Recent Advances in Pain Management

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Neuromodulation
Neromodulation

- Electrical
  - Spinal Cord Stimulation
- Chemical
  - Intrathecal Drug Delivery
Indications for Implantables

Spinal Cord Stimulation (SCS)
- Lumbar Radiculopathy
- Cervical Radiculopathy
- "Mononeuropathy"
- Intercostal Neuralgia
- Peripheral Vascular Disease
- Angina
- Novel uses

Reflex Sympathetic Dystrophy
- Causalgia
- Failed Back Surgery Syndrome
- Arachnoiditis
- Diabetic Neuropathy
- Alcoholic Neuropathy
- AIDS Related Neuropathy
- Stump Pain
- Phantom Limb Pain
- Postherpetic Neuralgia
- Spinal Cord Injury
- Plexus Neuropathies

Intrathecal Drug Delivery System
- Diffuse Cancer Pain
- Osteoporosis
- Visceral Pain
- Axial Somatic Pain
- Hand, Neck Pain
- Multiple Sclerosis
Intrathecal Drug Delivery
Indications For Intrathecal Drug Delivery System

- Management of Spasticity
- Management of Malignant pain
- Management of Nonmalignant pain
Intrathecal Baclofen Infusion

Excellent evidence for treatment of spasticity in:

- Multiple sclerosis
- Cerebral palsy
- Spinal cord injury


Case series:

- Traumatic Brain Injury
- Hydromyelia
- Lateral sclerosis
Why Intrathecal?

- Control complex pain conditions
- Less medication
- Less side effects?
- Unique route to deliver certain medication

Bupivacaine
Ziconotide
Equivalent Dosages for Morphine

Oral = Parenteral = Epidural = Intrathecal

300 mg = 100 mg = 10 mg = 1 mg
<table>
<thead>
<tr>
<th>Reservoir volumes</th>
<th>Flow rates</th>
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Spinal Cord Stimulation
Spinal Cord Stimulation

- 1970’s in disrepute, poor indications, no follow up
- 1980’s middle, slow rise, better indications and assessment
- 1990’s steady rise in popularity
- 2000’s new indications, decade of Sacral Nerve stimulation, peripheral neuromodulation???
Early applications of electrical stimulation for pain

- 46 AD
- Scribonius Largus describes the use of torpedos (aquatic animals capable of electric discharge) for medical applications.
- “The live black torpedo when applied to the painful area relieves and permanently cures some chronic and intolerable headaches...carries off pain of arthritises...and eases other chronic pains of the body”
History of electrical stimulation of the nervous system for the control...
What is it?

- Electrodes that are placed in the spine
- Connected to a pulse generator or receiver
- Spinal cord is stimulated
How does spinal cord stimulation work?

- Gate Control Theory
- Increase inhibitory neurotransmitters
  - Glycine
  - GABA
  - Serotonin
- Inhibit transmission
- *Probably not*
  - opiate mediated response
  - Placebo effect
Traditional Indications for Neural Stimulation of the Spinal Cord (SCS)

- Lumbosacral radiculitis (failed back surgery syndrome) and cervical radiculitis (primary indication in the USA)
- Peripheral vascular disease (mainly in Europe)
- Nerve injury pain
  - diabetic neuropathy
  - neurotrauma
- Angina (mainly in Europe)
- CPRS
New Indications for Electrical Stimulation

- Retrograde for Complex unilateral pain patterns
- Retrograde SNRS
- Peripheral N. for Intractable Occipital Neuralgia
- Complex Abdominal Pain
  - Pancreatitis
  - Irritable bowel disorder
Sacral Nerve Stimulation
Peripheral Subcutaneous Field Stimulation
Post Herpetic Neuralgia Left side of the Face
Inguinal Neuralgia
Intercostal Neuralgia