Utilization of Implantable Devices for Pain: A Look at Intrathecal Pumps & Spinal Cord Stimulators

Gundersen Health System (GHS)
Located in La Crosse, WI

- Providing integrative Pain Medicine services throughout Wisconsin, Minnesota and Iowa

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Learning Objectives

1. Identify the diagnoses and distinguish which are appropriate for intrathecal pump implant versus spinal cord stimulator implant.
2. Outline the process for determining whether the patient is an appropriate candidate for an implantable device.
3. Describe management of the implantable devices including maintenance, programming and use of adjunctive therapies.

Implantable Devices: What Are They?
Spinal Cord Stimulators

Definition: Also referred to as a neuro-stimulator, a spinal cord stimulator is an implanted device that delivers electrical stimulation along the fibers in the epidural space of the spinal cord. The stimulation is provided through implanted wires, called leads that, when turned on, interrupt the signal that goes to the brain that makes us feel pain. Instead of pain a tingling sensation is felt.

Manufacturers include: Medtronic, St. Jude, Boston Scientific

Indications for Spinal Cord Stimulation:

- Radiculopathies
- Painful ischemic peripheral vascular disease
- Chronic low back pain
- Phantom limb pain
- Complex Regional Pain Syndrome
- Post Herpetic Neuralgia
- Abdominal and visceral pain
- Angina - refractory to medications and surgical bypass

Gundersen Health System currently has 155 patients with "spinal cord stimulator implant" documented on their problem list.
**Intrathecal Pumps**

*Definition:* also referred to as a drug pump, this device consists of a pump and catheter which are surgically implanted under the skin. The pump is generally placed in the abdomen. The catheter connects to the pump with the tip of the catheter located in the intrathecal space of the spine. The pump releases prescribed amounts of pain medication through the catheter directly to the fluid around the spinal cord to assist with pain symptoms.

**Indications for Intrathecal Pumps:**

- Cancer related pain
- Chronic low back pain
- Chronic leg pain
- Complex Regional Pain Syndrome
- Phantom limb pain
- Post Herpetic Neuralgia

*Can also be implanted for spasticity related to spinal cord injury, Multiple Sclerosis, Cerebral Palsy, etc.*

There are currently 28 patients that have intrathecal pumps implanted, specifically for pain, at Gundersen Health System.
Work Up Process for Implantable Devices

MD Visit
- Complete chart review of past treatments including medications, physical therapy, interventional procedures, surgery and conservative measures
- Face to face evaluation
- Referral to Neuropsychology

Neuropsychology
- Assess for realistic expectations
- Coping skills
- Assess for underlying anxiety/depression
- Support system
- Lifestyle and pacing activity
- Sleep Hygiene

Pain Board
- Pain team meets weekly to discuss and develop plan of care for pain patients that are more complex or are being evaluated for an implantable device
- Feedback from all members of the team is encouraged and any concerns are addressed
- RN will take responsibility for following through with contacting patient to discuss action plan and schedule appropriate appointments
Education Regarding Implantable Devices

- Amount of appointments expected
- Education class
- Pre and post-op, neuropsychology follow up
- Restrictions during Trial and Implant
  - These restrictions apply for entire trial and 6-8 weeks following implant
  - No bending/twisting over 30 degrees
  - No lifting over 10 pounds
  - No putting your arms over your head
  - No sex
  - During the trial no showering
  - Following implant can shower after 48 hours
  - No sitting for too long

Education Regarding Implantable Devices

- Functional Goals
  - Ex. Cooking a meal without sitting down
  - Ex. Sleeping through the night
- Pain Team Expectations
  - 50% reduction in pain
  - 50% improvement in function

Spinal Cord Stimulator Trial

- Pre-operative appointments
  - History and Physical with PCP or Pain Med NP
  - Pre-operative instructions with RN
  - Registration
- Post-operative appointments
  - Day 1 post op appointment
    - Wound check, reprogramming if needed
  - Day 5 lead pull
    - Assess if pain team expectations and patient’s functional goals were met
    - Determine if it is appropriate to proceed with implant
Intrathecal Test Dose
- Pre-operative appointments
  - History and Physical with PCP or Pain Med NP
  - Pre-operative instructions with RN
  - Registration
- Post-operative appointments
  - Day 1 post op appointment
    - Wound check
    - Assess for side effects of test dose
    - Assess if pain team expectations and patient's functional goals were met
    - Determine if it is appropriate to proceed with implant

Management of Implantable Devices
- Spinal Cord Stimulator
  - One week post op with RN
    - Wound check
    - Assess need for oral pain medications and need for reprogramming
  - One week post op with Neuropsychology
    - Assess coping with newly implanted device

- Spinal Cord Stimulator
  - Four week follow up with MD/NP
    - Wound check
    - Discuss wean or discontinuation of oral medications
    - Reprogramming if needed
  - Follow up yearly to assess battery life
  - Follow up as needed after fall/injury with appropriate imaging
  - Follow up for reprogramming per patient need or request
Intrathecal Pump

- One week post op with RN
- Four week post op with MD/NP

- Patient is assessed for:
  - Wound check
  - Need for intrathecal medication adjustment
  - Side effects of intrathecal medication
  - Use of oral pain medications
  - Function

Intrathecal Pump

- As needed appointments
  - Changes in pain
  - Injury
  - Following MRI
  - Troubleshooting pump issues

Intrathecal Pump Refill

- Time between refills is dependent on medications used, concentration and dose
- Typical intrathecal medication used at GHS include:
  - morphine, hydromorphone (Dilaudid), ziconitide (Prialt), bupivacaine, clonidine, lioresal (Baclofen, Gablofen)
- PACC guidelines are followed:
  - Maximum concentrations and dosages
  - Length of time medication may remain in pump
PACC Guidelines for Life Expectancy of Medications

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Morphine
Hydromorphone
Ziconitide
Bupivacaine
Clonidine
Baclofen

PACC Guidelines for Maximum Concentrations of Medications:

- morphine: 20mg/ml
- hydromorphone: 15mg/ml
- ziconitide: 100mcg/ml
- bupivacaine: 30mg/ml
- clonidine: 1000mcg/ml
- lioresal: 2000mcg/ml

PACC Guidelines for Maximum Daily Dose of Medications:

- morphine: 15mg
- Hydromorphone: 10mg
- Ziconitide: 19.2mcg
- bupivacaine: 10mg
- clonidine: 40-600mcg
- lioresal: most patients are well maintained between 300mcg & 800mcg/day
Intrathecal Pump Refill
- Refills are completed by NP/PA and RN
- Can be done in exam room or under fluoroscopy
- Safety checks implemented with each refill
  - "Time out"
  - Needle held in place at all times
  - Remove old medication and compare to expected amount
  - Instill 5cc's of medication, removal of 2cc's- repeat until full amount is placed in pump
- Assess:
  - Need for adjustments in dosing
  - Side effects
  - Use of oral pain medication

Cancer Patients
- No intrathecal test dose unless required by insurance
- Dose adjustments occur more frequently, typically 1-2 times per week
- Use of Patient Therapy Manager (PTM)
- Weaning of oral pain medications

Spinal Cord Stimulator VS Intrathecal Pump
- Spinal Cord Stimulator
- Of the 155 patients with "spinal cord stimulator implant" on their problem list:
  - 7% are no longer followed at GHS due to change in insurance or relocation
  - 10% of the implanted spinal cord stimulators are not being used due to ineffective therapy or are non-functional.
Spinal Cord Stimulator VS Intrathecal Pump

- Spinal Cord Stimulator
- There are 106 patients actively using the spinal cord stimulator implant.
  - At the time of implant 80% were using oral pain medications.
  - Tramadol, Schedule II narcotics
  - 46% continue to use oral pain medications after implant.
  - 22% are using long acting pain medications either alone or in combination with a short acting medication.
  - 52% are using no oral pain medications after implant.

Intrathecal Pump

- Intrathecal Pump
  - Of the 28 intrathecal pumps managed:
    - 3 are implanted for cancer related pain
    - 25 are implanted for chronic non-malignant pain

At the time of implant 84% of the chronic non-malignant pain patients were using oral pain medications

- Tramadol or Schedule II narcotics
- 64% of these patients continue to use oral pain medication
Intrathecal Pump

- At time of implant 100% of the cancer patients were using oral pain medications (long acting and short acting).
- All were able to wean off the long acting medications within 1 month of implant.
- Short acting medications are continued for breakthrough pain.

In Conclusion...

- In our practice:
  - Spinal cord stimulators are implanted more frequently for chronic pain.
  - Has proven to provide more pain relief while minimizing the use of oral pain medications.
  - Intrathecal pumps are implanted rarely for chronic pain.
  - Higher doses and use of oral pain medications needed over time.
  - May be implanted if all other options are exhausted including failure of SCS trial.

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Questions?

References

