

# Pain Management 101

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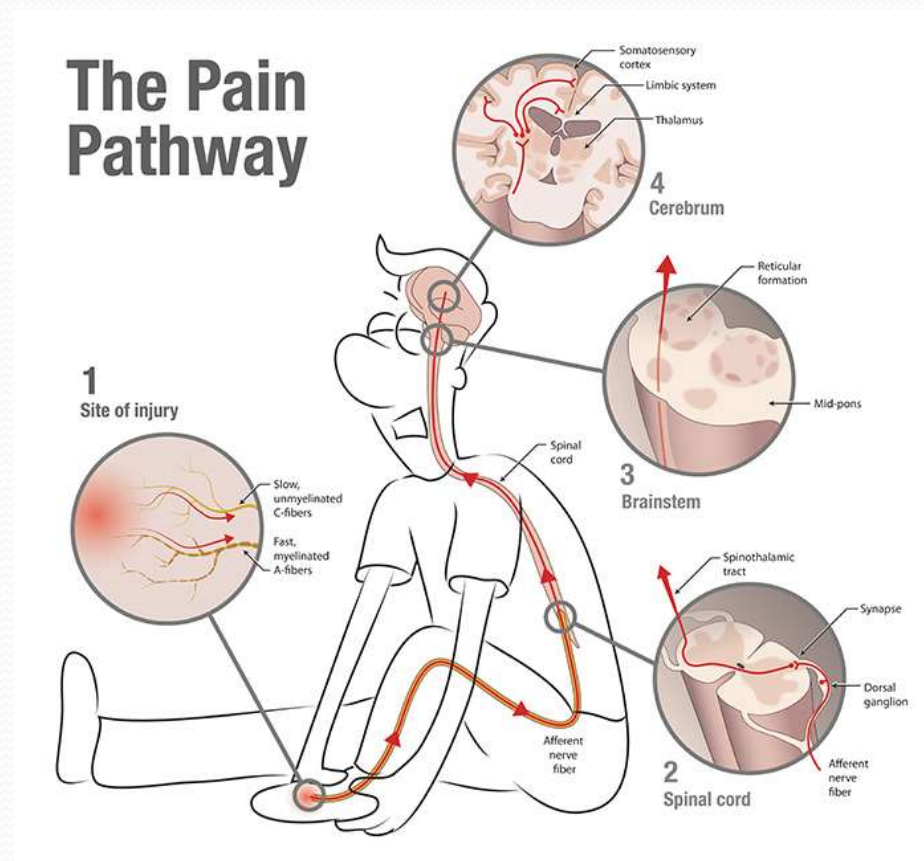
Boston Medical Center

Boston Outpatient Surgical Suites

New England Baptist Hospital

*Work Related Injuries Workshop  
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# Pain Origin





# Soft Tissues

- muscles
- nerves
- tendons (muscle to bone)
- ligaments (bone to bone or organ to organ)
- Intervertebral discs

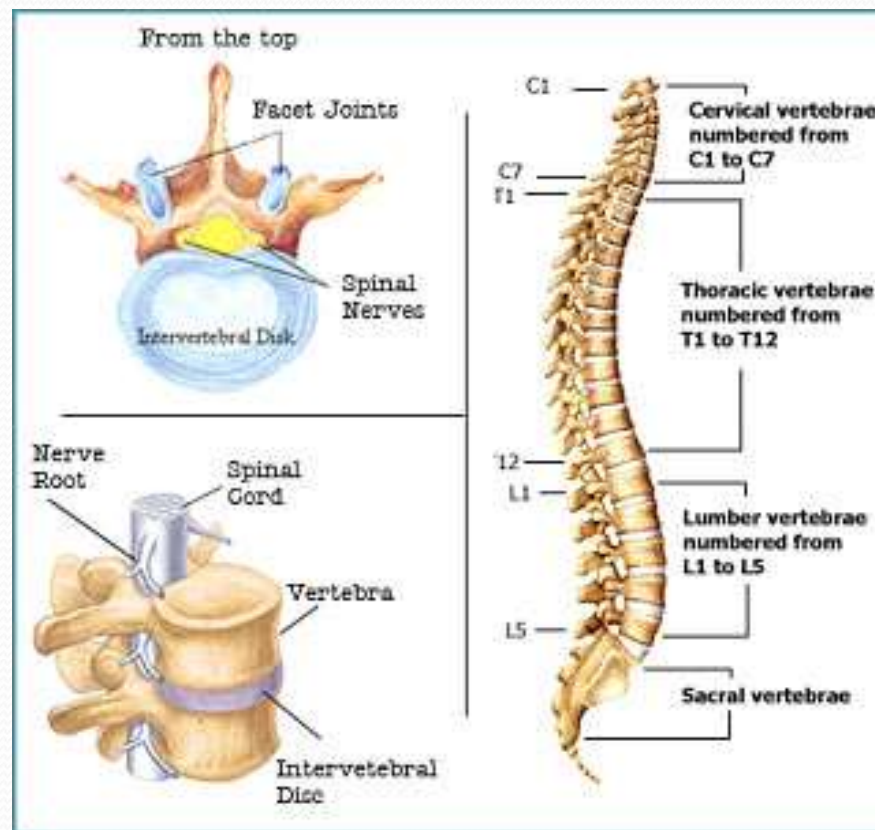




# Injury Timeline

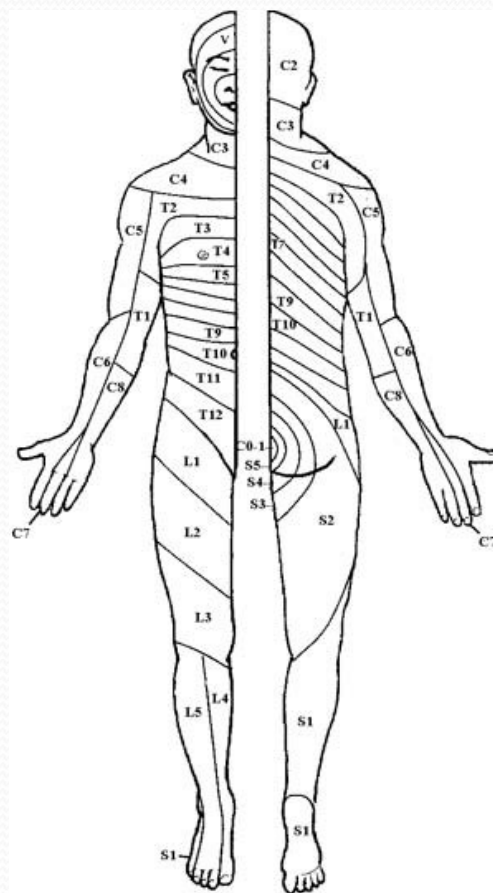
- Acute (first two days-damage)
- Subacute (first six weeks-beginning of repair)
- Remodeling (six weeks-three month-strengthening of the repair)
- Late stage (three month to six month, return to normal state)
- Chronic (pain six month post injury)

# Spine Anatomy





# Dermatomal Map



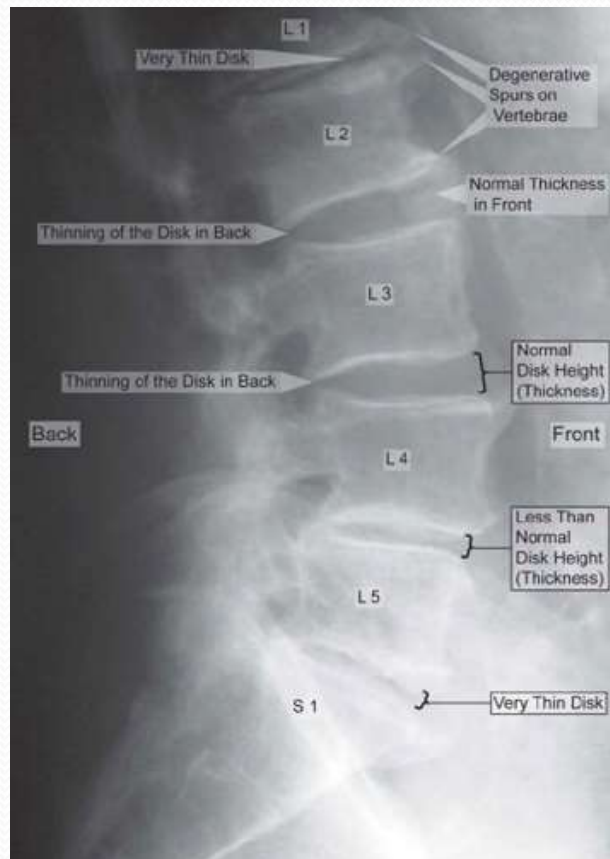


# Diagnostic Studies

- X-ray (bone)
- CT Scan (mega xray: bone, discs, organs)
- MRI (magnetic field: good for all but the bones)
- Ultrasound (sound waves)
- EMGs (electromyography, electric activity of the muscles and nerve/muscle junctions)
- Physical examination

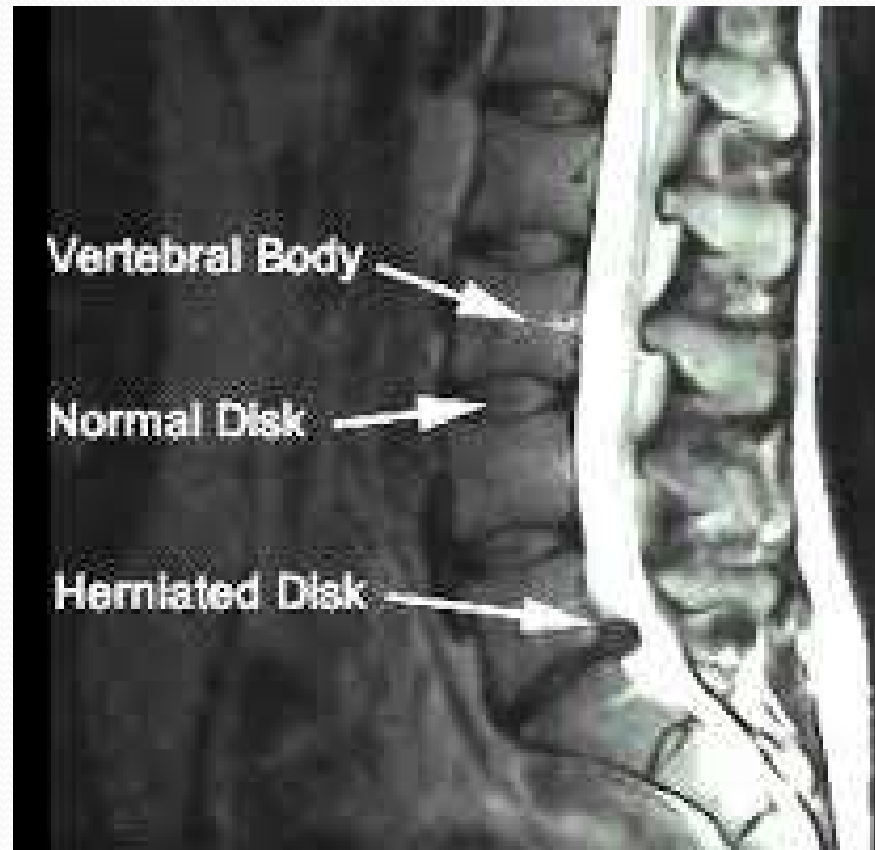


# Degenerative Disc Disease: xray





# Lumbar Disc Herniation: MRI





# Managing Pain Patients

- Patient education
- Devise treatment plan
- Have realistic goals
- Limit duration of narcotic monotherapy
- Offer alternative modalities/references
- Multidisciplinary approach





# Pain Clinic Modalities

- Steroid Injection Therapy
- Intravenous Medicinal Therapy
- Narcotic/Non-Narcotic Therapy
- Neurodestructive Modalities (Radiofrequency Thermocoagulation)
- Neuromodulation: Spinal Cord Stimulatio



# Medical Management

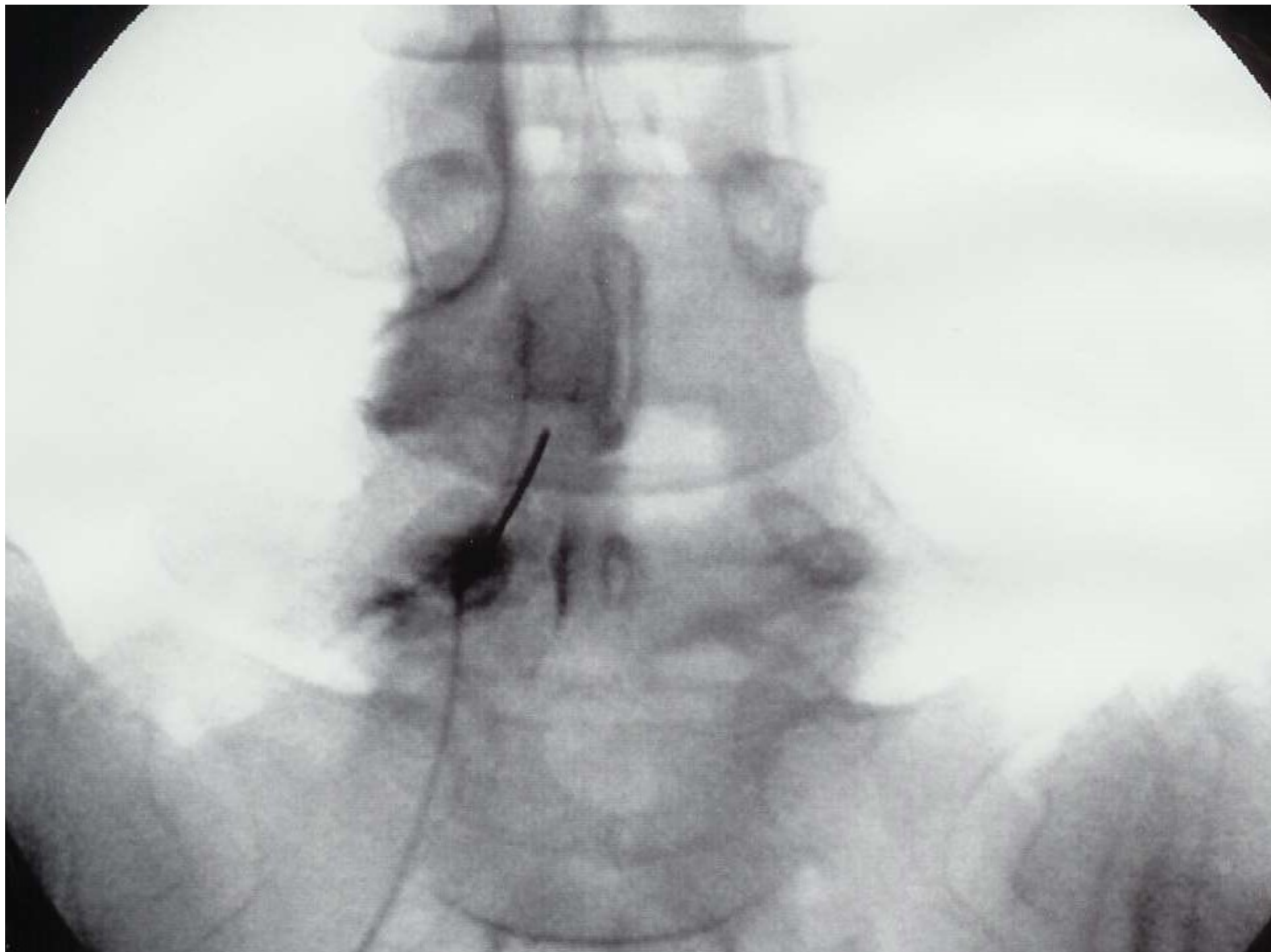
- NSAID's/COX<sub>2</sub> Inhibitors
- Acetaminophen
- Antidepressants
- Anticonvulsants
- Sedative/Hypnotics
- Opioids



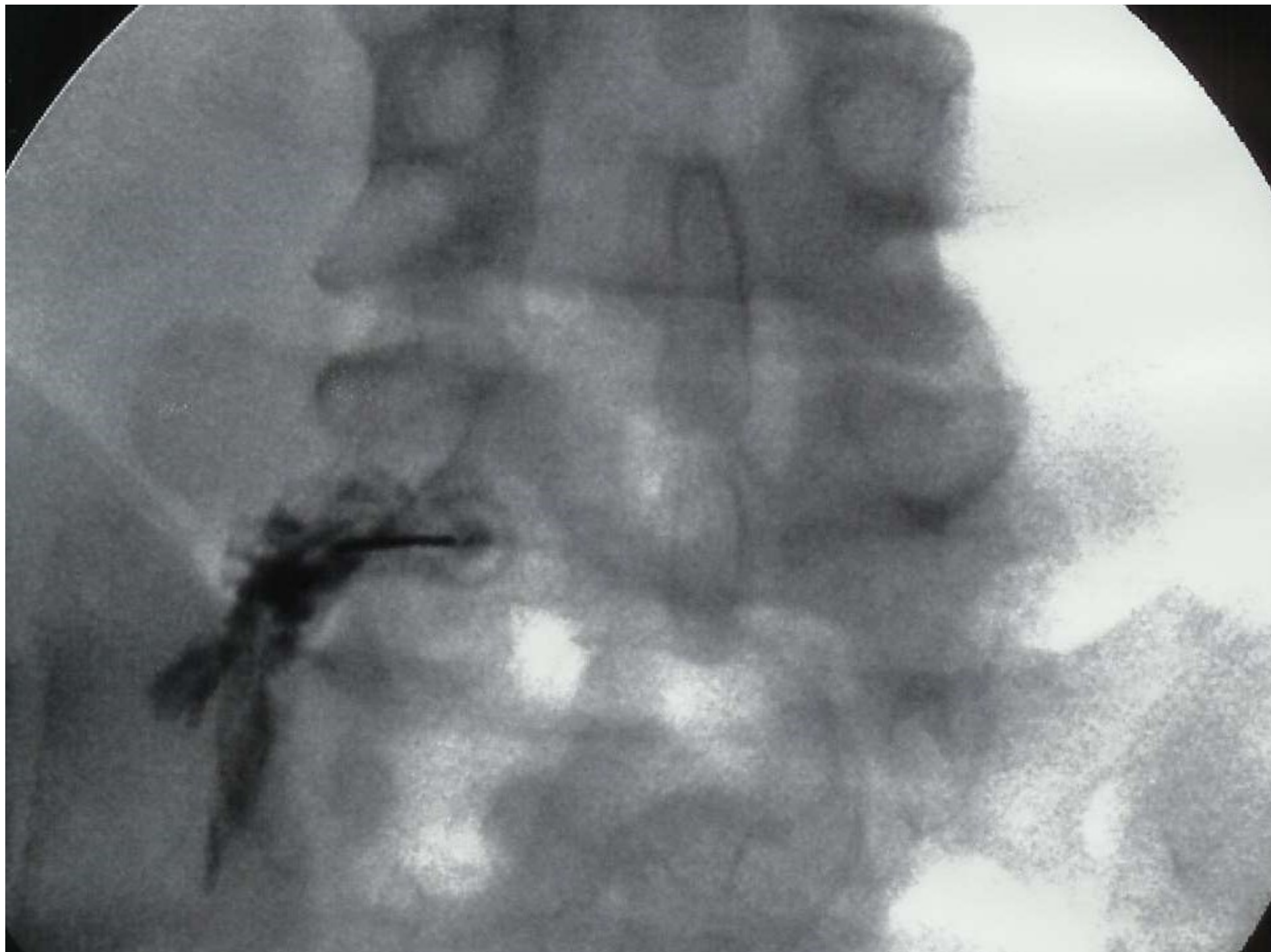


# Epidural Steroid Injections

- Delivering steroids to spinal nerves irritated by the inflammatory mediators from the intervertebral discs
- Part of the treatment strategy (aggressive PT, smoking cessation, weight loss, etc)







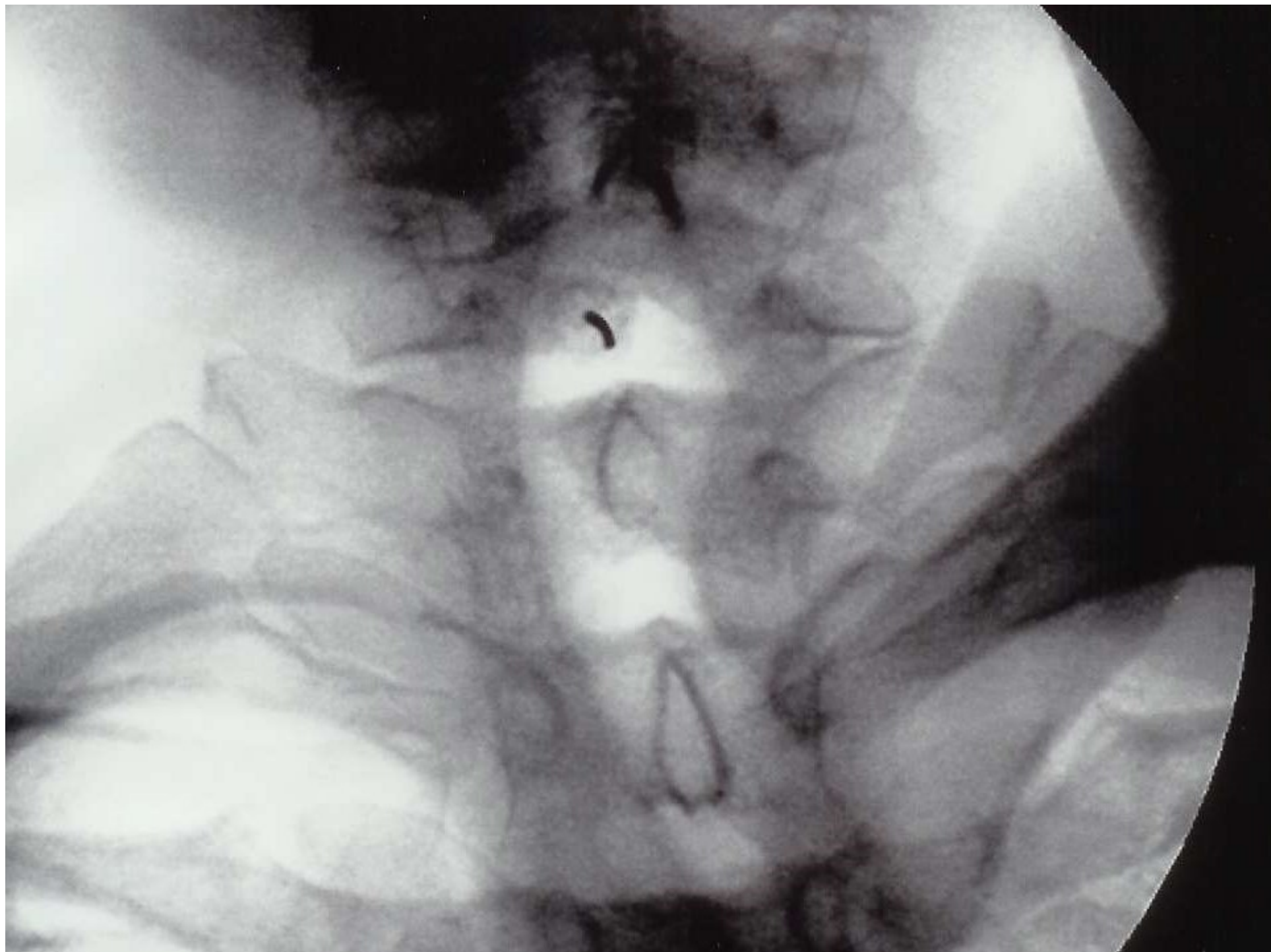
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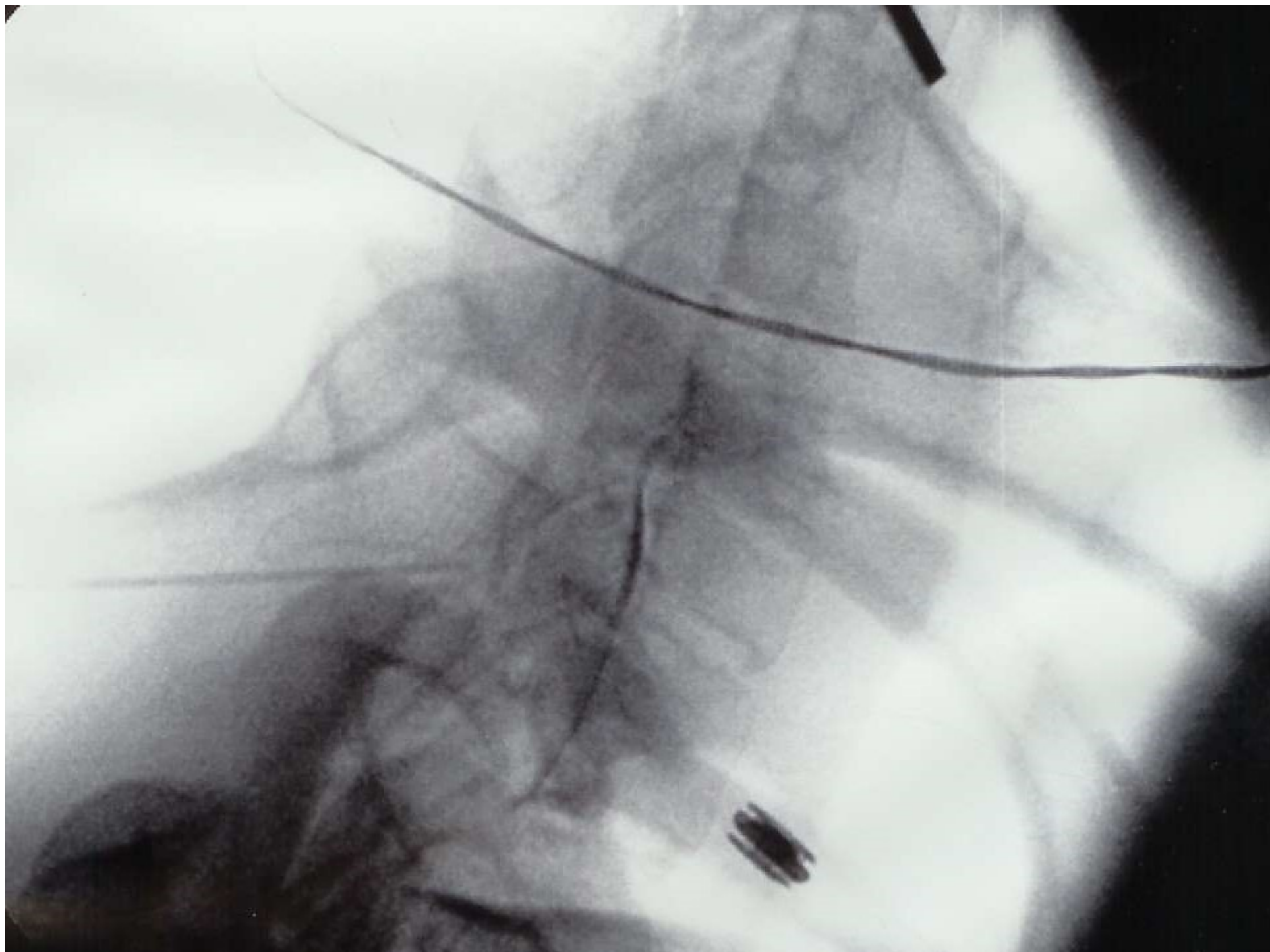
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# Complex Regional Pain Syndrome and Sympathetic Blockade

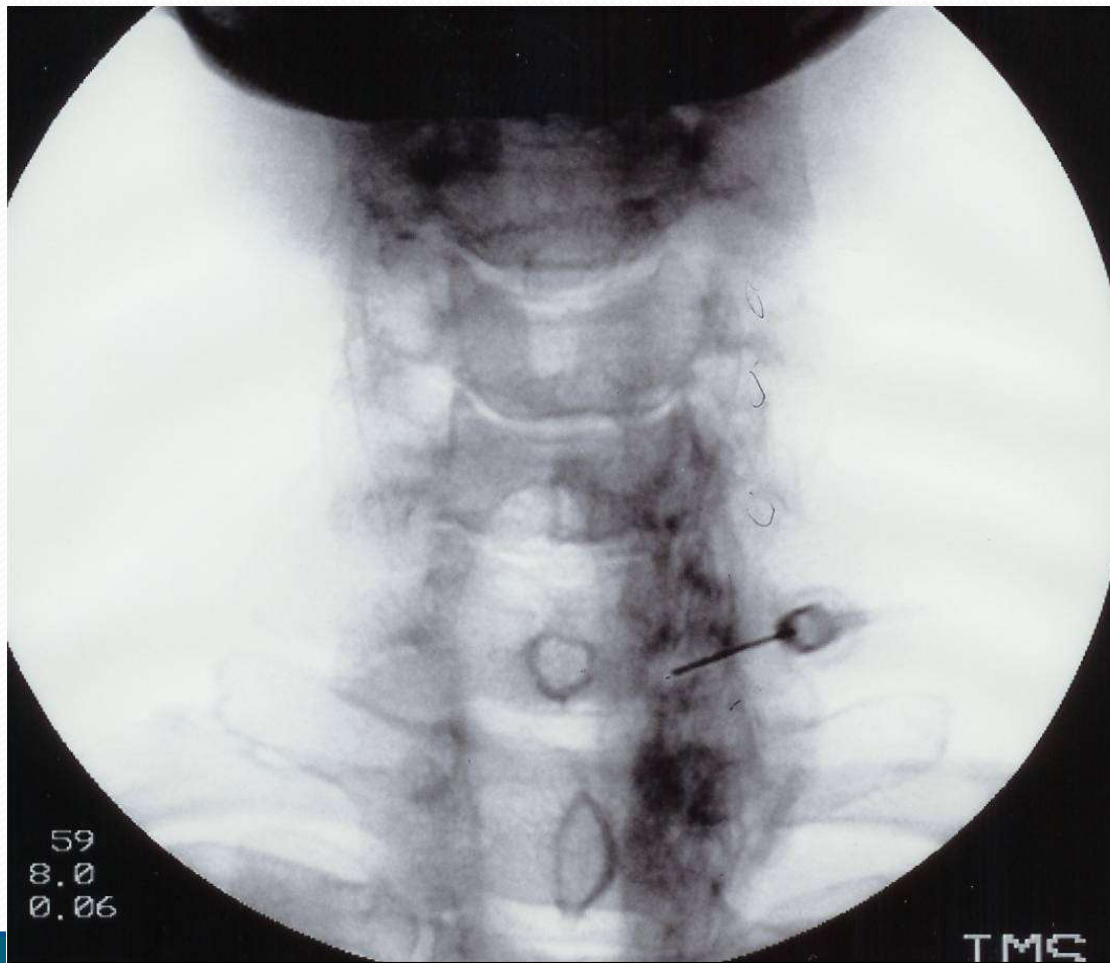
- Lumbar sympathetic and stellate ganglion block
- Diagnostic tools
- Treatment by interrupting sympathetic chain conduction to allow “resetting” of central nervous system

# Lumbar Sympathetic Block





# Stellate Ganglion Block



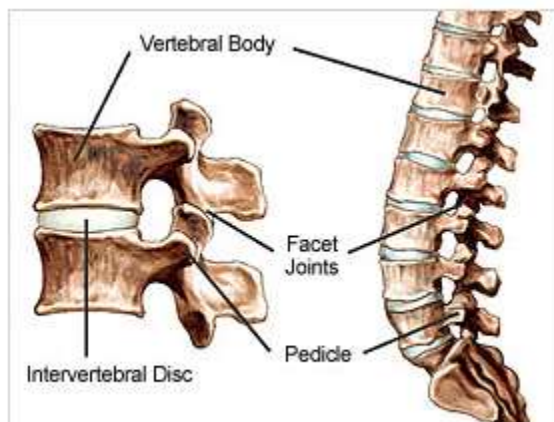


# Facet Joints Mediated Pain

- Facet joints are the cause of 15-40% of nonradicular back pain and 40-60% of nonradicular neck pain
- Diagnostic and therapeutic blockade is the only way to make precise diagnosis
- Each facet joint is innervated by a medial branch of the posterior ramus of the nerve root at the corresponding level, level above and level below



# Lumbar Facet Joints

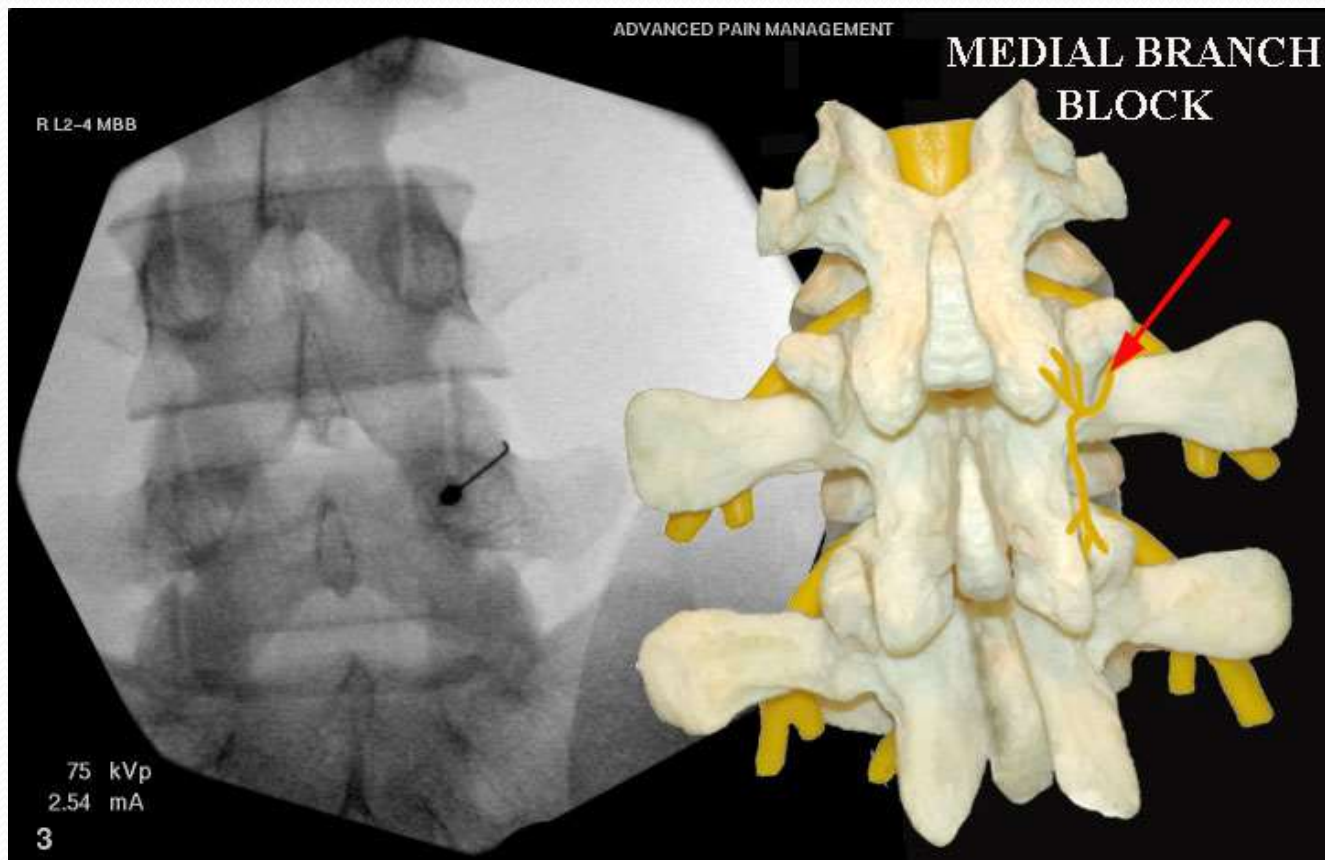


# Lumbar Facet Joints





# Facet Block



# Radiotfrequency

## Thermocoagulation (aka “burning procedure”)





# Radiofrequency Thermocoagulation

- Nerve destruction
- Controllable
- Small lesion size
- Repeatable
- Safe and effective

# Principles

- Nerves found by stimulation
- Lack of motor innervation confirmed
- Heat lesion of 80°C for 1 minute under local anesthesia
- Steroid to prevent neuritis
- Regrowth of nerve tissue in 4-8 month

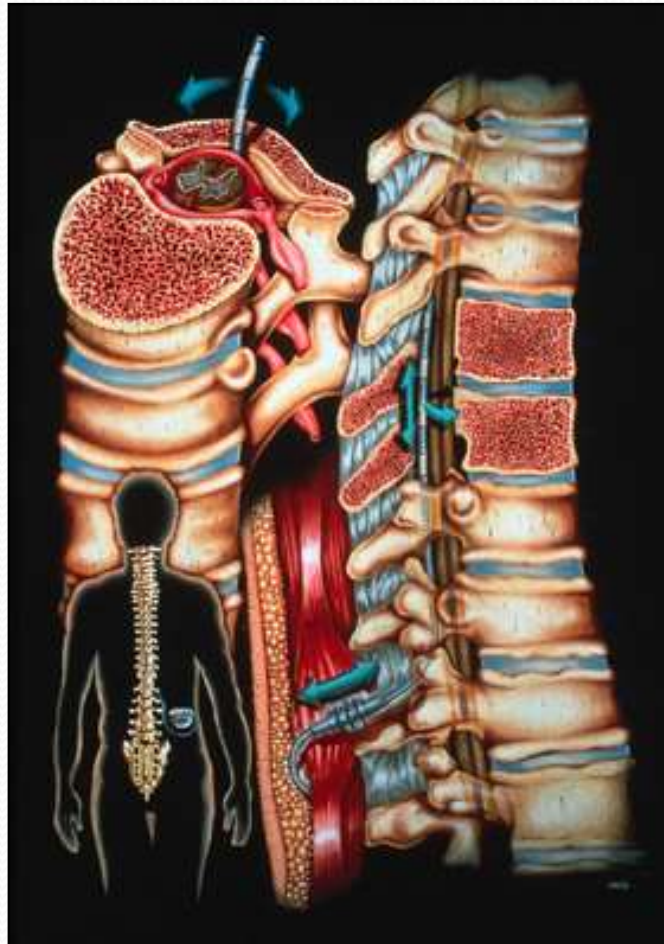




# RF Lumbar Facet Efficacy

- North reviewed 82 pts retrospectively
- 45% good relief (50% pain) at 2 years vs
- 13% with long term relief from local blocks
- Prior back surgery did not effect outcome
- Gallagher showed marked improvement in pain scores at 6 months vs placebo

# What is Neurostimulation?





# \$60,000 Saved per Patient's Lifetime

- CRPS I and II (RSD) 54 patients total,  
36 got physical therapy and spinal cord stimulator  
18 physical therapy alone

all patients maximized on meds

Over patients lifetime spinal cord stimulator  
saves **\$60,000**

Kemler and Furnee, Neurology 2002



# Mechanism of Action

- Direct application of an elegant scientific theory to medical practice
- Gate control pain transmission theory by Melzack and Wall 1965
- Input of peripheral pain fibers could be manipulated by external electric field (stimulation) applied to the spinal cord to “close the gate” of the pain transmission
- First stimulator implanted in 1967





# Technique

- Placement of an electrode array (leads) in the epidural space on top of the carefully selected segment of the spinal cord
- Tunneling of the wires
- Connecting wires to the computer/pulse generator

# Indications for Spinal Cord Stimulation

- Continuing severe pain and functional dysfunction despite maximized medications, failed injection therapies and failed surgeries
- Pain in the location amenable to stimulation: extremities, lower back, failed back surgery syndrome and complex regional pain syndrome I and II (RSD)
- No untreated psychopathology
- No coagulopathies or epidural lesions



# Recent improvements in spinal cord stimulation

- MRI compatibility
- High frequency stimulation



# Patient Selection Process

- Initial evaluation discussing pros and cons of therapy
- Psychiatric clearance
- Appropriate imaging: upper extremity and neck pain: cervical and thoracic MRIs, lower extremity pain and lower back pain: lumbar and thoracic MRIs. MRIs are needed to evaluate patency of the epidural space for the lead implantation (r/o spinal stenosis, tumors, etc)
- Reevaluation of the patient with MRI results
- Trial
- Implantation





# Trial and Implantation

- Percutaneous trial is a day procedure done under fluoroscopy
- Patient uses external device for 3-7 days
- Removal of the percutaneous lead takes 5 minutes
- If adequate pain control achieved: proceed to full implant, usually brief surgery, overnight stay at the hospital

