Device lead extraction: Laser envy

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What we will learn

• Why we extract leads
• Techniques
• Indications
• Contraindications
Need for lead extraction

- Implantations of pacemakers, defibrillators are increasing.
- About 3 million Americans have cardiomyopathy
- 1 million have tachy therapy devices
- Over 2 million pacemakers implanted since 1960.
## Symptoms of presentation

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Pocket Infection (n = 47)</th>
<th>Systemic Infection (n = 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erythema, n (%)</td>
<td>44 (93)</td>
<td>3 (30)</td>
</tr>
<tr>
<td>Swelling, n (%)</td>
<td>42 (89)</td>
<td>3 (30)</td>
</tr>
<tr>
<td>Increased warmth, n (%)</td>
<td>43 (85)</td>
<td>3 (30)</td>
</tr>
<tr>
<td>Fever, n (%)</td>
<td>37 (79)</td>
<td>5 (50)</td>
</tr>
<tr>
<td>Skin ulceration, n (%)</td>
<td>24 (51)</td>
<td>2 (20)</td>
</tr>
<tr>
<td>Tenderness, n (%)</td>
<td>24 (51)</td>
<td>2 (20)</td>
</tr>
<tr>
<td>Fatigue, n (%)</td>
<td>22 (47)</td>
<td>5 (50)</td>
</tr>
<tr>
<td>Purulent discharge, n (%)</td>
<td>20 (43)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Chills, n (%)</td>
<td>17 (36)</td>
<td>4 (40)</td>
</tr>
<tr>
<td>Loss of appetite, n (%)</td>
<td>16 (25)</td>
<td>4 (40)</td>
</tr>
<tr>
<td>Nausea, n (%)</td>
<td>5 (11)</td>
<td>3 (30)</td>
</tr>
</tbody>
</table>

Incidence -0.9-2.4%

Cabel et al AHA 2004
Cengiz et al Clinical cardiology 2010

Abbreviations: ICD, implantable cardioverter defibrillator; n, number of patients; PM, permanent pacemaker.
30 yr old male with DCM
Fig. 3: TEE 4 chamber view showing vegetation (Labelled as mass)
Valve interference
Multiple leads
Problems after implantation

- Infection
- Lead malfunction
- Lead interference
- Mechanical obstruction
Lead extraction

- Mechanical traction
- Locking stylet
- Support sheaths – for counter-traction
Laser lead extraction - eximer laser
Extraction system

Shared with vascular
Liberator
Lead Extraction video

• Lead Extraction
PLEXES trial n= 465

- 94% w/laser vs 64% without laser
- 33% cross over to laser technique
- Mean 10.1 min vs 14.1 min
- Including cross over 23.7 + 29 min
Complications

• Overall no difference between 2 arms
• Tamponade, Hemothorax, need for surgery, Death (2%/0.4%)
• Surgical extraction (4-5% mortality)
• Other potential problems – embolization of vegetations (uniform to all extraction)
Managing complications

• Simple mechanical traction with locking stylet (ref HR 2008 Jones et al)
• Leads 1-2 years old vs older leads
• Schedule in OR with surgical back up
• Plan for re-implantation –wiring ahead of time
• Keeping laser sheath parallel to vein
Mayo experience

- N=189
- 90% complete perc removal
- 10%- surgical
- 94% complete removal
- Complications: 20
- Valve damage, subclavian vein laceration, hemothorax, hematoma, fracture elad tip, massive bleed requiring surgery, death (1)
- 95% free of infection- 3 incomplete; 2 transvenous pacer
Indications

• Infective endocarditis
• Pocket infection as evidenced by pocket abscess, device erosion, skin adherence, or chronic draining sinus
• Gm positive bacteremia
• Gram neg bacteremia
CLASS III- when not to do- Infections

• CIED removal is not indicated for a superficial or incisional infection without involvement of the device and/or leads.

• CIED removal is not indicated to treat chronic bacteremia due to a source other than the CIED, when long-term suppressive antibiotics are required.
Other indications

- Chronic pain
- Venous occlusions
- SVC stenosis
- Contraindication in other side (shunts)
- Planned radiation

- Lead interference/ life threatening complications
- During upgrade
- To implant MRI compatible device
Contraindications

• Life expectancy < 1 year
• Leads through abnormal structures
When should I refer?

- Tenting of device
- Superficial erythema
- Infections
- Need for upgrade
- Device replacements
- Lead recalls/advisories
- Inappropriate shocks from lead malfunction
Summary

- Need for lead extractions - indications
- Contraindications
- Techniques
- Tertiary care center with experience