Neuro Quiz 58
Spinal Cord Stimulators (SCS)

THIS QUIZ IS BEING PUBLISHED ON BEHALF OF THE EDUCATION COMMITTEE OF THE SNACC

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1. A 55y male with an implanted SCS is scheduled for MRI of the brain. Which of the following statements is CORRECT?

A. Newer SCS are conditional for MRI of the head
B. The risk of thermal injury is mainly around the pulse generator
C. The risk of thermal injury is reduced if the device is turned off before the MRI
D. MRI is absolutely contraindicated
1.A. Newer SCS are conditional for MRI of the head

- According to the American Society for Testing and Materials, newer SCSs are regarded as conditional-5, meaning they are acceptable for a patient undergoing an MRI procedure or an individual in the MRI environment as long as specific guidelines or recommendations are followed.

- The current terminology used by FDA
  - MR safe
  - MR compatible
  - MR conditional
  - MR unsafe
1. B. The risk of thermal injury is mainly around the pulse generator.

   - Thermal injury can occur at all parts of the device including the electrodes. The magnetic pull can result in extraction of the pulse generator and create a missile.
1. C. The risk of thermal injury is reduced if the device is turned off before the MRI.

- Although the device should be turned off for any procedure under anesthesia, the risk of thermal injury is due to the induction of current at any ferro-magnetic component of the SCS and therefore the risk is present even if the device is turned off.
1. D. MRI is absolutely contraindicated

- The three forces, namely the strong magnetic field, the pulsed radiofrequency field and the pulsed magnetic field can result in heating of the spinal cord lead and create a magnetic pull on the device leading to damage and unwanted stimulation.
- However, newer SCS devices are MRI conditional for the whole body or restricted areas, depending on the manufacturer’s specification.
2. A 64y old man with a SCS for chronic back pain is scheduled for transurethral resection of prostate. Which of the following statements is CORRECT?

A. The SCS should be programmed to a higher level to combat perioperative pain
B. A bipolar cautery will interfere with the SCS and should not be used
C. The SCS should be turned down to the lowest and turned off for the procedure
D. No adjustment of the SCS is needed for the procedure
2. A. The SCS should be programmed to a higher level to combat perioperative pain

- The SCS should be reprogrammed to the lowest possible amplitude and then turned off prior to induction of anesthesia
- The SCS may not cover the area of the perioperative pain
2. B. A bipolar cautery will interfere with the SCS and should not be used

- The current in a monopolar electrocautery passes from the probe through the surgical wound to the grounding pad. If the SCS generator lies along this path, it can be damaged.
- The current in a bipolar electrocautery passes between the two probes of the forceps. It is safe to use a bipolar in the presence of any implanted electrical device.
- If a monopolar has to be used, the grounding pad should be placed away from the SCS generator.
2. C. The SCS should be turned down to the lowest and turned off for the procedure.

- The SCS should be reprogrammed to the lowest possible amplitude and then turned off prior to induction of anesthesia.
- This ensures that if the device is inadvertently turned on the stimulation would be low. Turning the device off reduces the risk of accidental reprogramming by electromagnetic interference.
2. D. No adjustment of the SCS is needed for the procedure

- The SCS should be reprogrammed to the lowest possible amplitude and then turned off prior to induction of anesthesia
3. Which of the statements regarding a SCS in a pregnant woman is CORRECT?

A. A parturient can continue to have an active SCS
B. An active SCS interferes with fetal scalp monitoring
C. Epidural for labor analgesia is contraindicated if a SCS is in place
D. Spinal anesthesia is acceptable for cesarean section
3.A. A parturient can continue to have an active SCS

- There are no studies examining the effects of SCS on human fetal development ... and likely there never will be!
- All manufacturers recommend the device be deactivated at the time of diagnosis of pregnancy and remain so till delivery.
- However, it is suggested that SCS may be better than continuing certain drugs that may be harmful to the fetus.
3. B. An active SCS interferes with fetal scalp monitoring

- Although, SCS should be turned off during pregnancy and delivery, there are reports of use of SCS without interference with fetal scalp monitoring and external fetal monitoring using Doppler.
3.C. Epidural for labor analgesia is contraindicated if a SCS is in place

• Although there is a possibility of damage to the SCS system during epidural placement, prior knowledge of the location of the electrodes and the leads can guide safe epidural placement if done at a level below the level of SCS lead entry.

• The fibrous deposits around the SCS wires can potentially interfere with adequate spread of the local anesthetic administered in the epidural space.
3. D. Spinal anesthesia is acceptable for cesarean section

• Spinal anesthesia is possible in the presence of SCS if performed armed with the knowledge of the location of the electrodes and wires.
4. In a patient with implanted SCS, which of the following statements is CORRECT?

A. There is no restrictions to undergo lithotripsy provided the device is turned off
B. An SCS is acceptable if the patient has a permanent pacemaker but not an internal cardiac defibrillator
C. Radiation therapy is acceptable provided the pulse generator is turned off
D. CT scan is the preferred method of imaging, but the device should be turned off
4. A. There is no restrictions to undergo lithotripsy provided the device is turned off

The recommendations by the manufacturers include:

- Turn off the stimulator prior to procedures
- The focus of the lithotripsy beam should be more than 15 cm of the SCS
- Ensure functionality at the end of the procedure by powering up the device and slowly increasing the stimulation amplitude
4.B. An SCS is acceptable if the patient has a permanent pacemaker but not an internal cardiac defibrillator.

- The stimulation from a SCS could suppress the pacing function of a pacemaker or prompt the delivery of an inappropriate defibrillation from an ICD.
- The manufacturers advise against simultaneous use of SCS and cardiac implanted electronic devices (CIED).
- However, if needed, placing the CIED in bipolar mode and implanting the pulse generator of the SCS on the contralateral side of the CIED is recommended.
4. C. Radiation therapy is acceptable provided the pulse generator is turned off.

- The high dose ionizing radiation can cause permanent damage to implanted devices.
- The severity of the damage depends on the radiation type, total dose and type of device. The damage can occur whether the device is on or off.
- It is recommended that the dose be less than 5 gray (Gy) and the pulse generator should be more than 1 cm outside of the direct beam, or it should be removed prior to the treatment.
4. D. CT scan is the preferred method of imaging, but the device should be turned off.

- CT scan is the preferred method of diagnostic imaging in patients with SCS.
- There have been concerns that patients with SCS experience a shocking sensation when high levels of radiation is used.
- It is recommended to use the lowest dose necessary for adequate images and to turn the device off during a scan.
5. Currently, SCS is FDA approved for the following indications EXCEPT...

A. Chronic neuropathic pain of legs
B. Radicular pain from failed back surgery
C. Chronic intractable angina
D. Complex regional pain syndrome of upper limbs
5 A. Chronic neuropathic pain of legs

- SCS is an effective treatment for chronic pain syndrome and approved by the FDA
5. B. Radicular pain from failed back surgery

- SCS is an accepted modality of treatment for patients who have not improved after back surgery and this indication is approved by the FDA.
5. C. Chronic intractable angina

- SCS has been shown to improve ischemic pain syndrome such as angina, but this is NOT FDA approved.
- However, in Europe, it is approved for refractory angina pectoris and peripheral limb ischemia.
5. D. Complex regional pain syndrome of upper limb

- Use of SCS for treatment of complex regional pain syndrome is approved by FDA
References
