Pain Management 101

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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



Frequent Terminology

- Sprain: trauma to a joint and ligaments (ankle sprain)
- Strain: trauma to muscle and tendons from forceful contraction and stretch
- Intervertebral disc: protrusion vs bulging vs extrusion
- Degenerative disc disease

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



X-ray pre and post whiplash



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
- Neurolytic Blockade
- Intravenous Medicinal Therapy
- Narcotic/Non-Narcotic Therapy
- Radiofrequency Thermocoagulation
- Spinal Cord Stimulation
- Discogenic pain therapies

Medical Management

- NSAID's/COX2 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)











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 lever, level above and level below

Lumbar Facet Joints



Lumbar Facet Joints



Facet Block



Radiofrequency

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

Radiofrequency Electromodulation

- Nerve modulation by electric field not destruction by high temperature
- Safe
- Effective

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

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

