

Gadgets in EOS Imaging and Surgery

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Disclosures

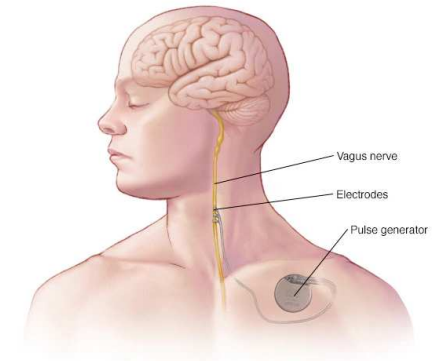
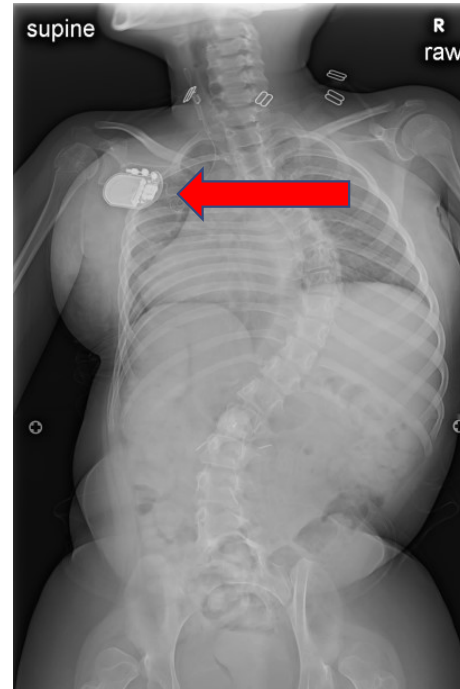
- **Research Grants:** NuVasive (Co-PI, Paid to Growing Spine Foundation), Project Title: Magnetically Controlled Growing Rods Vs. Traditional Growing Rods: A Prospective Comparison of Health-Related Quality of Life
- **Consulting:** ZimmerBiomet; Grand Rounds (a healthcare 2nd opinion company); Orthobullets
- **Stock options:** Zipline Medical, Inc.; Green Sun Medical
Stocks: Orthobullets
- **Board Membership:** Growing Spine Study Group, Growing Spine Foundation, CHLA Foundation
- **Paid Lecturer:** ZimmerBiomet
- **Patents:** with Medtronic & ZimmerBiomet
- **Royalties:** Wolters Kluwer Health; ZimmerBiomet
- **Editor:** Orthobullets, Co-Editor in Chief
- **Editorial boards:** Spine Deformity, Orthopedics Today, Journal of Children's Orthopedics

Gadgets

Deep Brain Stimulator
Vagal Nerve Stimulator
Neuromonitoring Needles
Cochlear Implants
Baclofen pump
VP Shunt
Piercings
Pacemakers
Defibrillators

Vagal Nerve Stimulator (VNS)

- Treatment of refractory epilepsy and depression.
- Wire wrapped around vagus nerve in neck
- Implant just under left clavicle

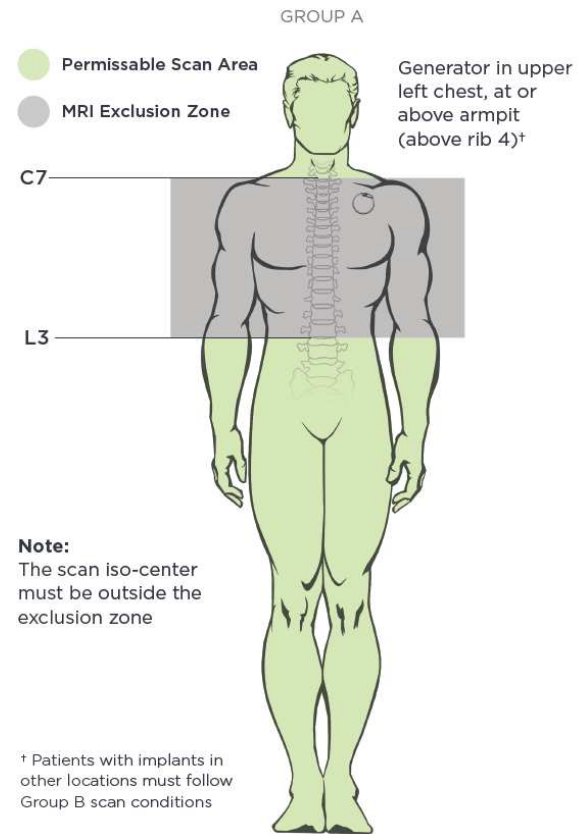


Vagal Nerve Stimulators (VNS)

MRI

- Safe with ALL models
- exclusion zone C7 – mid thoracic?
- Radiology may refuse to do study

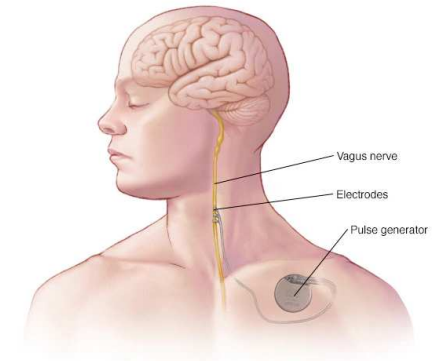
No special MRI equipment/coils required



Vagal Nerve Stimulators (VNS)

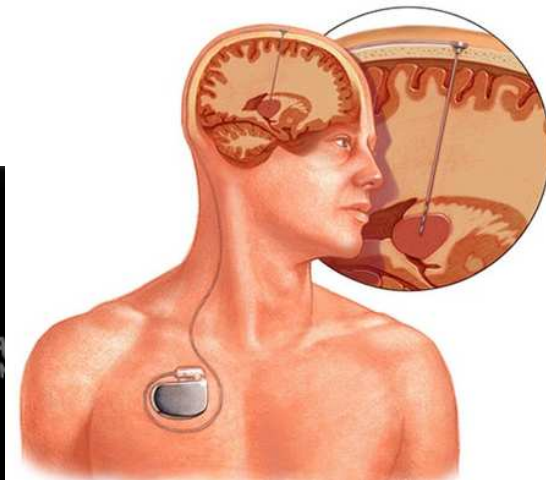
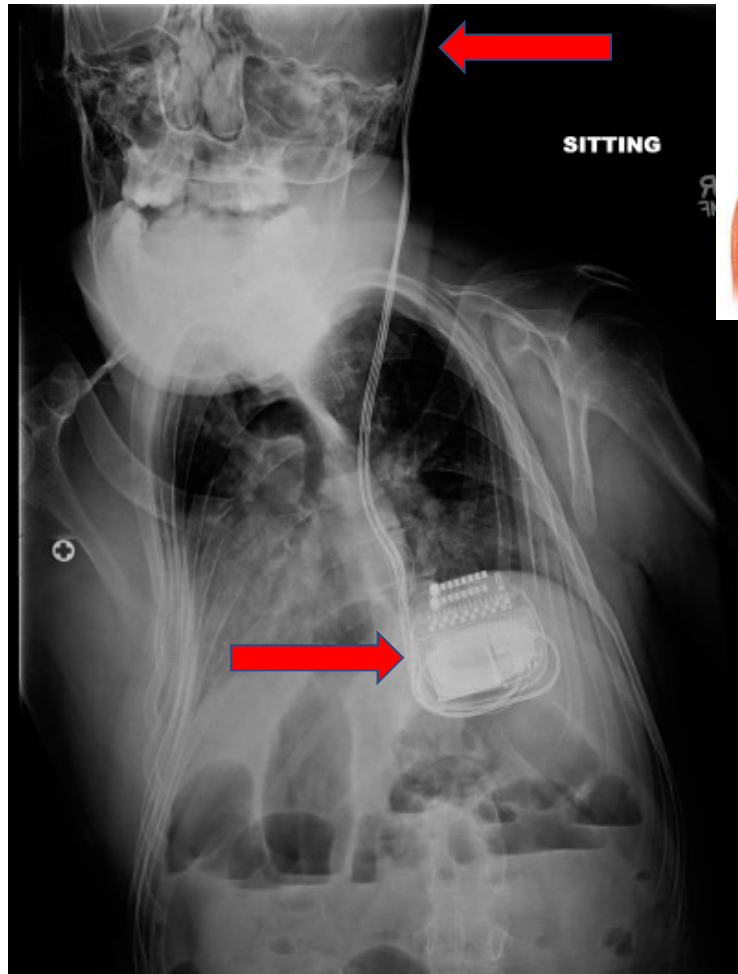
• Surgery

- Turn off before surgery
- Turn on after surgery
 - As long as the device is off during surgery – you may use the monopolar bovie



Deep Brain Stimulator (DBS)

- Wires in the brain can regulate abnormal impulses
- Controlled by a pacemaker-like device placed under the skin in the upper chest.
- Treat
 - movement disorders
 - dystonia
 - psychiatric conditions
 - OCD
 - reduce seizures

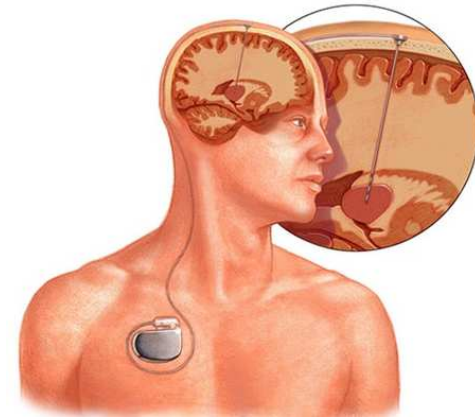
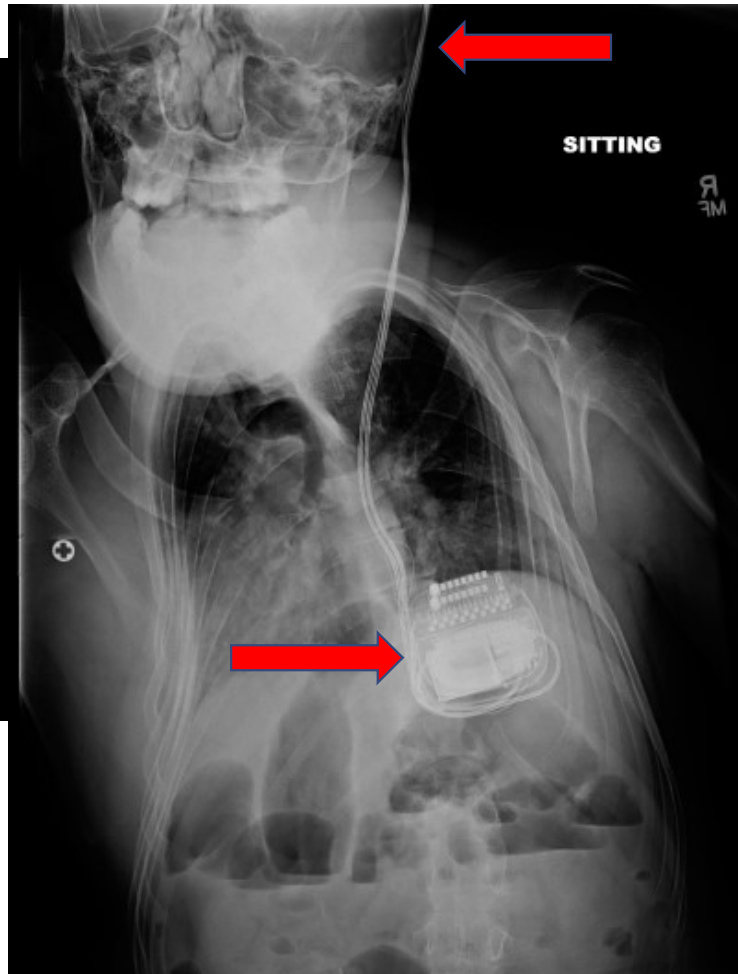


Deep Brain Stimulator (DBS) & Spine Surgery

- Concerns:

- Damage device
- Stimulate or shock patient

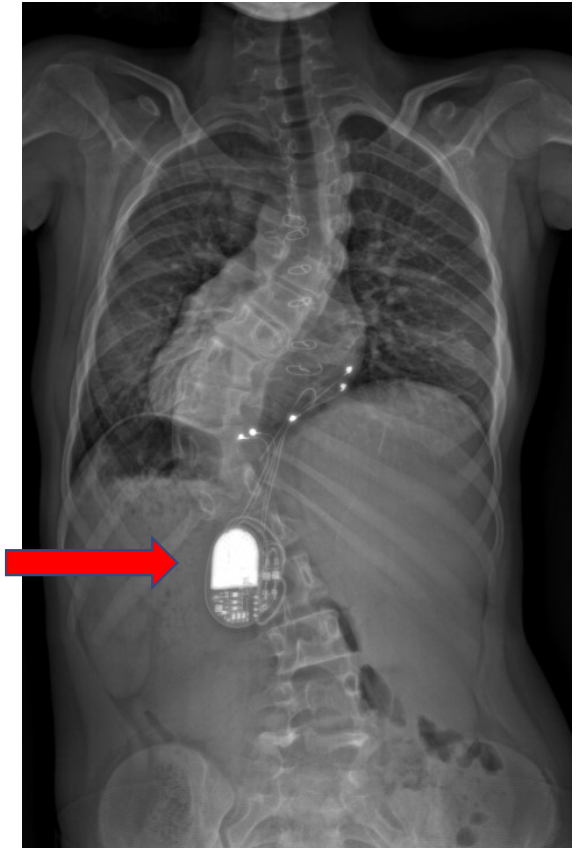
**Put in “Surgery mode” for monopolar and MRI
- rep can do it**



Cardiac Implantable Devices

pacemaker or defibrillator

- A pulse generator /battery
- Wires into heart



Cardiac Implantable Devices

pacemaker or defibrillator MRI

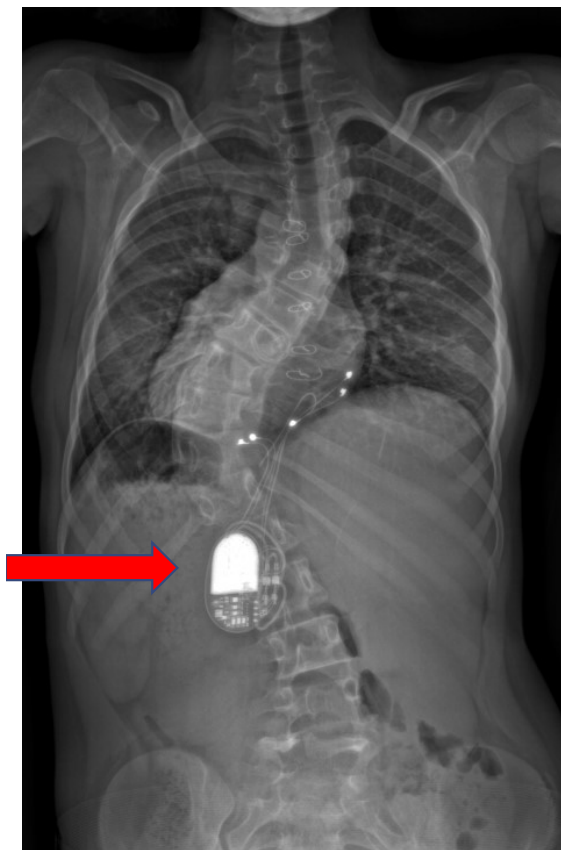
Tested and programmed before and after MRI

MRI in Patients with Cardiac Implantable Electronic Devices

Radiology, 2019

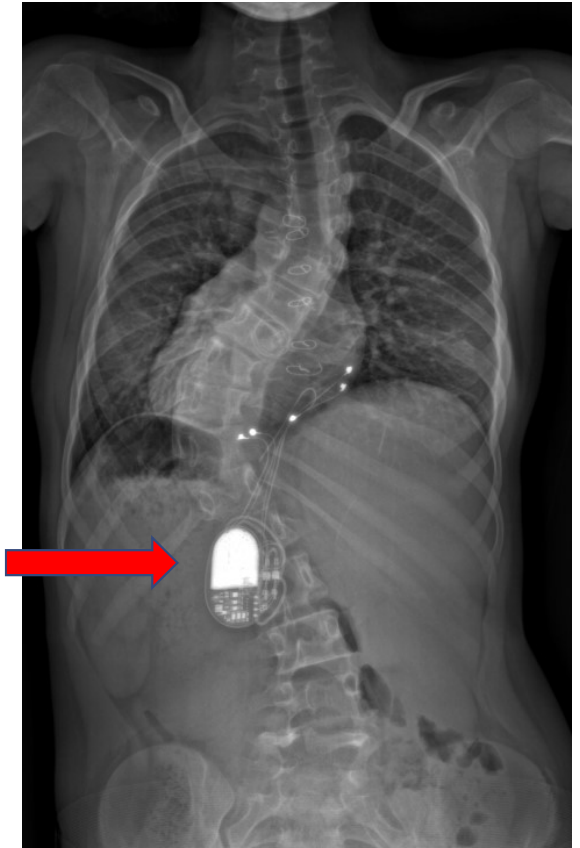
Rahul G. Muthalaly, MBBS, MPH • Nitesh Nerlekar, MBBS, MPH • Yin Ge, MD • Raymond Y. Kwong, MD, MPH • Arthur Nasis, MBBS, MD, PhD

adverse events are rare, nonexistent, and/or clinically insignificant in the wealth of published data.



Cardiac Implantable Devices

- Surgery - pacemaker shut down with a magnet
 - **May use monopolar Cautery**
- After surgery - re-programmed
- Call cardiologists before surgery

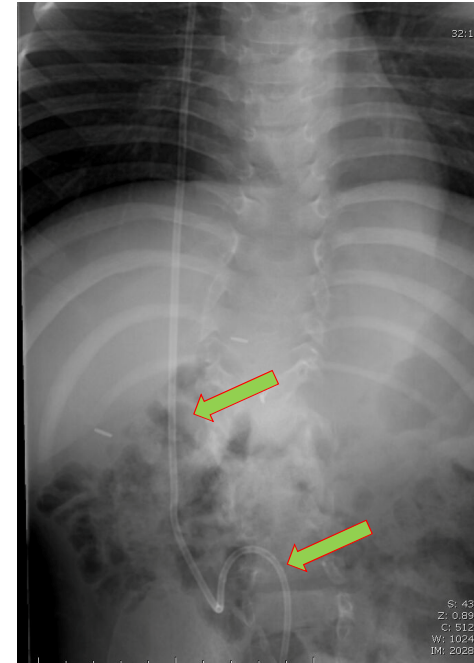
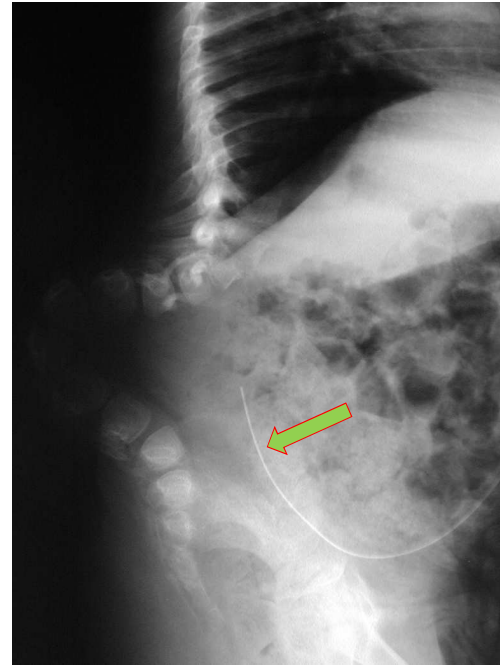
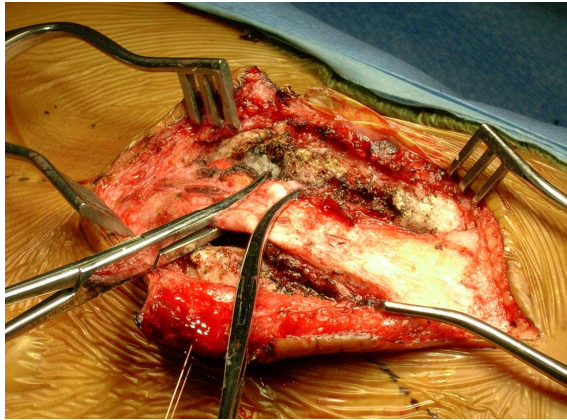


Spina Bifida



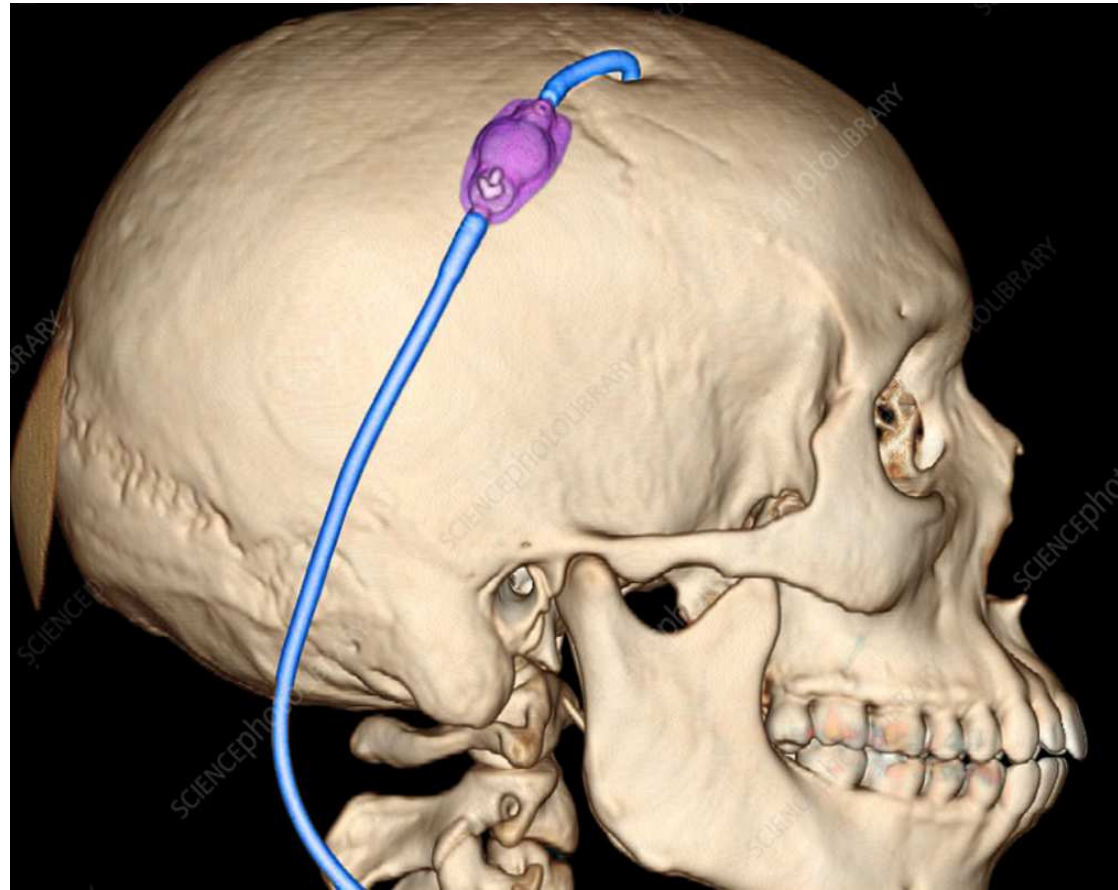
Kyphectomy

- Make sure VP Shunt is working
 - **Send to neurosurgeons**
- Cutting placode with non-functioning shunt → rapid death



Mayfield, Gardner-Wells, Halo

Feel the length of the tubing before placing a pin in the skull

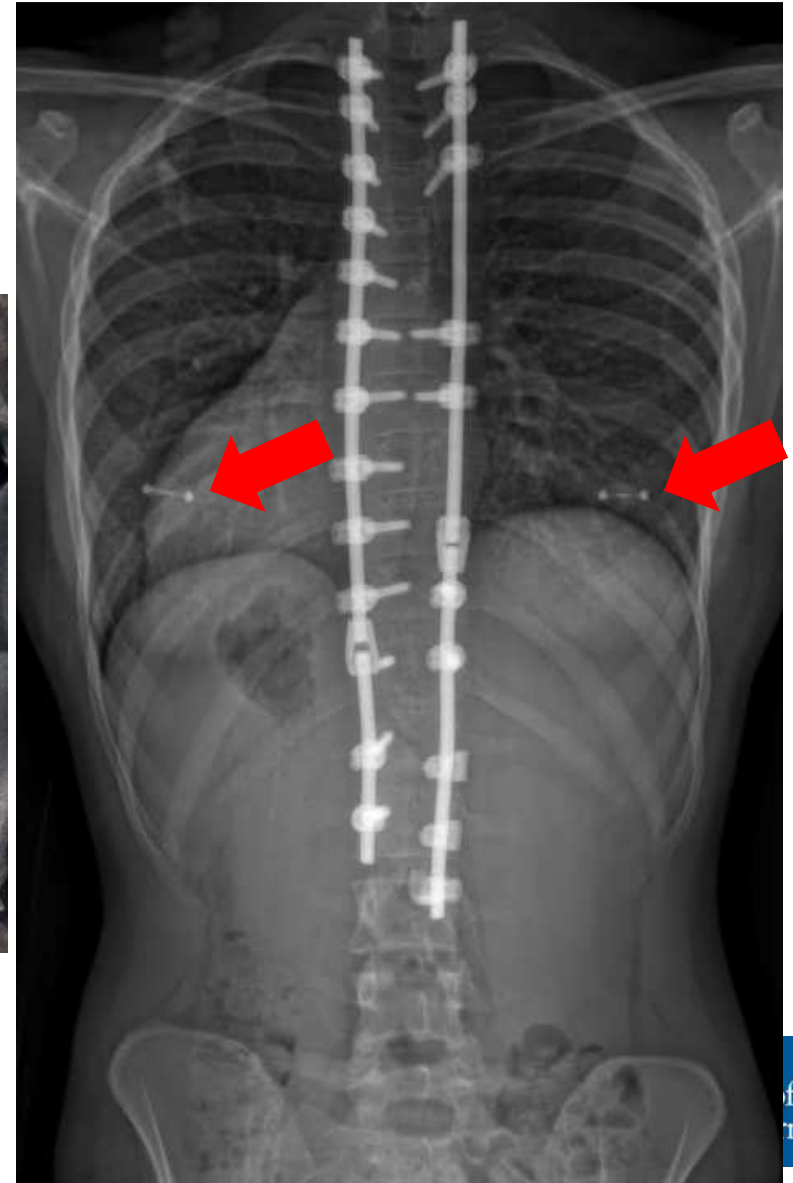


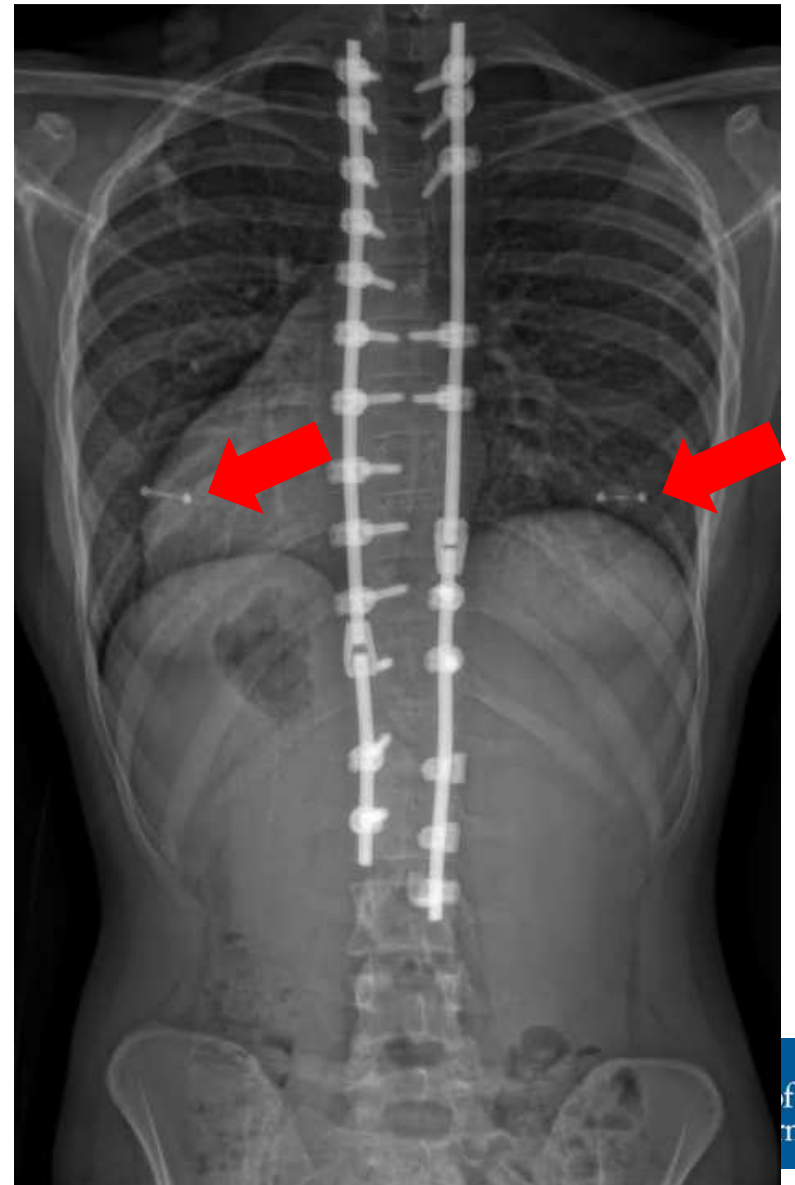
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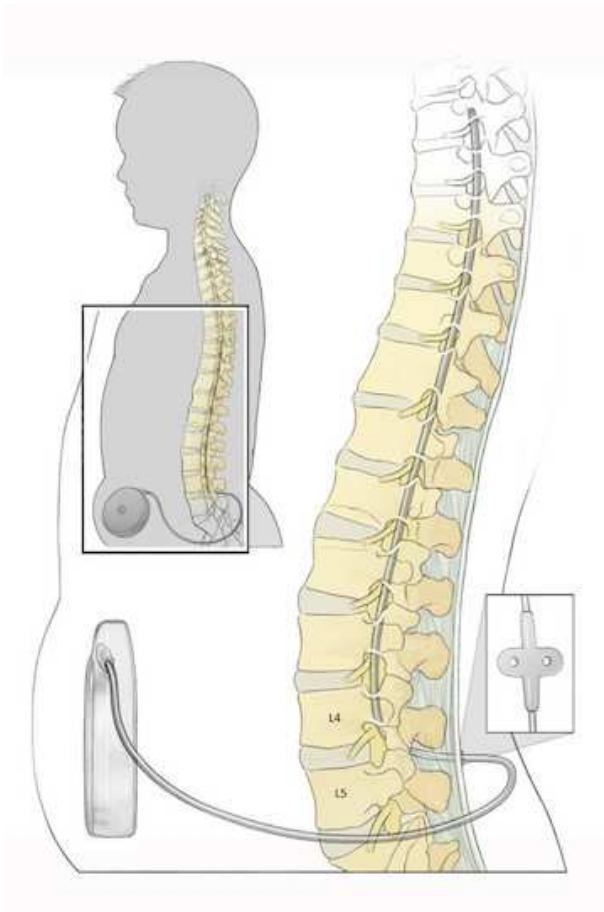
Body Piercings

- Remove during surgery
- Can hold open hole with plastic spacer





Baclofen Pumps - MRIs



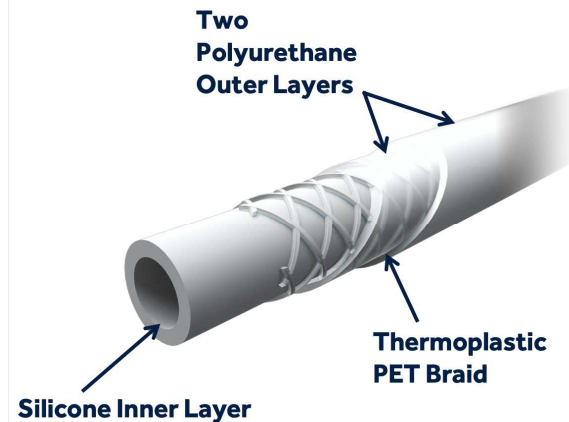
- can be done
- MRI will turn off the pump.
- Must be turned back on by the neurology after the study is complete

Baclofen Pump - Surgery



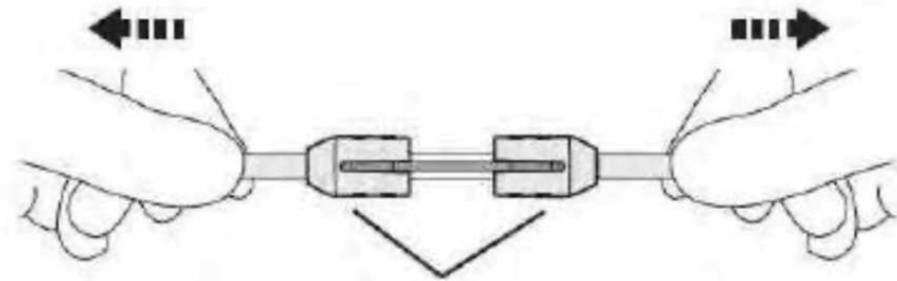
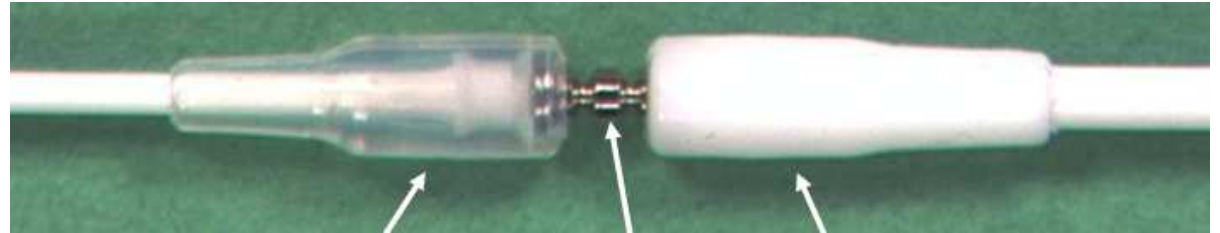
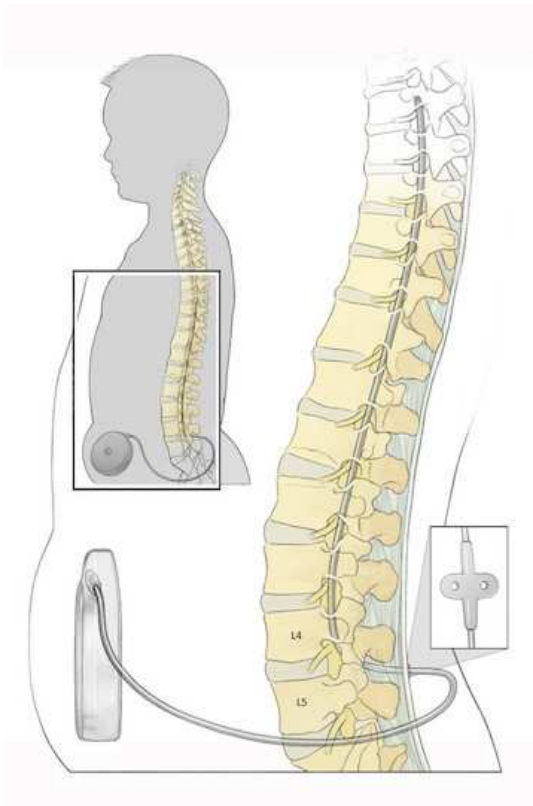
- Pad around device when positioning
- Leave it on
- Intra Thecal - record how many CM are at dura

***Bovi wont cut it, knife or scissors will cut it



Baclofen Pump

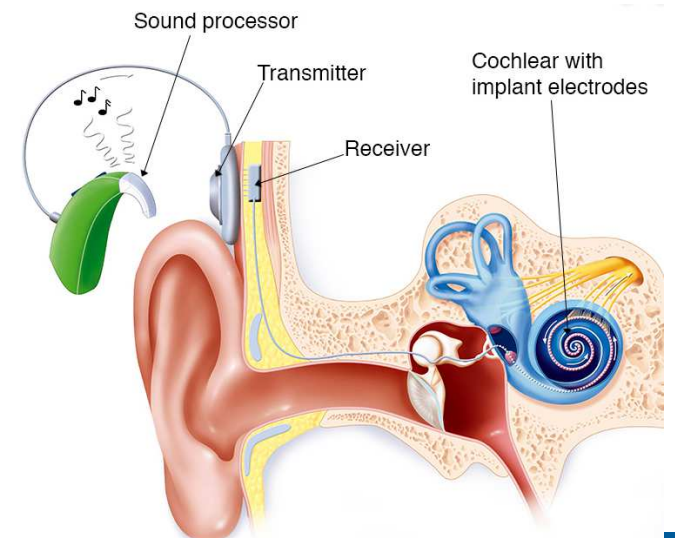
Ask Rep for catheter repair kit



Verify that the collets are firmly attached. The collets should not move back and forth or rotate.

Cochlear Implants

- MRI - can migrate or cause pain
 - Know exact model of implant and bring documentation to study – ask rep
 - **HIGHLY VARIABLE** - some must be surgically removed - elective procedure -
 - Newer (within last 2 years) Remove external portion (just like hearing aids)

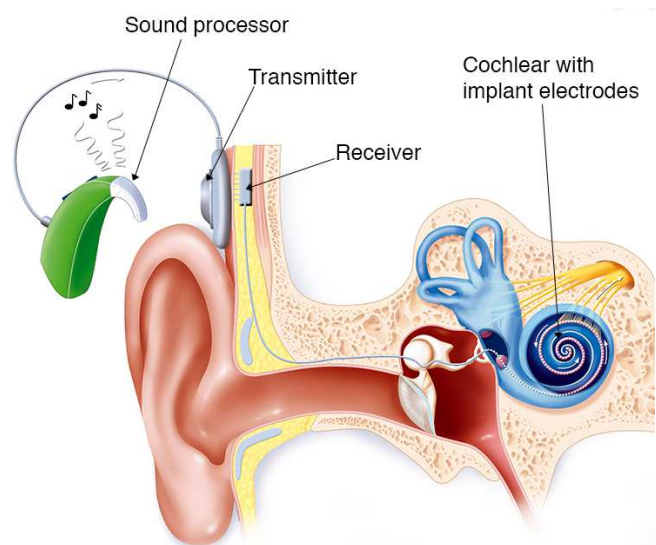


Does Electrocautery Damage Cochlear Implants?

Anita Jeyakumar, Neal M. Jackson, Victoria B. Givens, Todd M. Brickman,
and Moisés A. Arriaga

*Department of Otorhinolaryngology, Louisiana State University-Health Science Center, New Orleans,
Louisiana, U.S.A.*

Cochlear Implants and Spine Surgery:
Historical Recommendation:
Do NOT use monopolar



Conclusions:

- The cochlear implant devices had no evidence of electrical damage by monopolar cautery, even up to levels of 100 W
- more flexible recommendations should be considered.

Dermal Discolorations and Burns at Neuromonitoring Electrodes in Pediatric Spine Surgery

Spine, 2016

Austin Sanders, BA,* Lindsay Andras, MD,* Alison Lehman, MS PA-C,* Nancy Bridges, BSN, MBA, CNOR,† and David L. Skaggs, MD, MMM*

- Bovie pads must NOT touch the needles
- Black discolorations resolve in 6 months
- Full thickness burns



- Deep Brain Stimulator }
Vagal Nerve Stimulator } Call Rep
- Baclofen pump → Call Rep & Repair Kit
- Pacemakers }
Defibrillators } Call cardiology
- VP Shunt → Clear by Neurosurgery
Don't put Mayfield/Halo pin into tubing

Thank You



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Southern California

