Implanted Cardiac Pacemaker and Defibrillator Management

INITIAL EVALUATION

All patients with an implantable cardiac device and scheduled for procedure or therapeutic radiation are to be seen at the Cardiopulmonary Center.

1 Device check not needed if completed within the last 3 months and with documented NORMAL battery, impedances, and pacing safety margins. Device to be rechecked when transitioning from one treatment to another (i.e., radiation, surgery). After 5 PM, weekends, and holidays, cardiology service on-call can be contacted for emergency device checks.

2 Recommend all surgical procedures to be scheduled early in the morning
   - Pacing dependent or surgery above the waist: Recommend scheduling surgery in main operating room
   - Pacing non-dependent and surgery below the waist: Recommend scheduling surgery in either main or ACB operating room

Abdominal implants: If surgery between thorax and pelvis, refer to above the waist; if outside thorax and pelvis, refer to below the waist

Follow Cardiac Device (Pacemaker/ICD) clinic recommendations

Refer to Appendix A for Conditions Under Which Postoperative Interrogation is Not Necessary

Refer to Appendix B for Magnet Application

Disclaimer: This algorithm has been developed for MD Anderson using a multidisciplinary approach considering circumstances particular to MD Anderson’s specific patient population, services and structure, and clinical information. This is not intended to replace the independent medical or professional judgment of physicians or other health care providers in the context of individual clinical circumstances to determine a patient’s care. This algorithm should not be used to treat pregnant women.
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Central Line/Peripherally Inserted Central Catheter (PICC) Placement

Patient presents for CVC/PICC placement or exchange

Note: Avoid placement of CVC/PICC on the same side of cardiac device

CVC = central venous catheter
PICC = peripherally inserted central catheter

Special circumstance: If ICD or pacemaker was implanted less than 3 months prior, procedure should be performed under fluoroscopy or in the Cardiac Catheterization Lab.

Proceed with procedure as clinically indicated

Arrangements must be completed by direct communication between Infusion Therapy Team and Cardiac Device (Pacemaker/ICD) clinic for intra-procedure monitoring

Yes

No

Pacemaker dependent?

Pacemaker

Proceed with procedure as clinically indicated

CVC

ICD

PICC
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THERAPEUTIC RADIATION

PRIOR TO START OF RADIATION THERAPY

Patient to be scheduled for radiation treatment ➔ Pacemaker or ICD ➔ Cardiac Device (Pacemaker/ICD) clinic consult

High risk device exposure?

Yes ➔ Multidisciplinary conference: clinician to clinician communication) to discuss treatment plans along with other options ➔ Refer to Cardiac Device Management plan in electronic health record (EHR) and schedule follow-up as clinically indicated ➔ Start radiation treatment

No ➔ Treatment plan per Radiation Oncology Team (morning radiation treatment appointment recommended) ➔ At completion of radiation treatment, schedule patient with Cardiology for final pacemaker/ICD assessment

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1. Radiation dose specification documented in clinic note is recommended prior to Cardiac Device (Pacemaker/ICD) clinic consult
2. Start radiation treatment in accordance with Division of Radiation Oncology Electronic Medical Device Policy

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Department of Clinical Effectiveness V5
Approved by the Executive Committee of the Medical Staff on 06/25/2019
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**PRIOR TO SCHEDULING MRI**

- **MRI-conditional device**
  - Consult to Cardiac Device (Pacemaker/ICD) clinic noting patient to be scheduled for MRI and has a CIED
  - Cardiology to collaborate with Diagnostic Imaging (DI) faculty regarding clinical indication of MRI

- **MRI-non-conditional device**
  - Pacing non-dependent
    - Electrophysiologist to discuss risks and benefits of study with patient
      - MRI approved?
        - Yes
          - MRI protocolled for implanted devices by DI
          - Consent patient, if not previously obtained
        - No
          - Electrophysiologist to notify primary team and DI that patient cannot proceed with MRI
          - DI to recommend alternative imaging study
  - Pacing dependent
    - Abandoned lead
    - Epicardial lead

**MRI**

- MRI approved and scheduled?
  - Yes
    - MRI protocolled for implanted devices by DI
    - Consent patient, if not previously obtained
  - No

**DURING MRI**

- Monitors applied:
  - Cardiac monitoring
  - Pulse oximetry
  - Blood pressure
  - Program device as indicated

**POST MRI**

- CIED checked
- Reprogram device back to original settings

Follow-up less than or equal to 3 months or as noted in the Cardiac Device Management note in the EHR

CIED = cardiovascular implantable electronic device

1 There will be an appropriate, qualified and credentialed clinician to monitor patient during procedure
2 Patient needs two consents: one for MRI study and one for MRI with CIED
3 Ensure appointment is scheduled for discussion
Advanced care planning has been established. Patient is DNR status with an implanted cardiac device.

The advanced care planning discussion with the patient/family member should clearly include and document whether or not shock therapy will be turned OFF.

Manufacturer's information may be obtained in the following manner:

- Cardiac Device (Pacemaker/ICD) clinic progress note
- Patient/Family member has manufacturer's card

1. It is recommended to turn OFF shock therapy
2. An order must be placed by the physician to turn OFF the shock therapy
   - Contact Cardiac Device (Pacemaker/ICD) clinic during business hours
   - Notify manufacturer representative after 5 PM and weekends

No need for any intervention

Continue advanced care plan

PATIENTS WITH DO NOT RESUSCITATE (DNR) STATUS
APPENDIX A: Conditions Under Which Postoperative Interrogation is Not Necessary

1. Device is checked preoperatively and found to be working correctly, and
2. No programming of device took place perioperatively, and
3. No monopolar electrosurgery used (bipolar is acceptable), and
4. No blood transfused, and
5. No hemodynamic issues noted, and
6. Procedures not involving electrosurgery (e.g., endoscopic ultrasonography)

APPENDIX B: Magnet Applications

<table>
<thead>
<tr>
<th>Pacemaker Manufacturer</th>
<th>Most Common Magnet Effect</th>
<th>Programmable (On-Off)</th>
<th>Defibrillator Magnet Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biotronik</td>
<td>No sustained asynchronous pacing</td>
<td>Yes</td>
<td>Biotronik</td>
</tr>
<tr>
<td>Boston Scientific/Guidant CPI</td>
<td>Asynchronous pacing at 100 or 90 bpm</td>
<td>Yes</td>
<td>Boston Scientific/Guidant CPI</td>
</tr>
<tr>
<td>Intermedics</td>
<td>No sustained asynchronous pacing</td>
<td>No</td>
<td>Medtronic</td>
</tr>
<tr>
<td>Medtronic</td>
<td>Asynchronous pacing at 85 bpm</td>
<td>No</td>
<td>Sorin</td>
</tr>
<tr>
<td>Sorin</td>
<td>Asynchronous pacing at 85 - 96 bpm</td>
<td>No</td>
<td>St. Jude Medical/Pacesetter</td>
</tr>
<tr>
<td>St. Jude Medical/Pacesetter</td>
<td>Asynchronous pacing at 86 - 100 bpm</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>
SUGGESTED READINGS

Crossley, G. H., Poole, J. E., Rozner, M. A., Asirvatham, S. J., Cheng, A., Chung, M. K., … Irefin, S. (2011). The Heart Rhythm Society (HRS)/American Society of Anesthesiologists (ASA) expert consensus statement on the perioperative management of patients with implantable defibrillators, pacemakers and arrhythmia monitors: facilities and patient management: this document was developed as a joint project with the American Society of Anesthesiologists (ASA), and in collaboration with the American Heart Association (AHA), and the Society of Thoracic Surgeons (STS). Heart Rhythm, 8(7), 1114-1154. doi: https://doi.org/10.1016/j.hrthm.2010.12.023
This practice consensus statement is based on majority opinion of the Pacemaker workgroup at the University of Texas MD Anderson Cancer Center for the patient population. These experts included:

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