INTERVENTIONAL PAIN MANAGEMENT UPDATE

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HIPPOCRATIC OATH

“I will prescribe a regimen for the good of my patients according to my ability and my judgment and never do no harm to anyone”

PRIMUM NO NOCERE
BACK PAIN

- 65 million sufferer in US
- Back pain is the #1 reason for health care expenditure
- US back pain costs are 3 times greater than cardiac services costs each year
- 20% of US working population experiences back pain every year
- By age of 50, 97% of people have degenerated lumbar discs

Lower Back Pain

Distribution of Pain in Mechanical Back Pain

Distribution of Numbness and Pain in Sciatic Nerve Compression
ROLE OF SURGERY

- No role in self-limited, episodic back pain, mild to moderate back pain that does not impair function, or in global, non-specific pain associated with inactivity and deconditioning.

- There is a clear and widely accepted role in progressive deformity, neural compression, intractable pain associated with instability.

MEDICATION PRECAUTION

- For neuraxial injections
  - Anticoagulants
    - Warfarin INR<1.2; 5 days
    - Low molecular weight heparin >12 hours
  - Thrombin Inhibitors — no data, monitor PTT
  - Antiplatelet: Plavix 7 days
    - Triclid 14 days
  - ASA and NSAIDS — no contraindication

BEWARE COMBINATION THERAPIES
PATIENT FACTORS

- Diabetes mellitus
  - Steroids can cause increase blood glucose
  - Blood sugar check in the morning of the procedure
  - Glucophage – renal problems with iodinated contrast = stop glucophage for 48 hours following procedure

Communicate with managing physicians PRN

Multidisciplinary approach

- Psychiatric evaluation
- Conventional treatment methods
- Interventional procedures
- Aggressive physical therapy
- Pharmacological management
Selecting the right procedure

**ALGORITHM**

- Conservative Treatments Exhausted
  - If facet, disc, sympathetic prognostic block → RF lesioning
  - If spinal/radicular pain → Neuroplasty
    - Single catheter technique → Neuromodulation
    - Double catheter technique → Neuromodulation
  - If spinal/radicular pain persists → Ongoing Psych, PT/OT, Pharmacologic Mgmt

(Racz GB, Eval. and Treatment of Chronic Pain, Ch.36 1998)

**PAIN MANAGEMENT MODALITIES**

- PHARMACOTHERAPY
- NERVE BLOCKS
- NEUROLYSIS - CHEMICAL, CRYOABLATION, RFL, SURGICAL
- ENDOSCOPY - EPIDUROSCOPY
- IMPLANTATION TECHNOLOGY - SPINAL CORD STIMULATOR, IMPLANTABLE INFUSION THERAPY
- NEWER TECHNOLOGY - IDET, NUCLEOPLASTY, VERTEBROPLASTY, MICRODISCECTOMY, ETC
- SURGERY
- PHYSICAL MEDICINE AND REHABILITATION
- PSYCHOLOGICAL AND BEHAVIORAL MANAGEMENT
- INTEGRATIVE MEDICINE - ACUPUNCTURE, MASSAGE, BIOFEEDBACK, HERBALS, MANIPULATION, ETC
PAIN MANAGEMENT MODALITIES

- There is no single treatment modality that guarantees complete pain relief.
- Interdisciplinary approach is most successful.
- A 50% or more reduction in total body pain is considered a positive response to therapy.

PHARMACOTHERAPY

- Cornerstone of therapy.
- WHO analgesic ladder.
- Classes of analgesics:
  - Non-opioids
  - Opioids
  - Analgesic adjuvants.
TYPES OF NERVE BLOCKS

- **DIAGNOSTIC** - ASCERTAIN PAIN TYPE, POSSIBLE MECHANISMS AND ORIGIN OF THE PAIN, LOCALIZE PAIN SITE
- **PROGNOSTIC** – PREDICTS SUBSEQUENT RESPONSE TO THERAPY
- **THERAPEUTIC** – PATIENT’S SUBJECTIVE RESPONSE AND PHYSICIAN’S OBJECTIVE OBSERVATION

NERVE BLOCKS: TECHNIQUES

- LOCAL INFILTRATION, TRIGGER POINT INJECTION, PROLOOTHERAPY, BOTOX
- SOMATIC NERVE BLOCKS
- SYMPATHETIC NERVE BLOCKS
- EPIDURAL STEROID INJECTIONS
- FACET JOINT INJECTION
- JOINT INJECTIONS- HIPS, KNEES, Shoulders, Sacroiliac, ETC
- INTRATHECAL BLOCK
NERVE BLOCKS - BASIC CONSIDERATIONS

- Requires anatomic knowledge and experience
- Accurate pain diagnosis
- Medical history and physical examination
- Laboratory examination when appropriate

NERVE BLOCK: MECHANISMS OF ANALGESIA

- Interruption of nociceptive or pain sensory pathways
- Induction of sympathetic blockade - reduce vasomotor, visceromotor, and sudomotor overactivity
- Somatosensory blockade
INTRAVENOUS SYMPATHETIC BLOCK

- ALTERNATIVE METHOD
- IF PATIENTS ARE ANTICOAGULATED, HAVE DECREASED PLATELETS OR POSTSURGICAL CHANGES AT SITE OF SYMPATHETIC BLOCK
- IV GUANITHEDINE, PHENTOLAMINE, BRETYLIUM
- BIER BLOCK (REGIONAL IV BLOCK)

NEUROLYSIS TECHNIQUES

CHEMICAL NEUROLYSIS
CRYOABLATION
RADIOFREQUENCY LESIONING
SURGICAL DISRUPTION
CHEMICAL NEUROLYSIS

- DESTRUCTION OF NERVES TO PROMOTE ANALGESIA
- NEUROLYTIC AGENTS CAN BE USED IN THE EPIDURAL AND SUBARACHNOID SPACES, PERIPHERAL NERVES, AND CELIAC PLEXUS.
- USE IS LIMITED DUE TO NON-SPECIFIC DESTRUCTION OF NERVES AND SURROUNDING TISSUES
- PRIMARILY USE IN MALIGNANT PAIN AND RARELY, IN INTRACTABLE CHRONIC PAIN

NERVE DAMAGE CATEGORY DURING NEUROLYSIS

- FIRST DEGREE OR NEUROPRAXIA - REVERSIBLE NERVE INJURY
- SECOND DEGREE OR AXONOTMESIS - DESTRUCTION OF AXONAL FIBERS BUT NEURAL SHEATH IS INTACT
- THIRD DEGREE OR NEUROTOMESIS - COMPLETE NERVE DESTRUCTION
## NEUROLYSIS

<table>
<thead>
<tr>
<th>AGENT</th>
<th>ADVANTAGES</th>
<th>DISADVANTAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALCOHOL (50-100%)</td>
<td>HYPOBARICITY MAYBE USEFUL</td>
<td>NEURITIS; SLOUGHING OF SUPERFICIAL AREAS</td>
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<tr>
<td>PHENOL 6-12% IN NS, GLYCERIN, CONTRAST</td>
<td>HYPERBARICITY OF USEFUL</td>
<td>&lt;PROFOUND &amp; SHORTER DURATION THAN ALCOHOL; NEURITIS; SLOUGHING</td>
</tr>
<tr>
<td>CRYOPROBE</td>
<td>REVERSIBLE, NO NEURITIS, SMALL DESTROYED AREA</td>
<td>VERY EXACT PROBE LOCATION, LARGE PROBE</td>
</tr>
<tr>
<td>RFL</td>
<td>SMALL AREA OF DESTRUCTION</td>
<td>NEURITIS, ACCURATE PROBE PLACEMENT</td>
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### What is RF?

A high frequency electrical current, transmitted from an active electrode (lesion electrode) through the body and to the passive electrode (dispersive electrode, grounding electrode). Tissue around the electrode is modulated or ablated.
What is RF?

Which types of pain can be treated with RF?

- Chronic/Benign and Chronic/Malignant
  - Cranial Pain
  - Spinal Pain
  - Peripheral Pain
EPIDUROSCOPY

- FLEXIBLE FIBEROPTIC ENDOSCOPY
- 3 DIMENSIONAL REAL-TIME VIDEO COLOR IMAGING
- PROVIDES A NEW MEDIUM FOR VIEWING THE CNS
- DIAGNOSTIC AND THERAPEUTIC TOOL

Epidural Lysis of Adhesions

Also known as:

- Neurolysis
- Epidurolysis
- Neuroplasty
- RACZ Procedure
**INDICATIONS FOR ENDOSCOPY**

- PROVIDES SPECIFIC ETIOLOGY OF LOW BACK PAIN
- TREAT EPIDURAL ADHESIONS AND INFLAMMATORY REACTION IN THE EPIDURAL SPACE IN PATIENTS WHO FAIL TO RESPOND TO CONSERVATIVE TREATMENT OR FAILURE TO IMPROVE FOLLOWING SURGERY

**CONTRAINDICATIONS OF ENDOSCOPY**

- PATIENT REFUSAL
- BLEEDING DISORDERS
- PREGNANCY
- INFECTION AT INSERTION SITE / SEPSIS
- HISTORY OF DRUG REACTION TO ANY OF THE INJECTED DRUGS (STEROID, HYALURONIDASE, OPIOID, LOCAL ANESTHETICS)
Principles of neurolysis

- Breaking up of scar formation
- Lesion specific injection
- Saturation of medication to swollen nerve roots
- Delivery of medication to painful nerve root and decompression
- Decompressed nerve root has better blood supply and chance for improved functions

COMPLICATIONS OF ENDOSCOPY

- NERVE TISSUE IRRITATION
- INTRAVASCULAR DRUG INJECTION
- POSTDURAL PUNCTURE HEADACHE
- TOTAL SPINAL BLOCK
- ALLERGY/ADVERSE DRUG REACTION
- RETINAL HEMORRHAGE
- BLEEDING
- INFECTION
Extended efficacy of neurolysis

PROSPECTIVE DOUBLE-BLIND EFFICACY STUDY

Percutaneous Epidural Neuroplasty
One Year Prospective Follow-up on 59 Patients

Percent of Patients Improved* at Each Follow-up Time

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<thead>
<tr>
<th>Discharge</th>
<th>1 Month</th>
<th>3 Months</th>
<th>6 Months</th>
<th>12 Months</th>
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<tr>
<td>83%</td>
<td>51%</td>
<td>49%</td>
<td>43%</td>
<td>49%</td>
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* 10 mm or more Visual Analog Scale decrease

(Racz GB, P.E. Neuroplasty, Pain Digest 1999)

IMPLANTATION TECHNOLOGY

- DRUG INFUSION THERAPY - OPIOIDS, LOCAL ANESTHETIC, CLONIDINE, BACLOFEN
- SPINAL CORD STIMULATOR IMPLANTATION
IMPLANTATION TECHNOLOGY

- END OF THE LINE THERAPY
- INDICATIONS:
  INCOMPLETE PAIN RELIEF FROM CONSERVATIVE MANAGEMENT
  NEUROSURGICAL/NEURODESTRUCTIVE PROCEDURES ARE NOT INDICATED

IMPLANTATION TECHNOLOGY

- BASIC PRE-REQUISITES
  NO ACTIVE DRUG ADDICTION.
  PATIENT IS NOT A SURGICAL CANDIDATE.
  PSYCHOLOGIC CLEARANCE IS OBTAINED.
  PATIENT FAILED CONSERVATIVE PAIN MANAGEMENT.
  TRIALS HAVE BEEN SUCCESSFUL.
  NO CONTRAINDICATION EXISTS.
DRUG INFUSION THERAPY

- Based on the concept of “Focused Drug Delivery”
- Drugs are delivered either into the epidural space or the subarachnoid space
- Involves catheter insertion

DRUG INFUSION DELIVERY SYSTEM

- Temporary epidural catheter system
- Tunneled percutaneous “semi-permanent” epidural / intrathecal system
- Fully implanted epidural / intrathecal port system
- Fully implanted continuous infusion pumps
- Fully implanted intrathecal patient controlled pumps
**DRUG INFUSION THERAPY: COMPLICATIONS**

- Skin and subcutaneous infection around catheter exit site
- Epidural hematoma
- Abscess
- Meningitis
- Drug side effects - itching, nausea, constipation, urinary retention less common
- Tolerance to drug effect

**DRUG INFUSION THERAPY FAILURE**

- Neuropathic or incident pain
- Failure of the delivery system
- Inadequate dosing
- Incorrect prescription
- Obstructed CSF mechanics
- Psycho-emotional decompensation
- Development of drug tolerance
**SPINAL CORD STIMULATOR IMPLANTATION**

- Requires insertion of epidural electrodes over the spinal cord area needed to be stimulated.
- A permanent neuro-pulse generator is subcutaneously implanted.
- "Pain Pacemaker"

**Current Indications (and growing)**

- Failed Back Surgery Syndrome.
- Ischemic Peripheral Vascular Disease.
- Atypical Trigeminal Neuralgia.
- Refractory Angina Pectoris.
- Phantom Limb Pain.
- Post Thoracotomy Pain.
- Multiple Plexopathies.
Preparing the Patient for Test Stimulation

- Position and sedate the patient
- Mark interspinous intervals with fluoroscopy
- Mark desired entry level

Important Information on Implanted Devices for Pain Therapy

- Possible complications
  - Infections
  - Lead dislodgment
  - Loss of functionality
- Surgical revision for reduction or loss of pain relief
- Interference may be caused by MRIs and other radio frequency devices
- Lead fracture
VERTEBROPLASTY

- an effective, minimally invasive procedure in which acrylic bone cement is injected into a pathologically compressed vertebral body.
Indications
- Pain related to vertebral compression fracture associated with:
  - Osteoporosis
  - Tumor infiltration

Pathologic Vertebral Body Compression Fracture
- Primary osteoporosis
  - Elderly patient
  - Female > male
- Secondary osteoporosis
  - Young patient
  - Steroid use
    - Asthma, vasculitis, transplant, inflammatory bowel disease
Contraindications:

- Moderate or severe retropulsion of the posterior vertebral body cortex into the spinal canal
- Height loss >70%
- Infection
- Coagulopathy

Complications

- Spinal cord or nerve root injury
  - <1%
  - Direct
    - Puncture
  - Indirect
    - Compression
    - Hematoma
    - Ischemia
Complications

- Hemorrhage
  - Rare
- Infection
  - Rare
- Pulmonary embolism

- Fracture
  - Lamina
  - Pedicle
- Increased pain
  - 1-2%
- Death

Complications

- Symptomatic cement extravasation
  - Incidence: depends upon etiology of fracture
    - Osteoporosis  1-2%
    - Neoplasm  5-10%
Complications: Cement Extravasation

- Location
  - Epidural
  - Foraminal
  - Paravertebral
  - Disc