Management of Patients with Implanted Pain Devices

Dr. Guy Buchanan
MBBS, FANZCA, FFPMANZCA
Specialist Pain Medicine Physician & Anaesthetist
Associate - Victoria Pain Specialists
Neuromodulation Technology at the Neural Interface

June 2014 • Volume 17 • Number 4
Pages 399–400

WILEY Blackwell

PAIN
THE OFFICIAL JOURNAL OF
THE AMERICAN ACDEMY OF PAIN MEDICINE
OXFORD UNIVERSITY PRESS

PRINT ISSN: 1091-2967
ONLINE ISSN: 1538-4657

Official Journal of the International Neuromodulation Society
www.neuromodulationjournal.com

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overview

• brief introduction to the technology
• perioperative considerations
• technology focused
• communication emphasised
• biocultural complexities too vast for today
the technology

• electrical - neurostimulators
• pharmacological - intrathecal drug delivery systems
electrical

• spinal cord stimulators (dorsal column)
• dorsal root ganglion stimulators
• peripheral nerve stimulators
hardware

• insulated leads with active electrodes
• titanium implanted programmable battery powered pulse generators
why?

• chronic neuropathic pains
• chronic sympathetically-mediated pain
• focal neuropathic pains
• post back surgery pains
• CRPS
• painful peripheral vascular disease
• refractory angina
mechanisms?

• suppression of WDR neurones in dorsal horn
• GABA-ergic
• altered cortical/meso-limbic processing
• altered sympathetic outflow
• release of vasoactive mediators
pharmacological

• intrathecal
• perineural
hardware

• intrathecal catheter (radio-opaque silicon rubber with titanium tip)

• titanium infusion pump (20 or 40 ml reservoir, battery, pumping mechanism, 87.5 mm diameter, 19-26 mm thick, displacement volume 91-121 ml)
why?

• symptom management below diaphragm
• cancer pain, refractory to systemic pharmacotherapy
• spasticity management (baclofen)
• ??? opioid containment strategy for some patients with chronic non-cancer pain???
what?

• opioids
• local anaesthetics
• clonidine
• baclofen
• (ziconotide)
• (midazolam)
relevant complications

• infection
• lead/catheter migration
• lead fracture/catheter occlusion
• implant failure
• acute withdrawal

Baclofen Withdrawal

• Severity of withdrawal varies
  – Mild
    • Minimal symptoms
    • Mild flu-like syndrome
  – Moderate
    • Increase in tone
    • Itching
    • Mild dysphoria
  – Severe
    • Continuous spasms
    • Severe pain
    • Delirium
    • Death
IT pump malfunction

• possible but rare

• altered CVS/Resp/CNS?

• needs usual investigations/management

• do not automatically blame device, but do remember to get the device checked and include it in differential
preoperative

• communication
• listen to patient
• include device company representative for technical details
• surgeon/physician/anaesthetist/pain specialist
imaging

• check device location

• surgical field?

• regional techniques?
preoperative - SCS

• interrogate system (technical representative)
• functioning normally?
• high impedances may mean a faulty lead
• generally turn system off
preoperative - IT

• interrogate system (technical representative)

• functioning normally?

• current devices are diathermy compatible

• generally leave running for background delivery (like a patch)

• abrupt withdrawal may be life-threatening esp baclofen!
antibiotics?

• no evidence base
• infection likely to require explantation
• epidural abscess a potential disaster
• suggest treat as for other implants using antibiotic guidelines
neuraxial anaesthesia?

- avoid the device!
- case reports of successful spinal anaesthesia in presence of SCS
analgesia?

- multi-modal where possible
- opioid doses generally as if opioid naive
- unless still on supplementary oral opioids
- complex and unpredictable psycho-social issues are foreseeable
- involve the pain specialist in discussions preoperatively
diathermy? (SCS)

• heating of device may cause tissue damage, esp at electrodes

• may damage any component of the device

• use bipolar diathermy at lowest effective voltage if possible

• monopolar is relatively contra-indicated if must use keep grounding pad away from device

• ultrasound/microwave diathermy contra-indicated
diathermy? (IT)

• compatible with bipolar/monopolar RF diathermy
• minimise proximity as pump may heat, manufacturers recommendation >30 cm
• ultrasonic/microwave diathermy compatibility unknown
postoperative

• interrogate system to check function
• continue intrathecal (generally not recommended to use bolus function for post-op analgesia)
• can usually restart SCS depending on precise circumstances
mri?

• potential harms
• lead movement/heating/nerve injury
• hardware damage
• software malfunction
**mri? (SCS)**

- most modern neurostimulators are MRI conditional
- head/extremity MRI may be possible depending on the system
- usually with 1.5 Tesla magnet
- whole body MRI may be possible for some devices
- need to follow specific recommendations
mri? (IT)

- Magnetic field stops the rotor of the pump motor for duration of exposure.
- Usually resumes when magnetic field exposure ends.
- Observational study of 43 consecutive 1.5 Tesla MRI scans, all okay.
- Case reports of pump malfunction exist.
- So check function post MRI, especially baclofen!
ppm?

• modern devices are usually ppm compatible
• both devices will need to be in bipolar mode usually
• Stimulation may be sensed by AICD and lead to defibrillator activation.
• This would usually be resolved around the time of AICD implantation.
• Animal studies suggest that the devices can be compatible with each other.
cardioversion/defibrillation?

• consult technical representative prior to elective cardioversion and switch off

• current flow through device may cause electric shock injury or damage the device

• place paddles away from device (similar to PPM)

• use lowest clinically appropriate energy

• check device function
pregnancy?

• case reports
• foetal/uterine effects unknown
• electrical currents largely shielded by non-conductive bone (vertebra)
• anatomical changes may stretch leads
• epidural/spinal anaesthesia? should be planned/discussed early with all relevant parties
other uses

- Parkinsons disease
- PTSD
- Bladder dysfunction
- Gut
key take aways

• communicate
• communicate
• communicate
The biggest communication problem is we do not listen to understand.

We listen to reply.