

Zero SVC Injury With Transvenous Lead Extraction Utilizing Mechanical Right-Left Rotation System: A Contemporary Experience

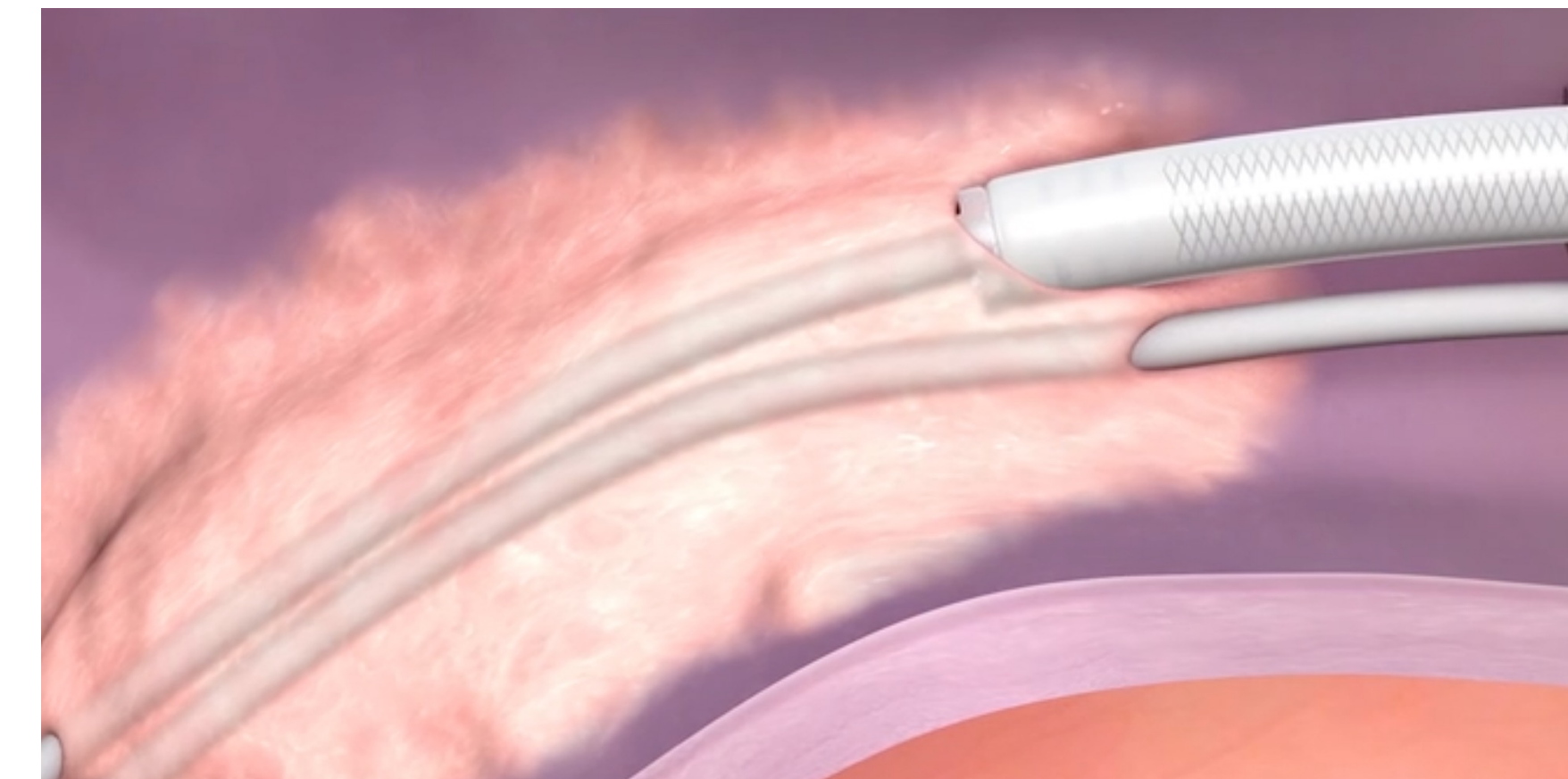
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Purpose:

- Transvenous pacemaker/defibrillator lead extraction (TLE) bridges the specialties of EP and cardiac surgery.
- Two main approaches: mechanical extraction or laser-powered tools which are susceptible to superior vena cava (SVC) injury.
- Debate exists regarding the safety and efficacy of these approaches and whether extraction should occur in the operating room or the EP Cath lab.

Materials and Methods:

- TLE cases performed by 4 cardiac surgeons between January 2019 and December 2021.
- Performed in the operating room with TEE guidance (to assess for pericardial effusion and valve function).
- All cases performed using mechanical right-left controlled rotation system.
- Outcomes: procedural success, complications per 2017 Heart Rhythm Society guidelines, 30-day mortality.
- Procedural success = complete extraction of all leads without major complication.



Results:

- 210 leads** extracted from 104 patients (Table 1)
- Baseline Characteristics
 - Mean age 63.8 ± 16.7 years / 69% (72/104) male
 - Mean BMI 30.1 ± 7.71 kg/m²
 - Most common comorbidities: hypertension (77%), heart failure (68%) and coronary artery disease (45%)
 - Mean LVEF 36.6 ± 17.1 %
 - Prior sternotomy in 25%** (26/104) of patients
- Procedural Details:
 - Indications for extraction: infection (69%) and lead malfunction (19%).
 - Devices: single-chamber **Defibrillators** (46%) and **Pacemakers** (33%).
 - Mean age oldest lead 9.79 ± 7.25 years.
- OUTCOMES:
 - No SVC tears**
 - 0.0% Procedure-related mortality.**
 - 95% Complete procedural success (99/104) cases:**
 - Distal lead fracture (3), Inferior vena cava laceration requiring emergent sternotomy (1), Tricuspid valve damage requiring delayed tricuspid valve replacement (1).
 - 4 (3.9%) minor complications:
 - 3 wound hematomas and 1 superficial wound infection.
 - 30-day mortality of 1.9%

**Table 1:
Demographics
and Results**

Total Patients	104
Leads Extracted	210
Age (years)	63.83 $\pm$ 16.74
Male (%)	69.2% (72/104)
BMI (kg/m ²)	30.1 $\pm$ 7.71
HTN	77% (80/104)
DM	35% (36/104)
CKD	23% (24/104)
CAD	45% (47/104)
Nonischemic CM	33% (34/104)
HF	68% (71/104)
Mean LVEF	36.6% $\pm$ 17.1
Prior Open-Heart Surgery	25% (26/104)
Indication of Extraction (Infection)	69% (72/104)
Indication of Extraction (Malfunction)	19% (20/104)
Indication of Extraction (Upgrade)	6.7% (7/104)
Device Type (ICD)	46.2% (48/104)
Device Type (CRTD)	21.2% (22/104)
Device Type (PPM)	32.7% (34/104)
Mean Age of Oldest Lead	9.79 $\pm$ 7.25
Complete Procedural Success	95% (99/104)
Major Complications	1.9% (2/104)
Minor Complications	3.9% (4/104)
Thirty-Day Mortality	1.9% (2/104)

Conclusions:

- Mechanical Right-Left controlled rotation system enables safe and effective Transvenous Lead Extraction.
- No SVC tears in our experience.
- Performance of procedure in the operating room by cardiac surgeons allows for rapid conversion to sternotomy in event of major complication.