Anesthetic considerations for patients with implanted devices for treating chronic pain and more

Alaa Abd-Elsayed, MD, MPH
Medical Director, UW Pain Services
Medical Director, Pain Clinic
Section Head, Chronic Pain Medicine
Assistant Professor of Anesthesiology
University of Wisconsin-Madison

Objectives:
1- learning about implantable devices for treating chronic pain
2- Anesthetic precautions in patients with implanted devices.
3- Precautions related to Methadone use in the perioperative period.

A 65 years old man with history of failed back surgical syndrome, DM and HT is being seen in the pre-operative clinic before a scheduled splenectomy next week. While you are obtaining history, patient mentioned to you that he has a spinal cord stimulator implanted last year.

1- What is a spinal cord stimulator?
2- How will you handle the SCS as you proceed with surgery?
Spinal cord stimulator is a device placed for treating chronic pain.

Common indications:
Failed back surgical syndrome
CRPS
Low back pain with radicular pain

Mechanism of action:
Gate theory and others.

Criteria for implant:
1- Failure of conservative management.
2- SCS trial.
3- SCS implant.
Will you turn off the SCS or keep it on?
Will use monopolar or bipolar cautery?
Is it ok for patient to have an MRI before surgery?
Will you recommend an epidural catheter for pain control?

The same patient in the previous scenario is showing up again in the preoperative clinic 5 years after first surgery for evaluation for resection of a gastric tumor. During his visit with you, patient mentioned he still has the SCS and he is very happy with the pain control it provides him. In addition patient told you he now has CIED placed for a cardiac condition that he did not recall much about.

1- Is it safe to have SCS and AICD together? Do they interact?
2- What precautions will you recommend to handle both devices during surgery?

1. Preoperative Evaluation
   A. Establish whether a patient has a cardiac rhythm management device (CIED).
   1. Conduct a focused history (patient interview, medical records review, and review of available chest x-rays, electrocardiograms, or any available monitor or rhythm strip information).
   2. Conduct a focused physical examination (check for scars and palpate for device).
   3. Define the type of CIED.
      a. Obtain manufacturer’s identification card from patient or other source.
b. Order chest x-ray if no other data are available.
c. Refer to supplemental resources (e.g., manufacturer’s databases).

B. Determine the dependence on pacing function of the CIED.
1. Patient has history of symptomatic bradyarrhythmia resulting in CIED implantation.
2. Patient has history of successful atrioventricular nodal ablation.
3. Patient has inadequate escape rhythm at lowest programmable pacing rate.

C. Determine CIED function.
1. Interrogate device (consultation with a cardiologist or pacemaker-ICD service may be necessary).
2. Determine whether the device will capture when it paces (i.e., produce a mechanical systole with a pacemaker impulse).
3. Consider contacting the manufacturer for perioperative recommendations.

II. Preoperative Preparation
A. Determine whether EMI is likely to occur during the planned procedure.
1. Determine whether reprogramming pacing function to asynchronous mode or disabling rate responsive function is advantageous.
2. Suspend antitachyarrhythmia functions if present.
3. Advise the individual performing the procedure to consider use of a bipolar electrocautery system or ultrasonic (harmonic) scalpel.

4. Temporary pacing and defibrillation equipment should be immediately available.

B. Evaluate the possible effects of anesthetic techniques and of the procedure on CIED function and patient-CIED interactions.

III. Intraoperative Management
A. Monitor operation of the CIED.
1. Conduct electrocardiographic monitoring per ASA standard.
2. Monitor peripheral pulse (e.g., manual pulse palpation, pulse oximeter plethysmogram, and arterial line).
3. Manage potential CIED dysfunction.

B. Electrocautery.
1. Assure that the electrosurgical receiving plate is positioned so the current pathway does not pass through or near the CIED system. For some cases, the receiving plate might need to be placed on a site different from the thigh (e.g., the superior posterior aspect of the shoulder contralateral to the generator position for a head and neck case).
2. Advise the individual performing the procedure to avoid proximity of the cautery’s electrical field to the pulse generator or leads.
3. Advise the individual performing the procedure to use short, intermittent and irregular bursts at the lowest feasible energy levels.
4. Advise the individual performing the procedure to reconsider the use of a bipolar electrocautery system or ultrasonic (harmonic) scalpel in place of a monopolar electrocautery system if possible.

C. Radiofrequency (RF) ablation.
1. Advise the individual performing the procedure to avoid direct contact between the ablation catheter and the pulse generator and leads.
2. Advise the individual performing the procedure to keep the RF’s current path as far away from the pulse generator and lead system as possible.

D. Lithotripsy.
1. Advise the individual performing the procedure to avoid focusing the lithotripsy beam near the pulse generator.
2. If the lithotripsy system triggers on the R-wave, consider preoperative disabling of atrial pacing.
E. Magnetic resonance imaging.
1. MRI is generally contraindicated in patients with CIEDs.
2. If an MRI must be performed, consult with the ordering physician, the patient’s cardiologist, the diagnostic radiologist, and the CIED manufacturer.

F. Radiation therapy.
1. Radiation therapy can be safely performed in patients who have CIEDs.
2. Surgically relocate the CIED if the device will be in the field of radiation.

G. Electroconvulsive therapy.
1. Consult with the ordering physician, the patient’s cardiologist, a CIED service, or the CIED manufacturer.

H. Emergency defibrillation or cardioversion.
1. For the patient with an ICD and magnet-disabled therapies:
   a. Advise the individual performing the procedure to terminate all sources of EMI while the magnet is removed.
   b. Remove the magnet to reenable antitachycardia therapies.
   c. Observe the patient and the monitors for appropriate CIED therapy.
   d. If the above activities fail to restore ICD function, proceed with emergency external defibrillation or cardioversion.
2. For the patient with an ICD and programming-disabled therapies:
   a. Advise the individual performing the procedure to terminate all sources of EMI while the magnet is removed.
   b. Re-enable therapies through programming if the programmer is immediately available and ready to be used.
   c. Observe the patient and the monitors for appropriate CIED therapy.
   d. If the above activities fail to restore ICD function, proceed with emergency external defibrillation or cardioversion.

3. For external defibrillation:
   a. Position defibrillation/cardioversion pads or paddles as far as possible from the pulse generator.
   b. Position defibrillation/cardioversion pads or paddles perpendicular to the major axis of the CIED to the extent possible by placing them in an anterior-posterior location.
   c. If it is technically impossible to place the pads or paddles in locations that help to protect the CIED, then defibrillate/cardiovert the patient in the quickest possible way and be prepared to provide pacing through other routes.
   d. Use a clinically appropriate energy output.
IV. Postoperative Management
A. Continuously monitor cardiac rate and rhythm and have back-up pacing and defibrillation equipment immediately available throughout the immediate postoperative period.
B. Interrogate and restore CIED function in the immediate postoperative period.
   1. Interrogate CIED; consultation with a cardiologist or pacemaker-ICD service may be necessary.
   2. Restore all antitachyarrhythmic therapies in ICDs.
   3. Assure that all other settings of the CIED are appropriate.

The same patient shows up to the preoperative pain clinic 3 years later for evaluation for open cholecystectomy. Patient requested seeing you in the preoperative clinic as you know all about his history.

Patient mentioned to you that he still uses the CIED and SCS but in addition he has now an implanted intrathecal pump to aid with his chronic low back pain.

Patient had a card that indicated that his pump has intrathecal morphine infusing at a rate of 1.5 mg per day with one bolus of 0.2 mg of morphine every 6 hours as needed.

What is an intrathecal pump?
What is the intrathecal to PO conversion of morphine? How about if patient has hydromorphone or Fentanyl?
Will you turn it off day of surgery?
What do you need to know when administering anesthesia for patient with intrathecal pump?
1 mg IT morphine = 10 mg epidural = 100 mg IV = 300 mg PO
Hydromorphone, Fentanyl, Clonidine, Bupivacaine?

Same precautions with cauterization.
Not always possible to turn off but you can lower infusion rate.
Adjust your opioid dosing based on IT pump.

The patient refers to you his cousin who is going for a bariatric surgery. Patient is a 45 year old man with history of DM, HTN, hypercholesterolemia and severe chronic pain. During history taking, patient mentioned to you that he has been using Methadone 40 mg TID PO for 10 years. Patient mentioned that Methadone has been helping significantly with his pain.

What do you know about Methadone?
Do you need to do any investigations? What are your concerns?
How will you handle in the perioperative period?
Methadone is an opioid
Act on NMDA receptors
Long acting
Used for chronic pain and addiction

Need to do EKG periodically as it can cause QT prolongation

Maintain home dose in the perioperative period for pain control and avoiding withdrawal.
A 35 year old woman is seeing you in the preop clinic based on her request as she heard you are an expert with implanted devices. Patient is going for cervical spine fusion surgery. Her history is significant for only neck pain and occipital headache. Patient mentioned she has a peripheral nerve stimulator placed in her occipital region for treating headache. She had the implant 3 years ago and has been working fine for her headaches.

How do you handle this device in the perioperative period?

THANK YOU
QUESTIONS