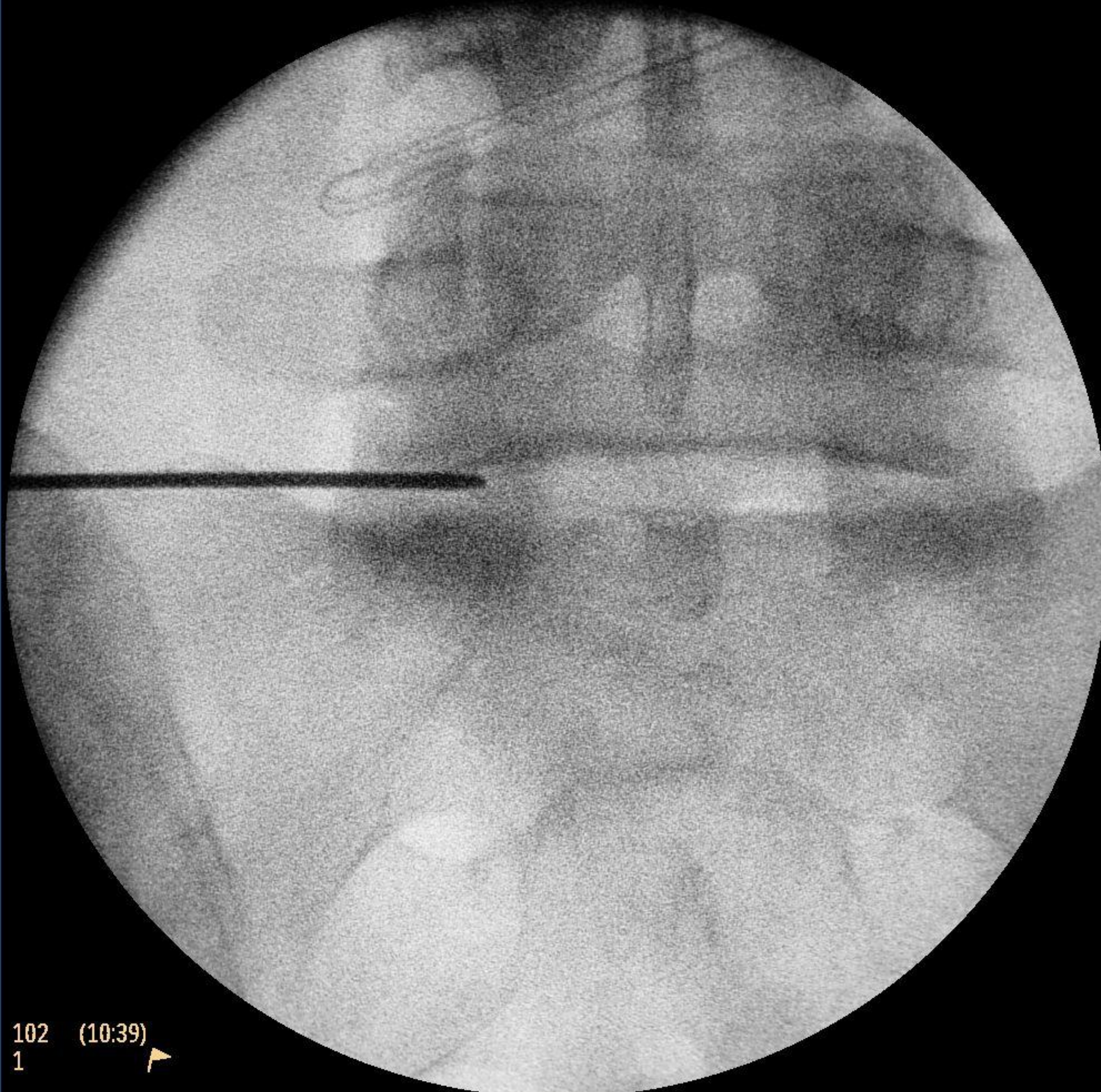
Körperstamm
16-02-2011



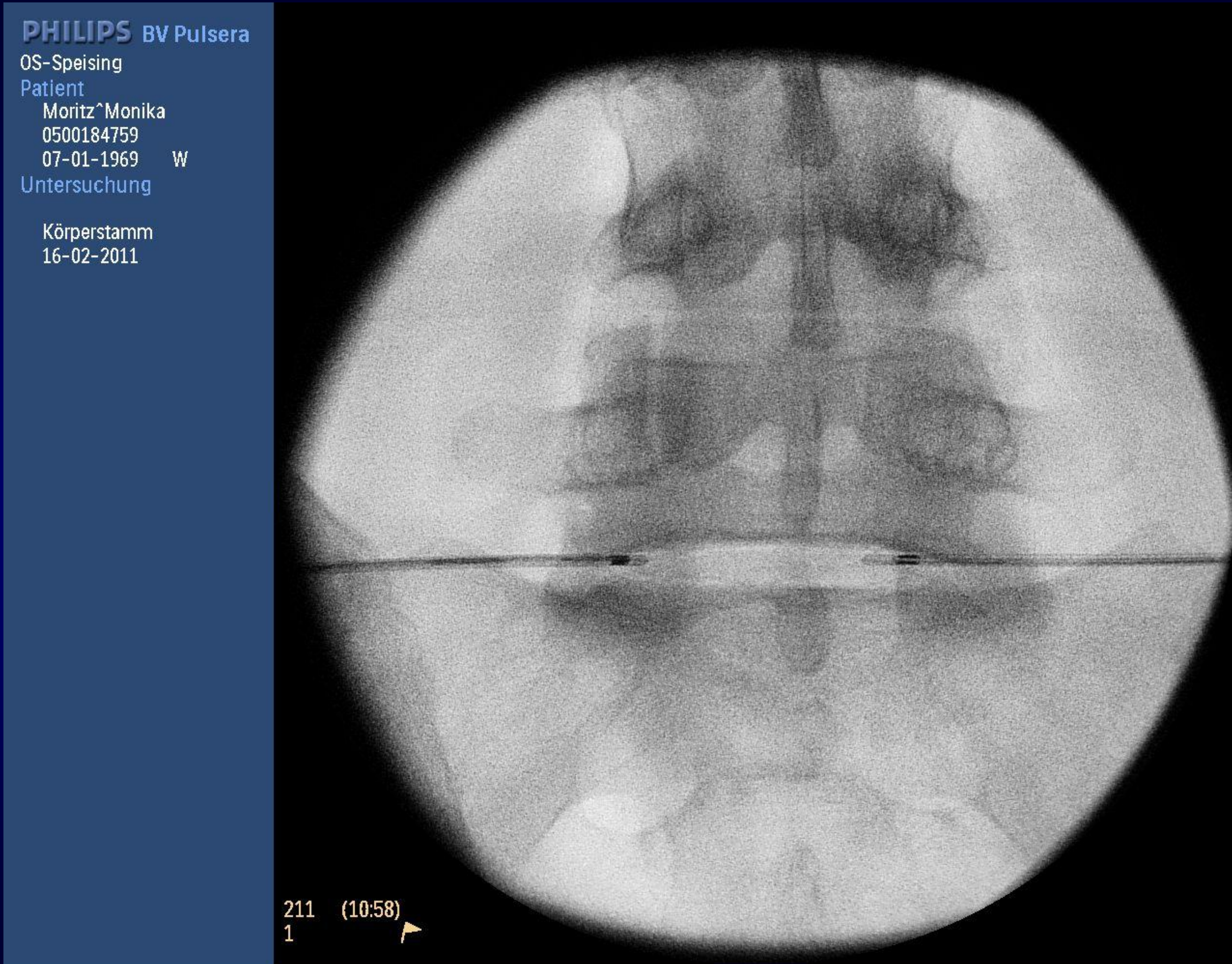
R-Clinic s.r.o.

PHILIPS BV Pulsera
OS-Speising
Patient
Moritz^Monika
0500184759
07-01-1969 W
Untersuchung

Körperstamm
16-02-2011



R-Clinic


PHILIPS BV Pulsera
OS-Speising
Patient
Moritz^Monika
0500184759
07-01-1969 W
Untersuchung
Körperstamm
16-02-2011
211 (10:58)
1

Failed RF Drill

Did I miss a nerve ?

Repeat test blocks on denervated levels

If pain relief -- Repeat RF same levels

If no pain relief -- Test adjacent levels

If pain relief -- New RF adjacent levels

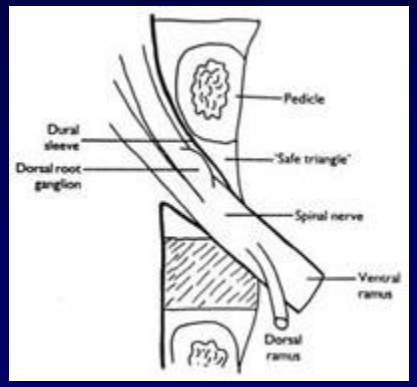
If no pain relief -- Back to the drawing board

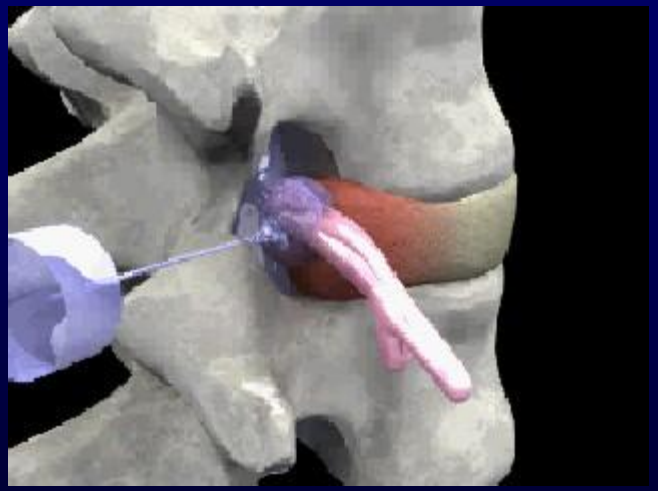
Complications

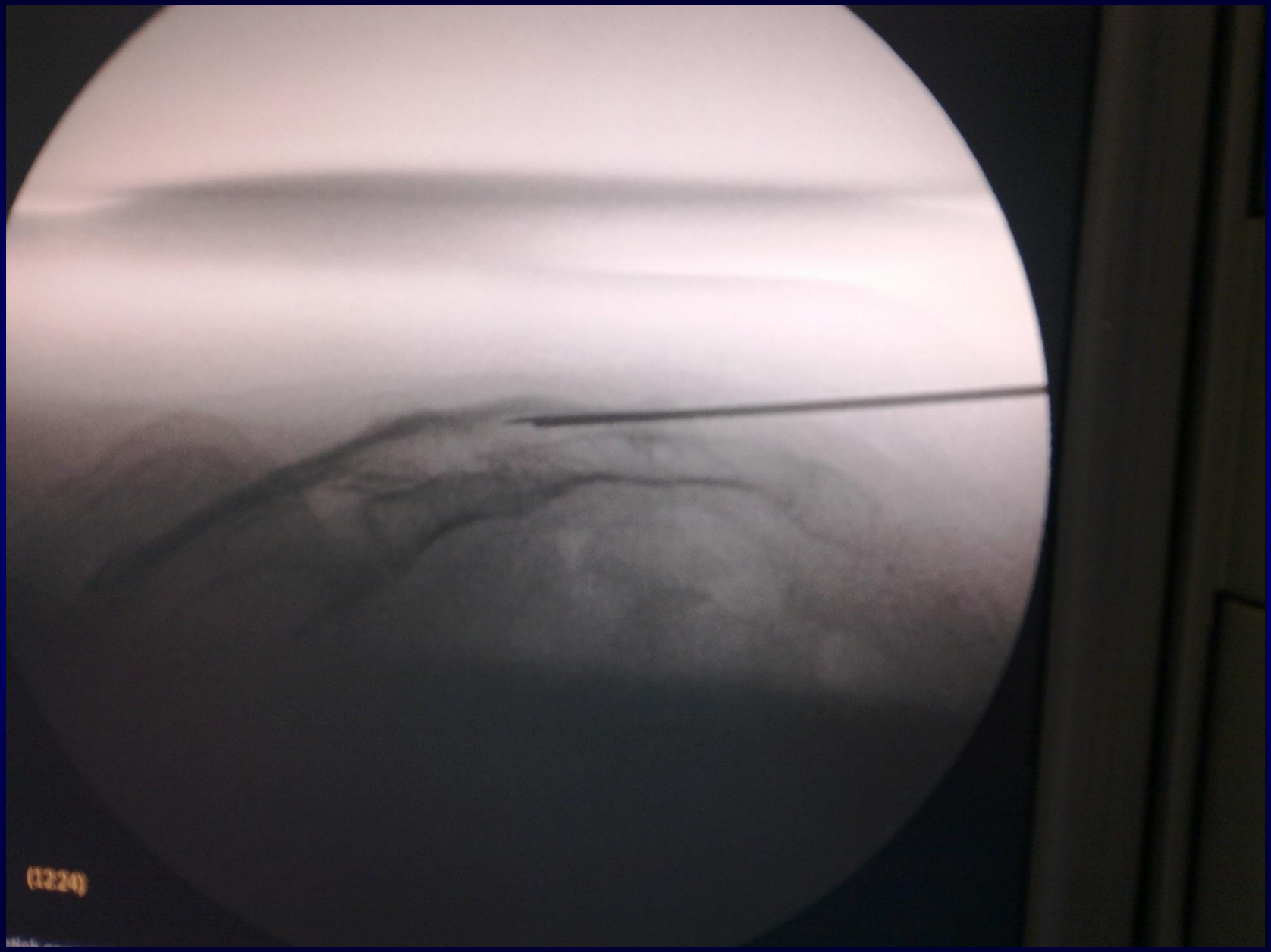
- Post - procedural pain
- Dysaesthesia
- Mild ataxia
- Numbness
- Hyperaesthesia
- Itching

Usually short lived

Selective nerve root blocks



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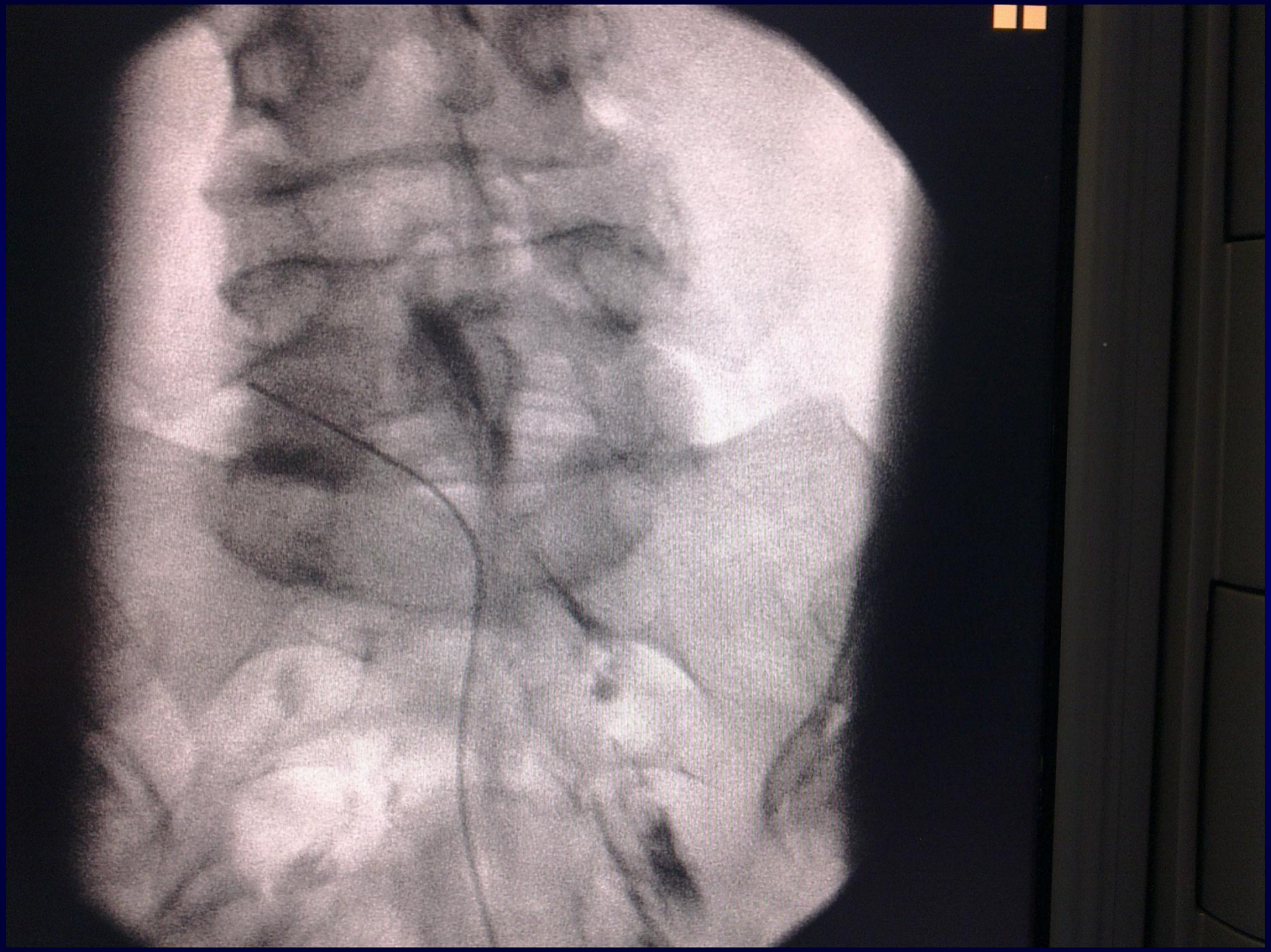
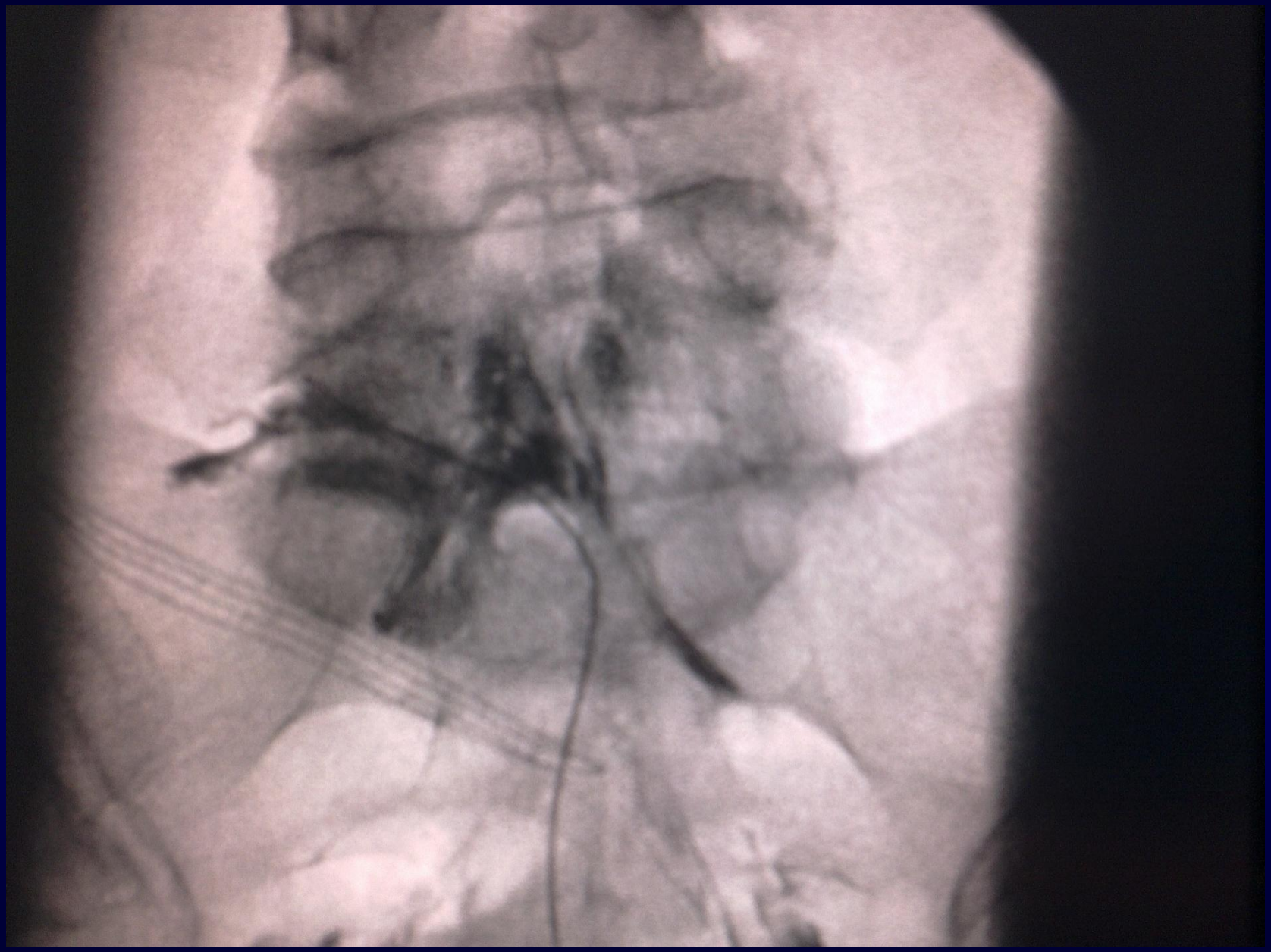




A position statement on SCS by American Academy of Pain Medicine, The American Society of Interventional Pain Physicians, the International Spine Intervention Society,the Neuromodulation Therapy Acces Coalition, and the North American Neuromodulation Society.

The paper considered SCS to be effective in reducing chronic neuropathic pain, while demonstrating cost – effective improvement in quality of life and functional outcomes.

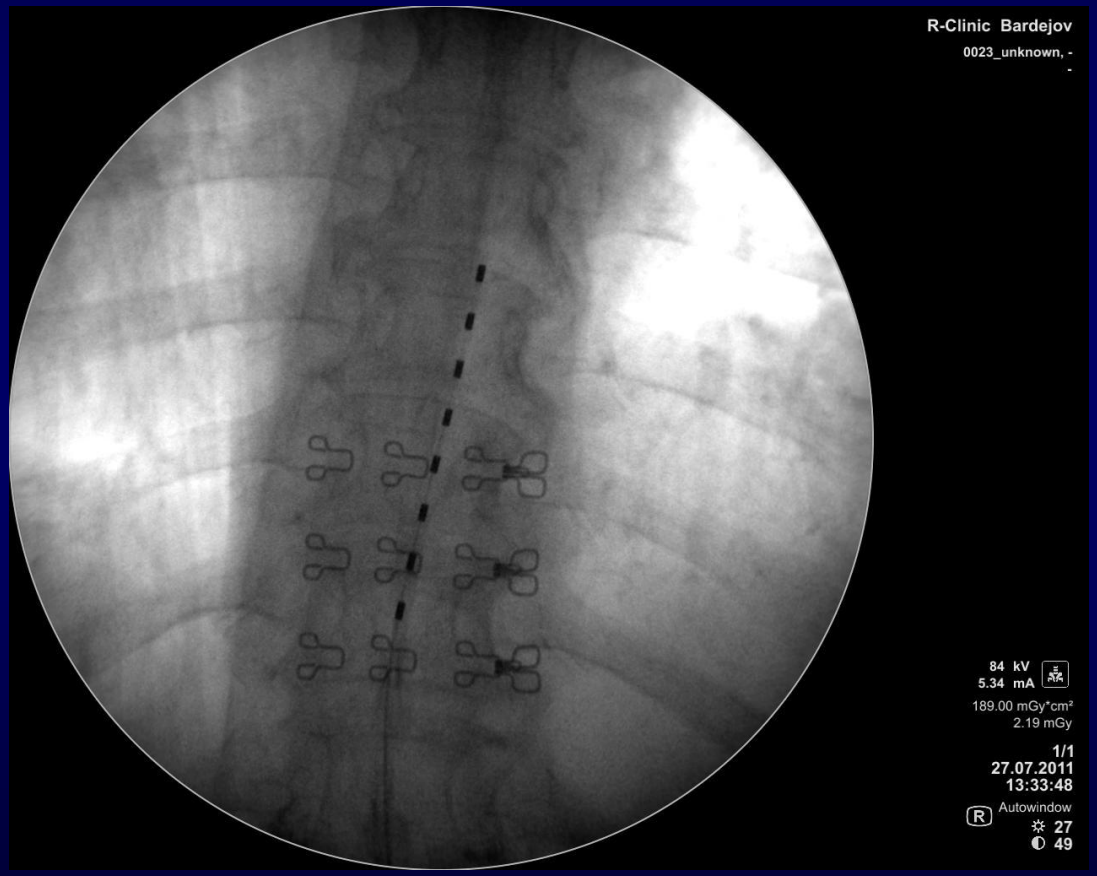
European Federation of Neurological Societies (EFNS)

Good evidence supports the use of SCS for reducing pain associated with FBSS and CRPS I. Positive results are also for CRPS II, peripheral nerve injury, DPN, PHN, brachial plexus lesion, amputation (stump and phantom pains)

SCS – spinal cord stimulation

- conventional
- non - conventional

SCS – AP view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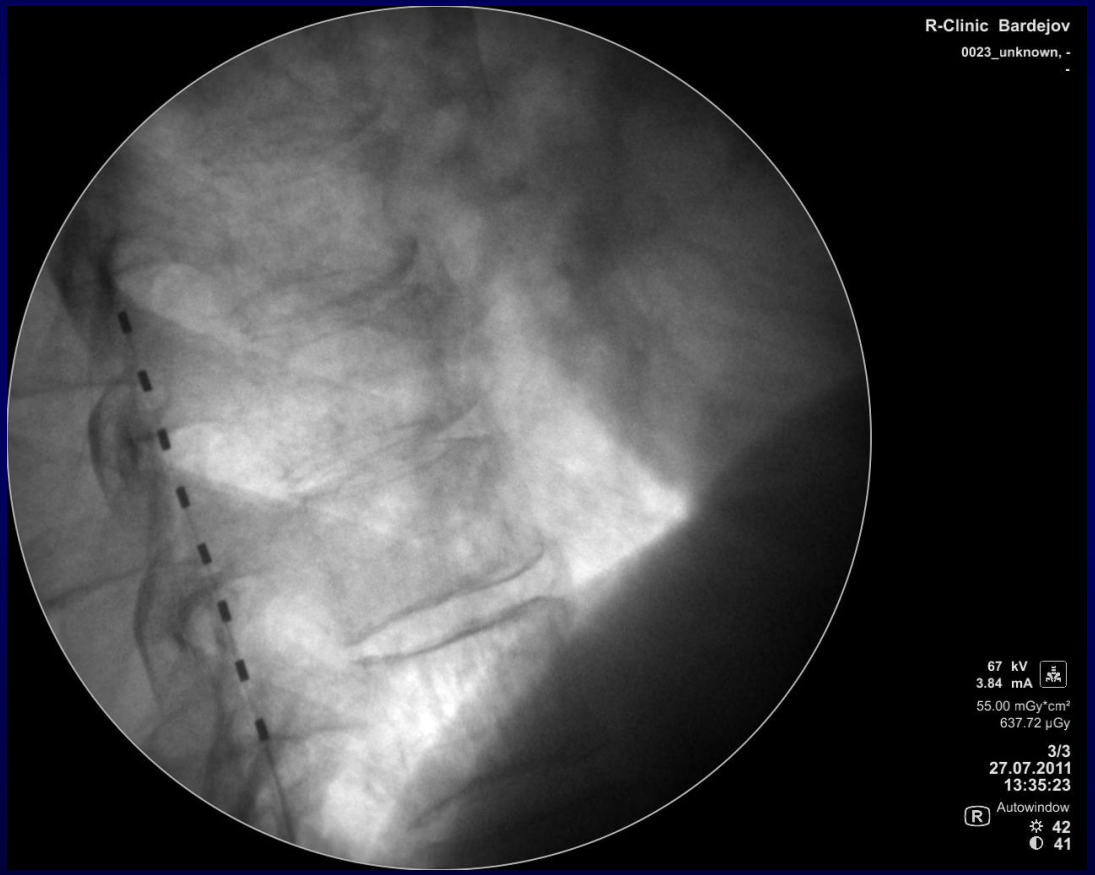
49

SCS – lateral view



THANK YOU FOR YOUR ATTENTION!