Anesthesia and Lead Extractions

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Objectives

• Define lead extraction procedures and why Anesthesiologists should be familiar with them.
• Discuss perioperative and anesthetic management of lead extractions.
• Gain a basic understanding of how transesophageal echocardiography can be a useful monitor in these cases.

Lead Extractions:

• High number of pacemakers / AICD (CIED) implanted annually
• Leads become defective, fracture, or get infected routinely
• Lead Extraction becoming more and more common. Estimates that as many as 52,000 must be extracted annually

Lead Removal Techniques

• Traction
• Traction Devices
• Mechanical Sheaths
• Rotating Threaded Tip Sheath
• Electrosurgical Sheath (Bovie)

Disclosures

• None
**Laser Specifications**
(Spectranetics Inc., Colorado Springs, CO)

- “Excimer” XeCl low temperature (50°C)
- High energy short-duration ultraviolet pulses (135 nsec)
- Shallow tissue penetration: 100 μM
  – Safety: Clear goggles
- Produces water, gas microbubbles, and small tissue particles (< 100 μM in diameter)

Hauser RG, Europace 2010;12:395-401

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**Cardiac Lead Removal Using the Spectranetics SLS® II Laser Sheath and LLD EZ™ Lead Locking EZ Device**

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**Laser Lead Extraction Evidence**


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**Complications in Lead extraction:**

- Reports of major complications **1.9% to 3.4%**

**Major complications include:**

- Cardiac avulsion
- Vascular avulsion
- Pulmonary embolism
- Stroke
- New device infection
- Death

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**2009 HRS society statement:**

*Transvenous Lead Extraction: Heart Rhythm Society Expert Consensus on Facilities, Training, Indications, and Patient Management*

This document was endorsed by the American Heart Association (AHA).

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2009 HRS society statement:

Required Personnel
• Primary Operator
• Cardiothoracic surgeon- if not PO, immediately available
• Scrubbed and non scrubbed assistant
• Fluoroscopy support
• Echocardiographer available
• Anesthesia available

2009 HRS society statement

• Basically no mention or position on type of anesthesia, or method of monitoring.
• ?

Lead Extraction Population

Ejection Fraction

Ahlgren, Bryan, DO

NYHA Classification

Procedural Factors

• Length of time lead implantation
• ICD lead, especially dual coil
• Endocarditis and/or pocket infection?
• Plan for venous access?
Multicenter Observational Study
Wazni O, JACC 2010;55:579-86

- 13 Centers, 1449 consecutive Pts, 2406 leads – 20-270 procedures/site
- Major adverse events 1.4%, Mortality 0.3% procedural, in-hospital 1.86%
- Associated with mortality: endocarditis (4.3%), endocarditis+DM (7.9%), endocarditis and creatinine>2 (12.4%)
- Unrelated to MAEs: GA vs sedation or EP lab vs OR

Protocol at the University of Colorado

- General Anesthesia
- Done in hybrid room or cardiac operating room with fluoroscopy available
- CT surgeon in room and usually opens device pocket
- CT anesthesiologist
- Perfusionist standing by with pump “wet down”
- Cardiac trained operating room staff

Protocol at the University of Colorado

Monitoring
- Standard ASA monitors
- Arterial line- +/- prior to induction
- 2 large bore IV’s
- Medications for CPB/resuscitation drawn up and ready to go on anesthesia cart
- Real time TEE

TEE in Laser Lead Extraction

- Intra-procedural TEE during transvenous lead extraction provides valuable real-time information and may change procedural management in up to 16% of cases

Take a ride into the “Danger Zone”
SVC

When to Get Nervous

Tricuspid Fibrosis

New TR?
Case:

- 34 yo female – developed post partum cardiomyopathy 8 years ago
- CIED placed at that time
- Heart function has since recovered, with near normal LV systolic function
- Plan is to remove leads / device
Other fun events to watch out for...

Conclusions

- Growing procedure, you may be likely to encounter increasing number of these cases.
- Risk factors for potentially more difficult cases
- “Best” anesthetic management still controversial though may be leaning towards GA with readiness for CPB
- TEE can be useful intra-operative tool