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

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- 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)
- 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.
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

CAUSE / MECHANISM

Curable
  Effective Treatment

Not Curable
  Pain Relief
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.

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.

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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.

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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

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
medial branch after emerging from under the mal

The blue arrow indicates where the medial branch disappears under the mal

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
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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
“ear” = sap

“eye” = pedicle

“snout” = TP

“forelimb” = iap
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

- Medial branch
- Angle between sap and TP
- Groove
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.
Electrode inserted as far as possible along medial branch
Are you still there?
Randomised controlled trial of cervical radiofrequency lesions as a treatment for cervicogenic headache


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

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.

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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

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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.
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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Leakage Nucleus Pulposus onto S1 root
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

The paper considered SCS to be effective in reducing chronic neuropathic pain, while demonstrating cost–effective improvement in quality of life and functional outcomes.
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
SCS – lateral view
THANK YOU FOR YOUR ATTENTION!