Lead Extraction

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Disclosures

- I have no financial conflicts of interest to disclose

Objectives

- List indications for referral for lead extraction
- Appreciate the importance of early referral of infected patients

Case: 67-year-old man

- History of CAD, VT, complete AV block
- Fever 2 weeks prior; drainage from ICD pocket

What is the next step?

A. Place a fancy dressing on it
B. Treat with oral antibiotics for 3 months
C. Sew the hole back together
D. Take the generator out, sew the hole back together, place a fancy dressing on it, and treat with antibiotics for 3 months
E. Take the entire system out (generator and leads)

What is the next step?

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D. Take the generator out, sew the hole back together, and place a fancy dressing on it
E. Take the entire system out (generator <u>and</u> leads)

2017 HRS Guidelines

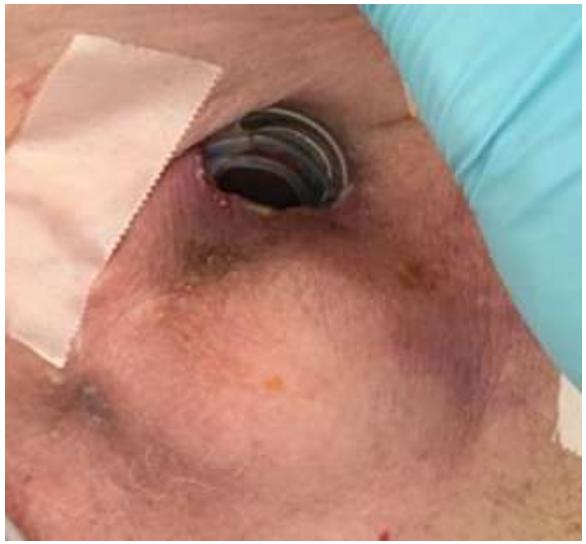
Complete extraction of the **device and leads** is recommended for **all patients** with **definite CIED infection**.

Definite CIED Infection:

- Deep pocket infection
- Pocket erosion (metal visible)
- Recurrent bacteremia (even if TEE negative)
- Evidence of endocarditis

FM Kusomoto, et al. Heart Rhythm, 2017;14:e503-e548

That Means We Extract:



11/17/2022 09:57	Direct blc	!		Abnormal
11/17/2022 09:57	Blood cul	Methicillin Resistant Staphylococcus aureus (The Infectious Diseases Service may be consulted regarding treatment options for patients colonized or infected with methicillin-resistant Staphylococcus aureus.)		Abnormal
11/17/2022 09:30	Blood cul			Abnormal
11/15/2022 04:18	Blood cul			Abnormal
11/15/2022 04:18	Blood culture aerobic and anaerobic	Blood, Perip...	Completed - Final ...	Abnormal

Whom Do We Extract?

Complete extraction of the device and leads is recommended for **all patients** with definite CIED infection.

All patients!

Whom Do I Not Extract?

- Hospice referral (shared decision making)
- Patients without **definite** CIED infection

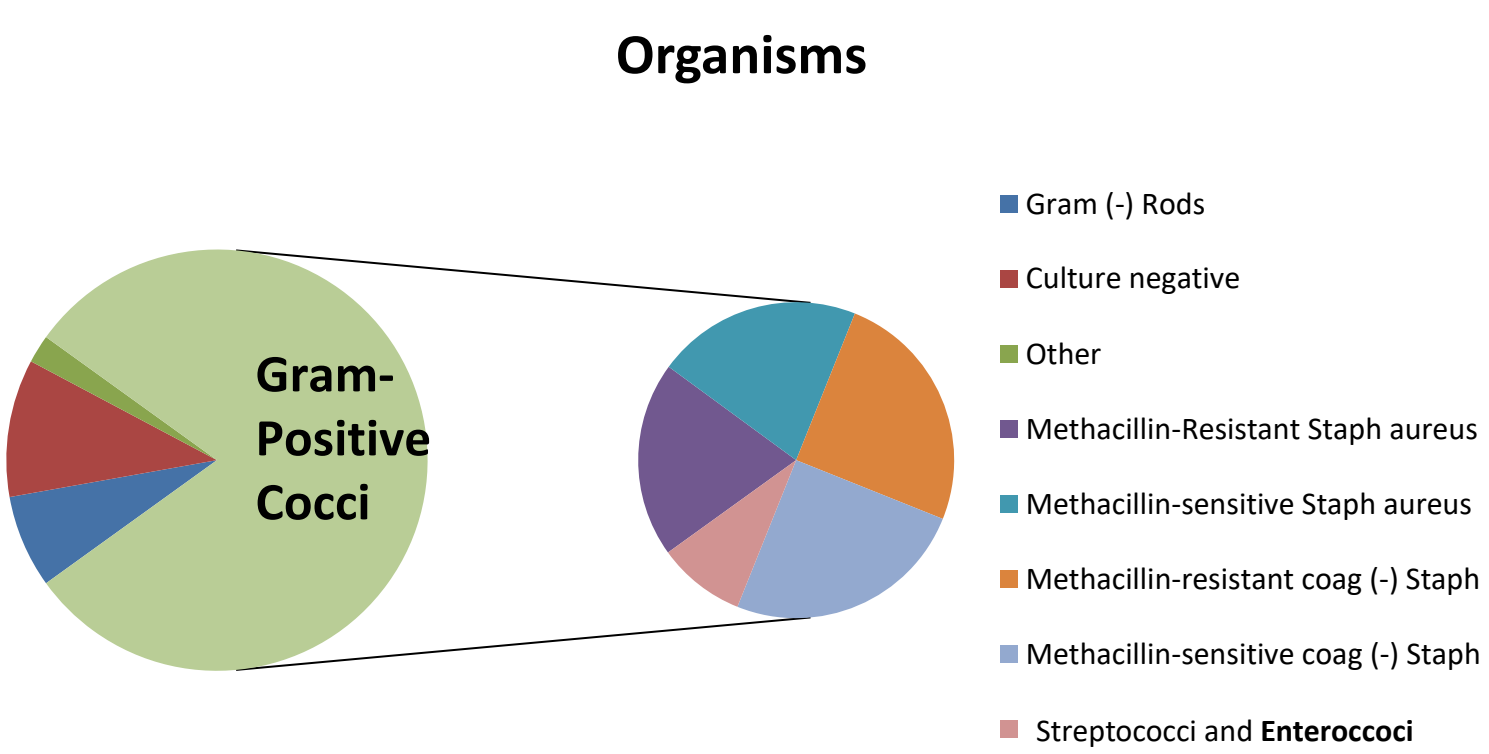
FM Kusomoto, et al. Heart Rhythm, 2017;14:e503-e548

Uncertain Situations

- Superficial versus deep pocket infection
- Single blood cultures, unusual organisms

The Answer to Uncertainty is **Close Follow-up!**

The Usual Suspects



Adapted from Hussein AA, et al. Microbiology of Cardiac Implantable Electronic Device Infections. JACC Clin Electrophysiol. 2016 Aug;2(4):498-505.

Next Steps:

- Hospitalization versus Outpatient
- Blood Cultures and other labs
- Chest X-Ray
- Transesophageal Echocardiogram (TEE)
- Call us!

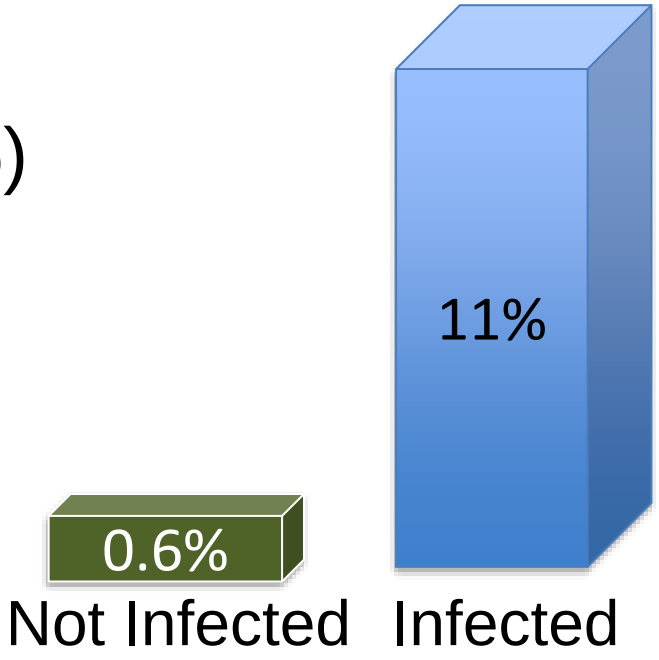
402-559-8888

Problem #1:

Infection **Kills**

No Difference in:

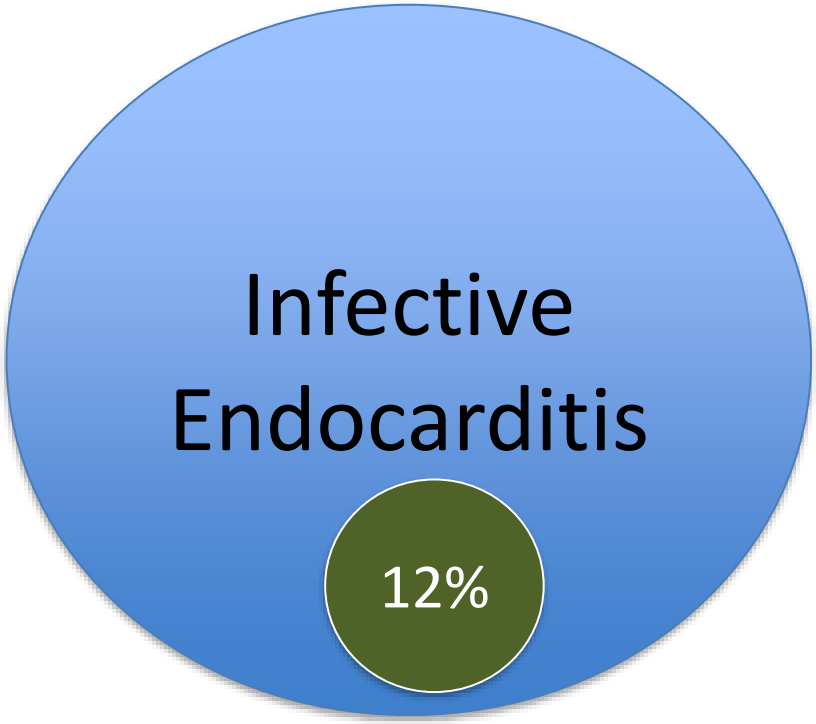
- Success rate (>90%)
- Complication rate (2%)

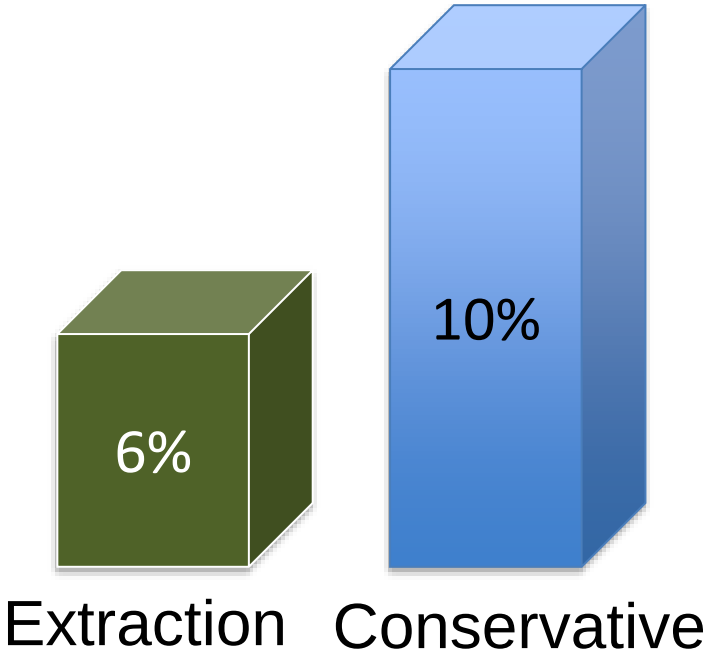


Chung DU et al. Transvenous lead extraction in patients with systemic cardiac device-related infection-Procedural outcome and risk prediction: A GALLERY subgroup analysis. Heart Rhythm. 2023 Feb;20(2):181-189.

Problem #2:

Low Utilization **Kills**

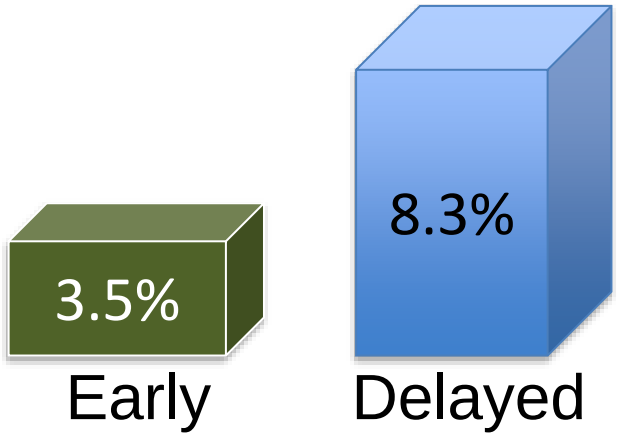




Sciria CT et al. Low Utilization of Lead Extraction Among Patients With Infective Endocarditis and Implanted Cardiac Electronic Devices. J Am Coll Cardiol. 2023 May 2;81(17):1714-1725.

Problem #3: Delay **Kills**

	Early (≤ 7 Days)	Delayed (>7 Days)
In-Hospital Mortality	3.5%	8.3%
In-Hospital Mortality with Systemic Infection	7.5%	10.4%

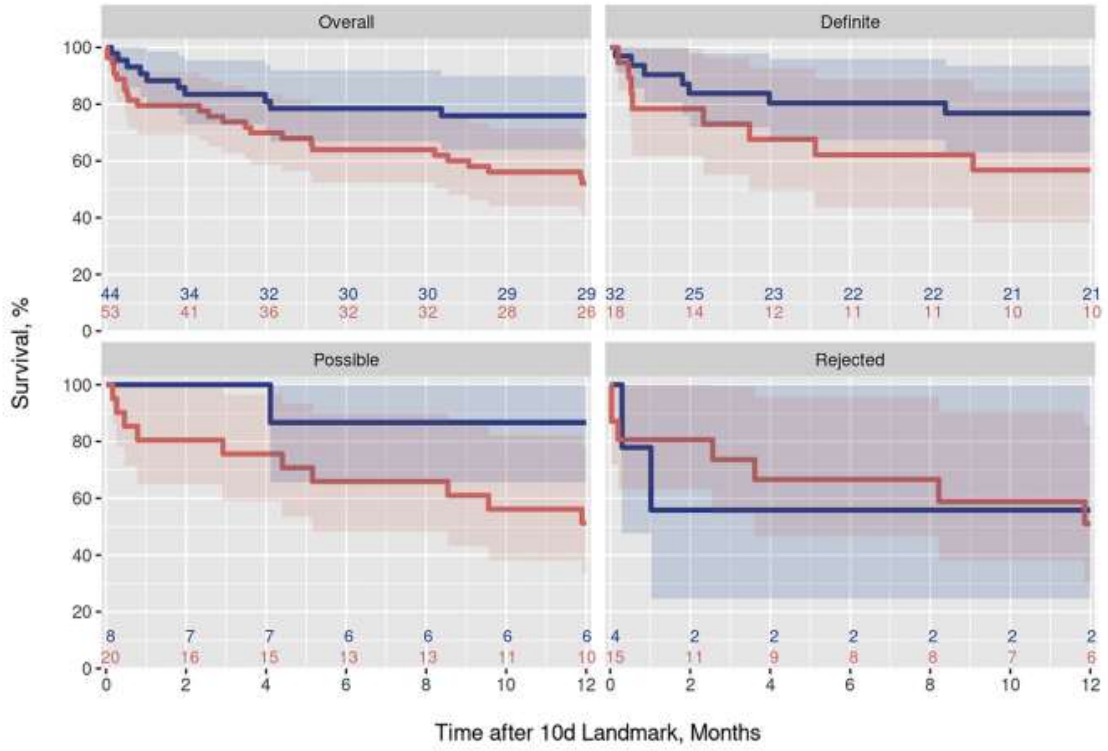


Lee JZ, et al. Impact of timing of transvenous lead removal on outcomes in infected cardiac implantable electronic devices. Heart Rhythm. 2022 May;19(5):768-775.

The Worst: *Staphylococcus*

Device infection in 80% of patients with *Staph* bacteremia

Complete extraction within 10 days of onset of Staph bacteremia: 83% reduction in risk of 1-year mortality



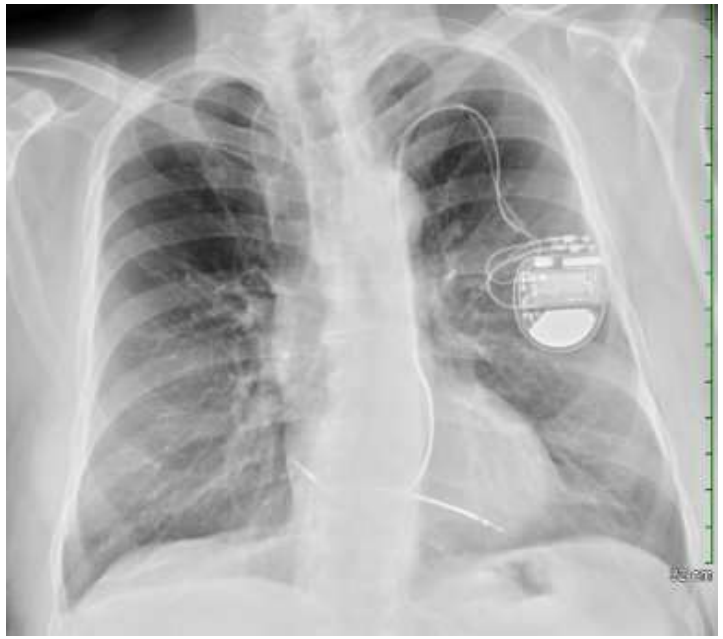
Chesdachai S, et al. Evaluation of European Heart Rhythm Association consensus in patients with cardiovascular implantable electronic devices and Staphylococcus aureus bacteremia. Heart Rhythm. 2022 Apr;19(4):570-577.

Hospitalization?

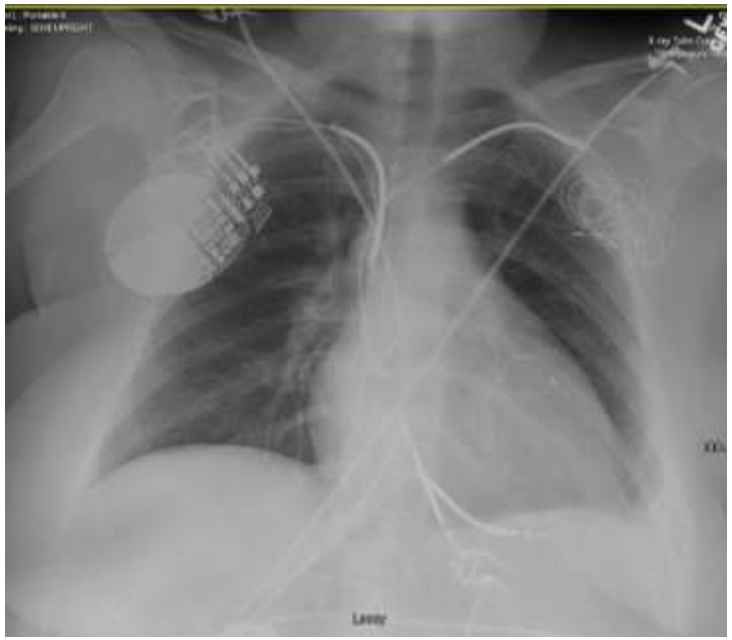
- If in doubt, send them to the ER **at a hospital that does extractions**
- Expedited outpatient management does not mean "next available"
- Either way, feel free to **call me or Dr. Faris Khan**

Chest X-Ray Shows All

Our Case:



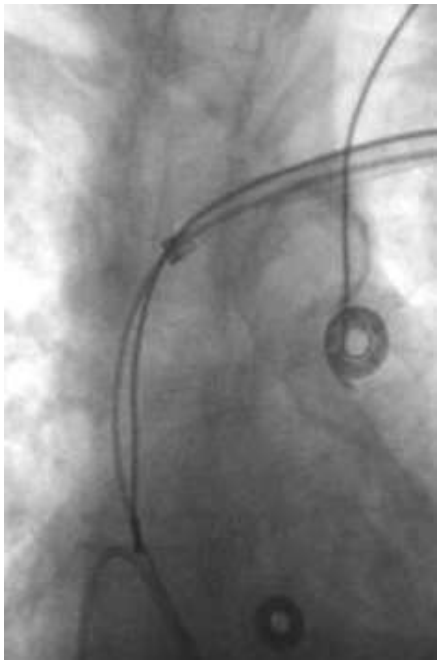
Another Case:



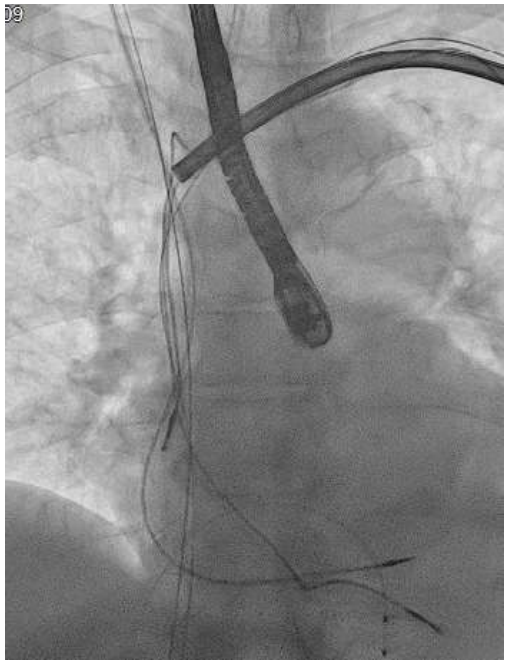
Role of TEE

The Tools:

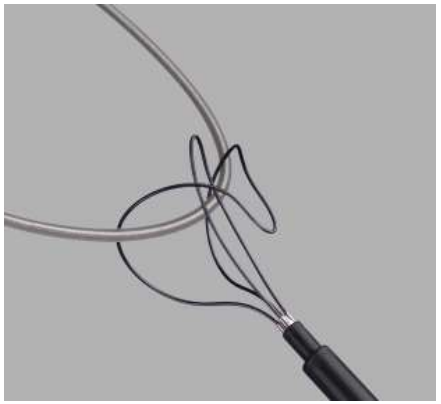
Laser



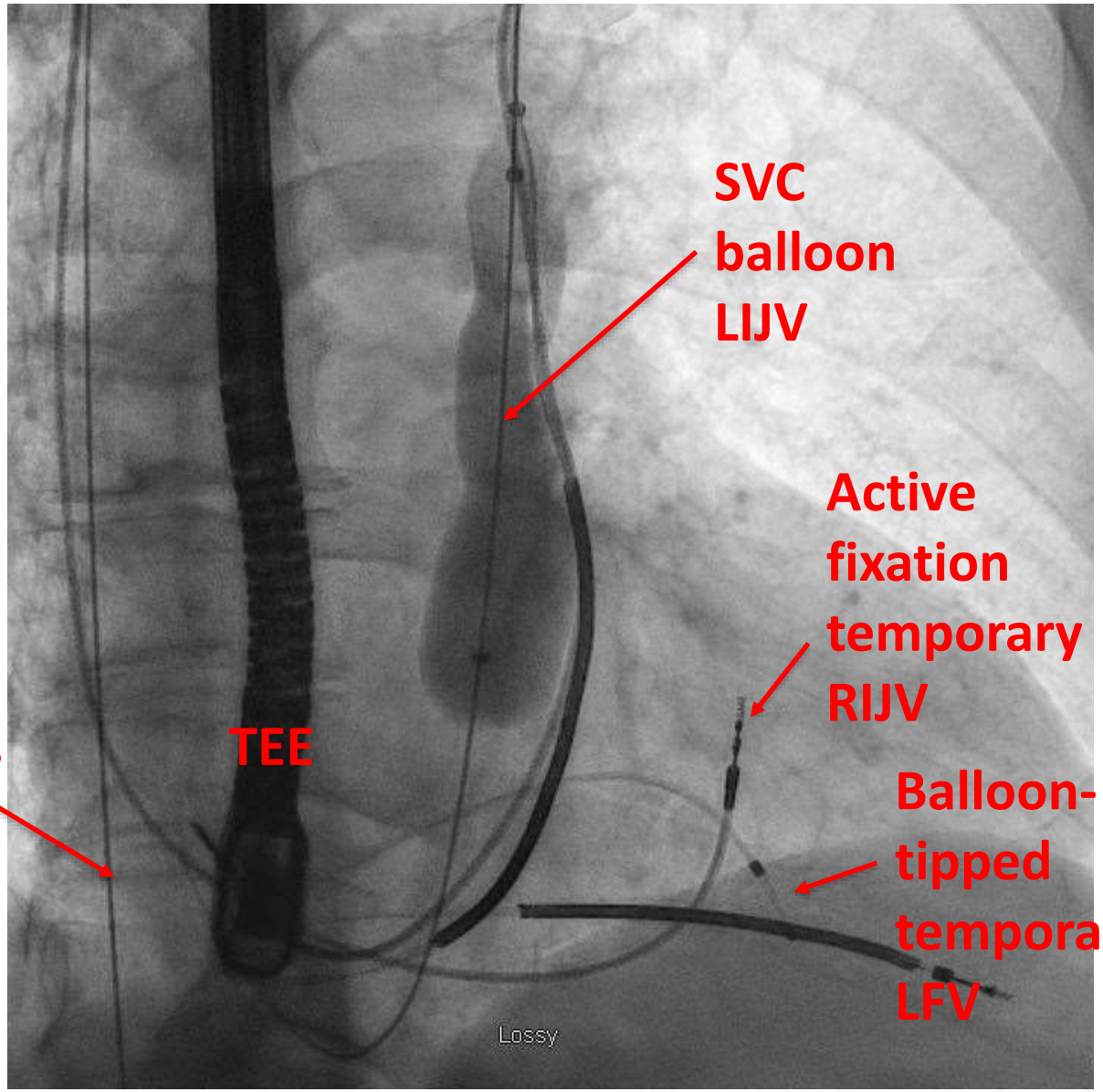
Rotational Cutting



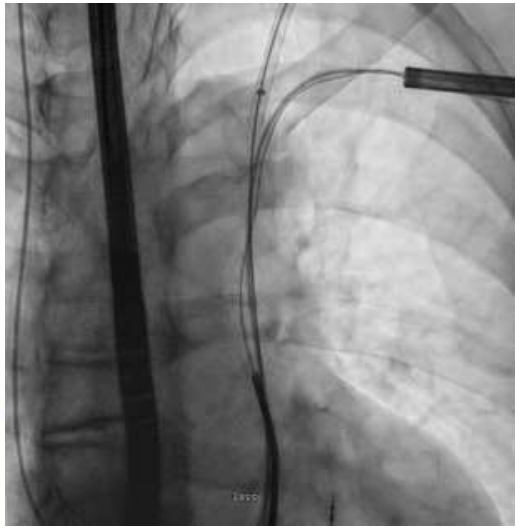
Snares

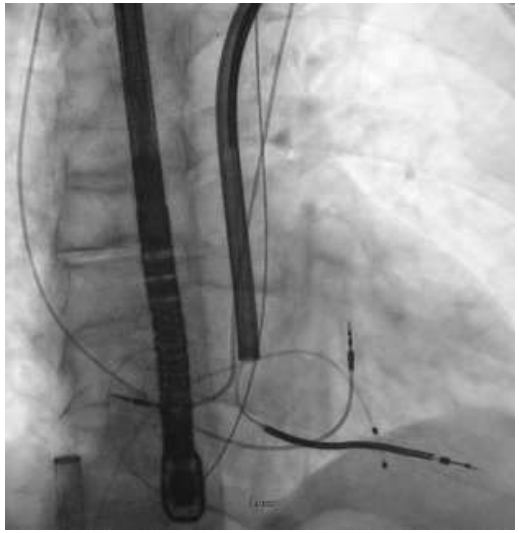


Our Case: Tools:



Our Case: Techniques





Our Data

2012-2018

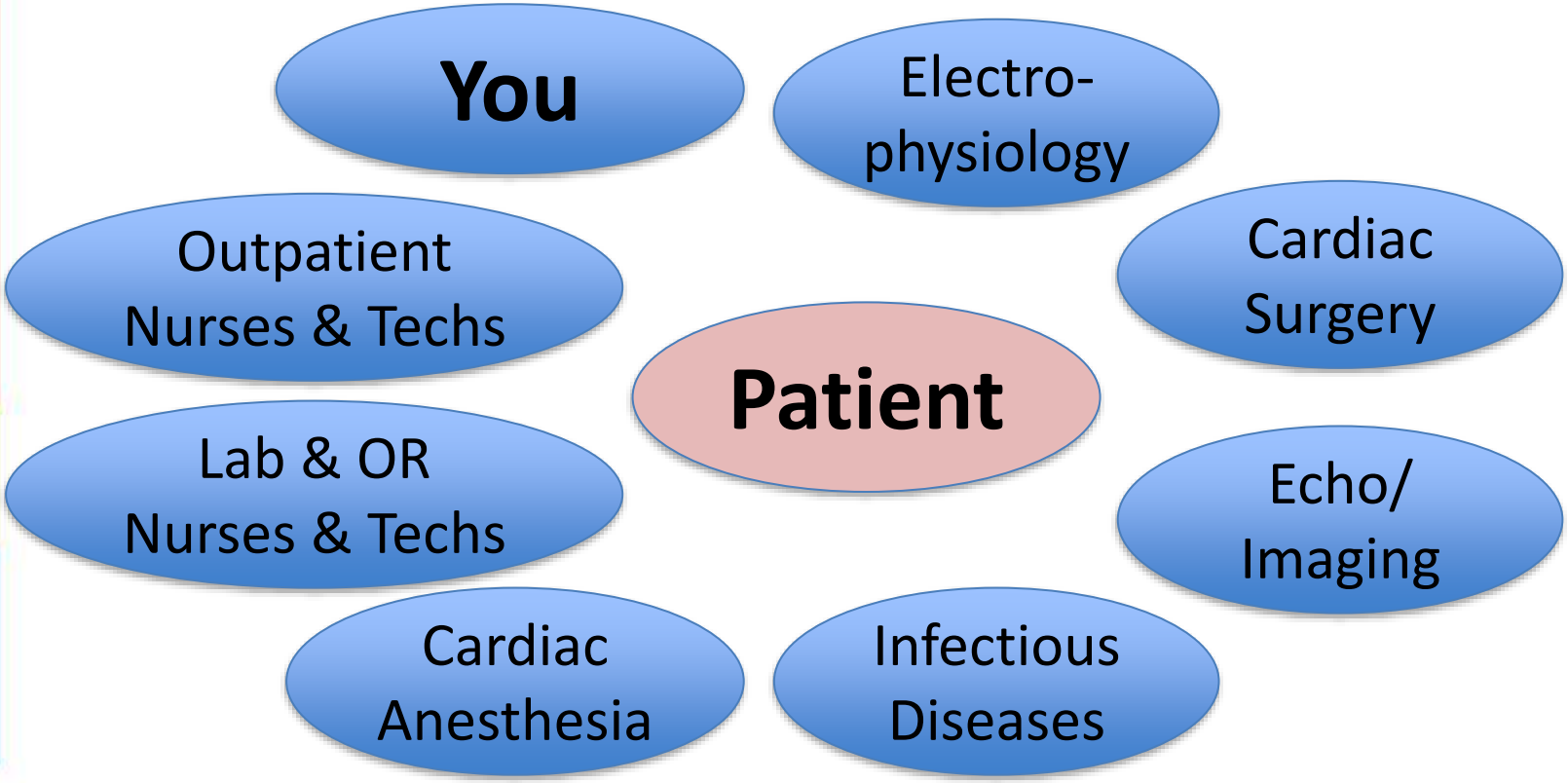
- 16+/-4 extractions/yr
- 83% complete success
- 94% clinical success
- 8.4% major complications

2019-2021

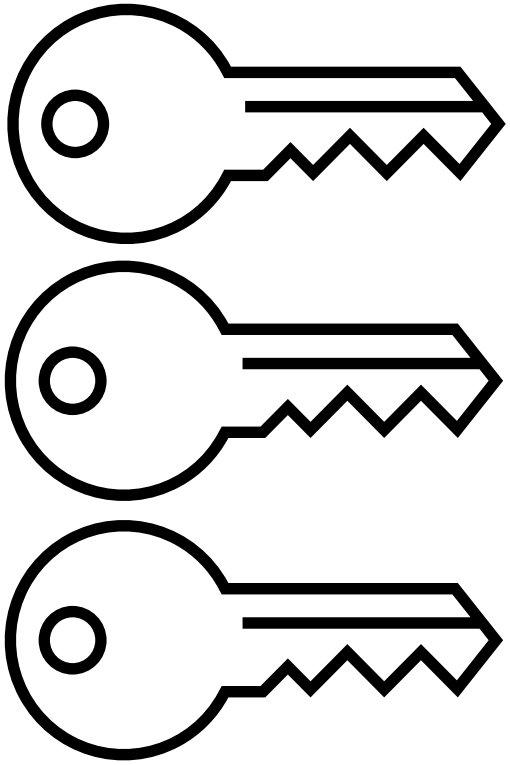
- 41+/-2 extractions/yr
- 85% complete success
- 96% clinical success
- 2.4% major complications

	Group 1 (2012-18)	Group 2 (2019-21)	P Value
Age (years)	62.0±14.7	61.9±17.4	0.93
Female	28.9%	36.2%	0.22
BMI (kg/m^2)	31.7±7.3	30.0±7.3	0.07
Ejection Fraction (%)	35.4±16.3	42.9±14.7	<0.001
Prior Sternotomy	33.9%	21.3%	0.03
Mean Lead Dwell Time (years)	5.7±4.1	6.6±5.1	0.06
Infectious Indication	33.1%	35.4%	0.69
Pacing Lead	66.7%	70.7%	0.38
Dual Coil ICD Leads	84.4%	46.0%	<0.001

Team


You
Electro-physiology
Outpatient Nurses & Techs
Cardiac Surgery
Patient
Lab & OR Nurses & Techs
Echo/ Imaging
Cardiac Anesthesia
Infectious Diseases

Keys to Survival



Identification of Infection

Timely Referral

Coordinating the Extraction

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