

Single Center Experience in Lead Extraction in Thailand



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Korean Heart Rhythm Society COI Disclosure

Natcha Soontornmanokati, Bs,CEPs.

The author have no financial conflicts of interest
to disclose concerning the presentation



Disclosure

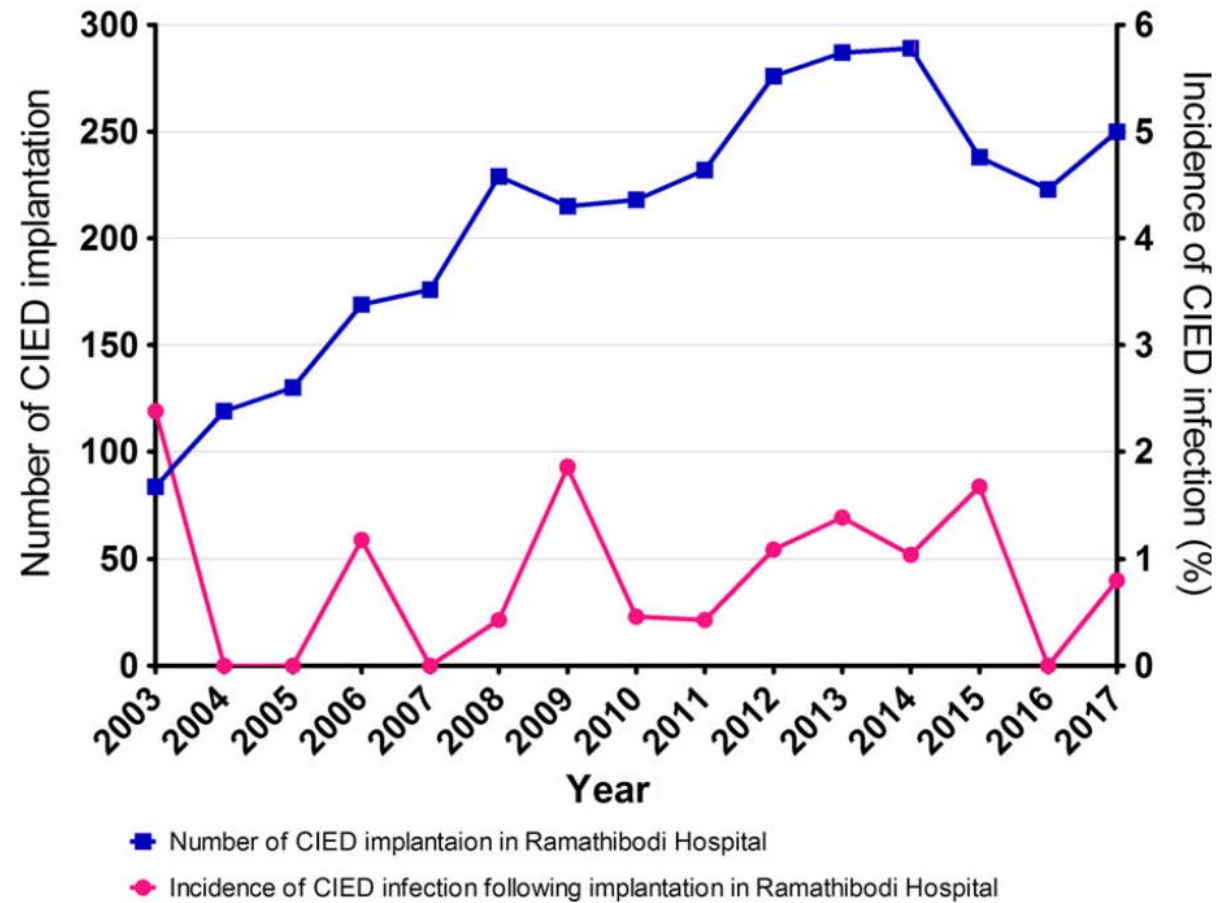
Relationships with commercial interests:
None



What would you do for this ?



Incidence of CIED infection





Risk factors of CIED infection in Ramathibodi hospital

TABLE 4 Univariate analysis for risk factors of CIED infection

	OR	P-value
Age	1.01 (1.00-1.03)	0.155
Body mass index	0.94 (0.87-1.02)	0.145
Autoimmune diseases	4.24 (0.75-23.93)	0.102
History of CIED infection	35.7 (7.74-164.66)	<0.001
Vancomycin + clindamycin	2.38 (0.64-8.80)	0.193
Duration of perioperative antibiotics (days)	1.26 (1.02-1.54)	0.030
Duration of operation (hours)	1.62 (1.10-2.40)	0.015
Hematoma	2.86 (0.60-13.56)	0.185
Temporary pacemaker	2.86 (0.60-13.56)	0.185
PPM (VVI)	12.25 (3.34-44.91)	<0.001
Type of the last procedure		
Primary implantation	1.00	
Generator change	0.63 (0.25-1.57)	0.327
Lead revision	1.07 (0.93-12.34)	0.956
Generator revision	10.71 (1.19-96.06)	0.034
Re-implantation	1.56 (0.56-4.30)	0.392



Procedural Definition

- Lead removal
 - Removal of a lead using any techniques.
- Lead explant
 - Removal of a lead using simple techniques.
 - Removed lead were implanted within 1 year.
- Lead extraction
 - Removal of a lead requiring the specialized equipment.
 - Removed lead were implanted longer than 1 year.

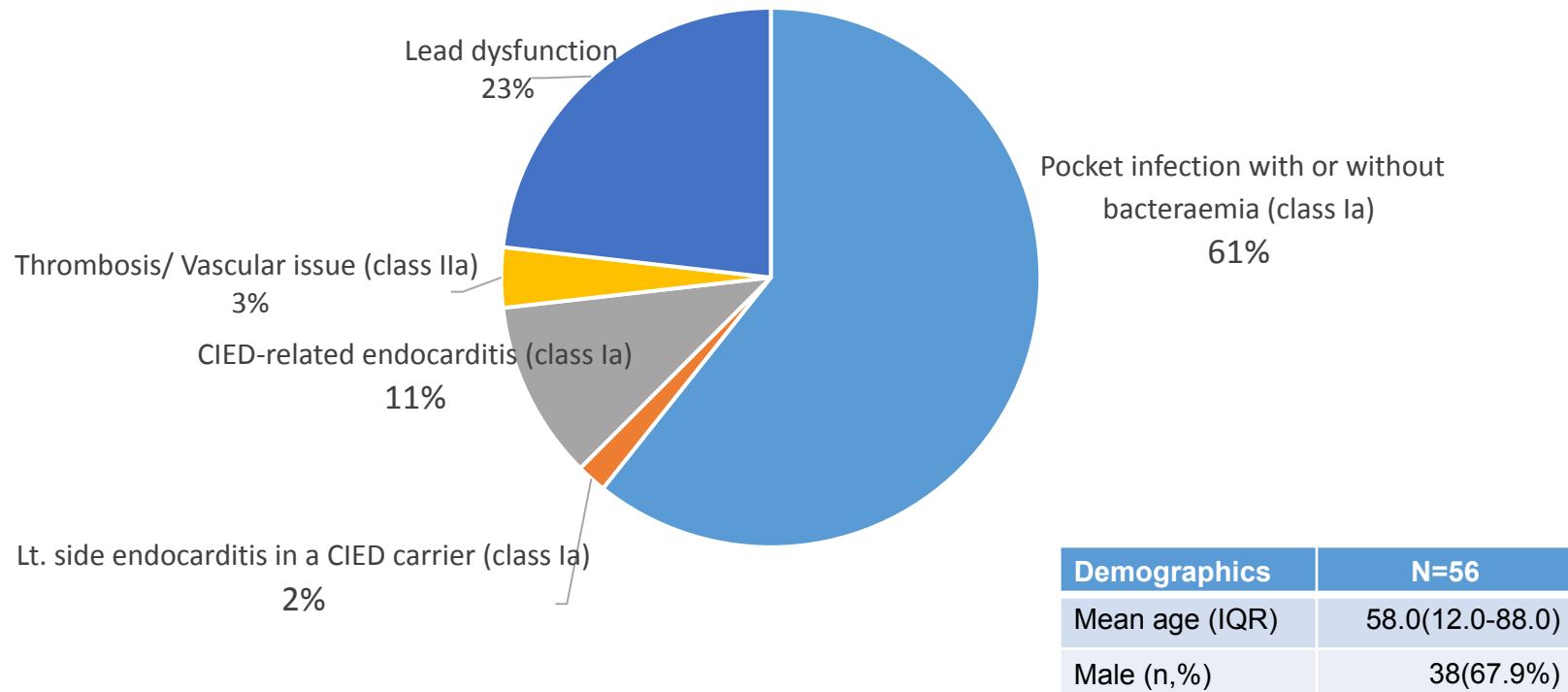


Indication for lead Extraction

Infectious	Clinical Scenarios (Class I Indications)
Pocket infection with or without bacteraemia	Localised signs of inflammation such as erythema, swelling, pain, tenderness, warmth or drainage with positive or negative blood cultures
Left-sided endocarditis in a CIED carrier	Left heart vegetations with or without tricuspid valve or CIED involvement, and positive blood cultures
CIED-related endocarditis	Positive blood cultures and lead or valvular vegetation(s), without local signs of pocket infection
Occult bacteraemia with probable CIED infection	Bacteraemia without an alternative source, resolves after CIED extraction
Non-infectious	Clinical Scenarios (Class I, IIa, And IIb Indications)
Thrombosis/vascular Issues	Clinically significant thromboembolic events attributable to thrombus on a lead or a lead fragment that cannot be treated by other means (class I)
	Superior vena cava (SVC) stenosis or occlusion that prevents implantation of a necessary lead (class I)
	Planned stent deployment in a vein already containing a transvenous lead to avoid entrapment of the lead (class I)
	Maintaining patency of SVC stenosis or occlusion with limiting symptoms (class I)
	Ipsilateral venous occlusion preventing access to the venous circulation for required placement of an additional lead (class IIa)
Chronic pain	Severe chronic pain at the device or lead insertion site or believed to be secondary to the device, which causes significant patient discomfort, is not manageable by medical or surgical techniques, and for which there is no acceptable alternative ¹⁷ (Class IIa)
Other	Life-threatening arrhythmias secondary to retained leads (class I)
	Lead removal can be useful for patients with a CIED location that interferes with the treatment of a malignancy ¹⁸ (class IIa)
	CIED implantation requires more than four leads on one side or more than five leads through the SVC (class IIa)
	Abandoned lead(s) that interfere with the operation of a CIED system (class IIa)
	Leads that pose a potential future threat to the patient if left in place, because of their design or failure (class IIb)
	Lead removal may be considered to facilitate access to MRI ¹⁸ (class IIb)
	The setting of normally functioning, non-recalled pacing or defibrillation leads for selected patients after a shared decision-making process (class IIb)



Indication for transvenous lead extraction



Indication of transvenous lead extraction in Ramathibodi hospital in 2008-2020



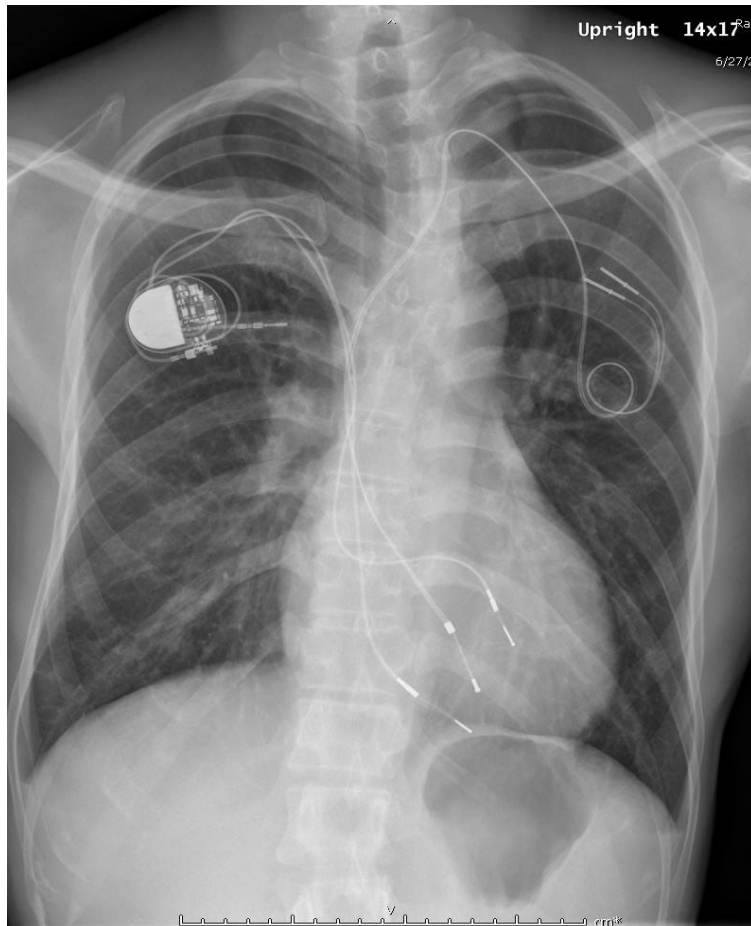
Lead Extraction data

Lead N=87	
Duration of implanted months mean, SD	87.75 ± 68.18
Lead type	
Pacemaker lead	58 (66.70%)
ICD lead	25 (28.70%)
LV lead	4 (4.60%)
Specialised sheath type N=56	
Laser sheath	49 (87.50%)
Mechanical rotating sheath	5(8.9%)
Laser & Mechanical rotating sheath	2(3.60%)

lead extraction data in Ramathibodi hospital in 2008-2020



A 39 years old man with CIED infection



Underlying with CHB

1986 Single chamber PPM
at Left side.

2003 Dual chamber PPM
at Right side.

2018 2nd Generator change

2019 Pocket erosion.
Vegetation at Rt. Lead.
Failure for lead removal.

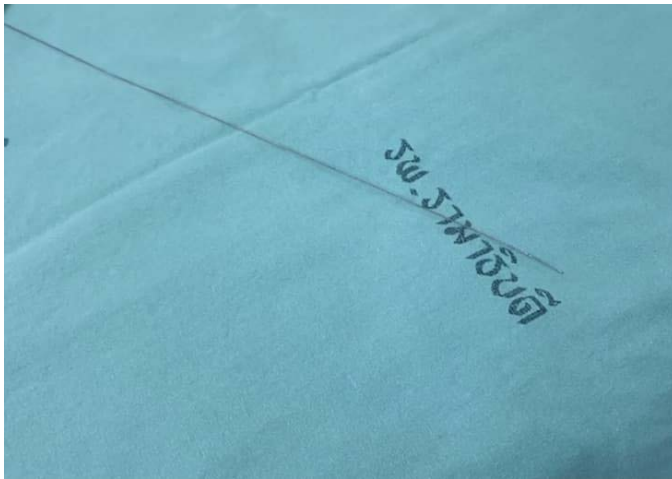
Refer for Lead Extraction on June
2019



Extraction tools

Locking Stylet device

- improve tensile strength to facilitate traction.
- Stabilize leads.



Undeployed



Deployed



Extraction tools (cont.)

Specialized sheath

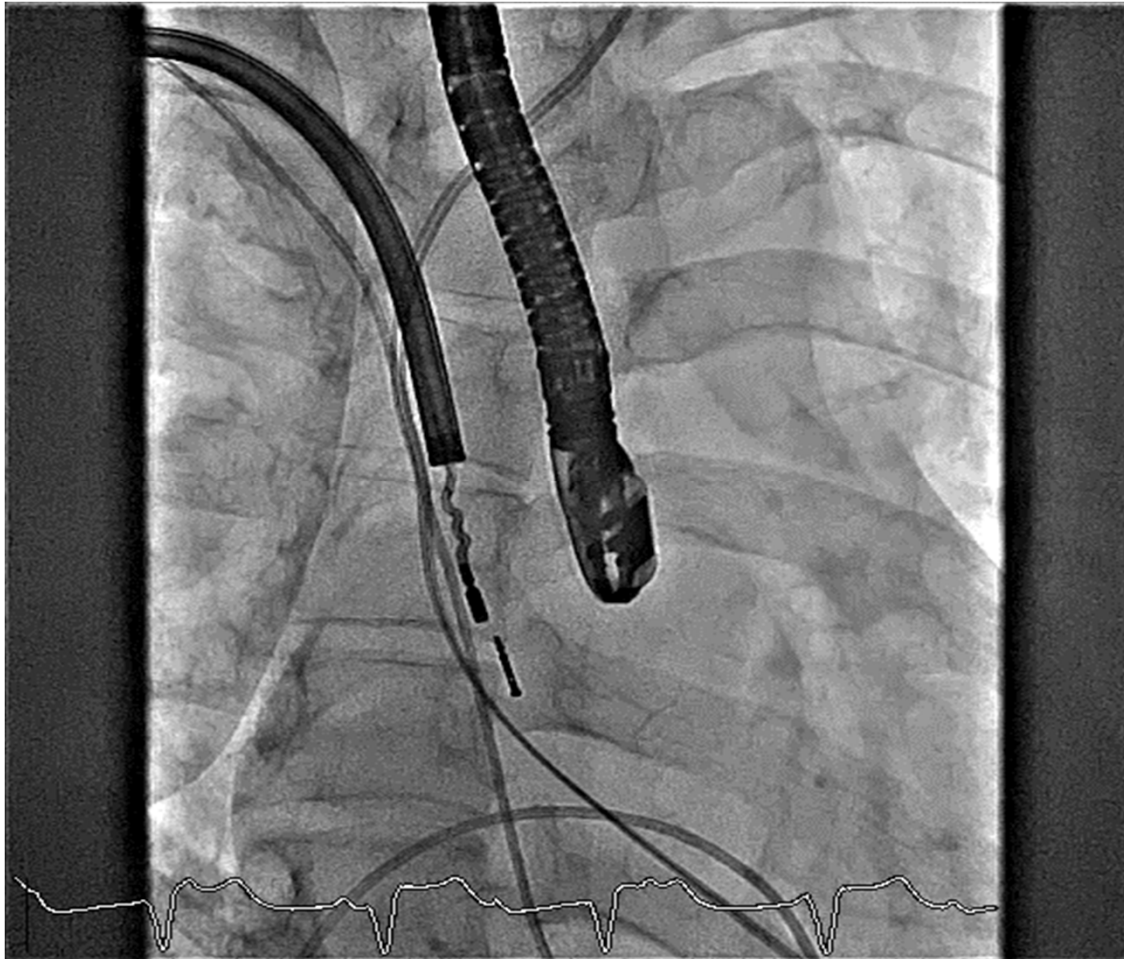


Type of Specialised Sheath	Useful For	Less Useful For
Non-powered telescoping sheaths ^{56,57}	Fibrous adhesions	Dense fibrotic or heavily calcified lesions
Laser sheaths ^{58, 59}	Fibrous lesions and scar tissue	Heavily calcified lesions
Rotational mechanical cutters ⁶⁰⁻⁶³	Dense calcified fibrotic lesions	Scar tissue





1st Lead

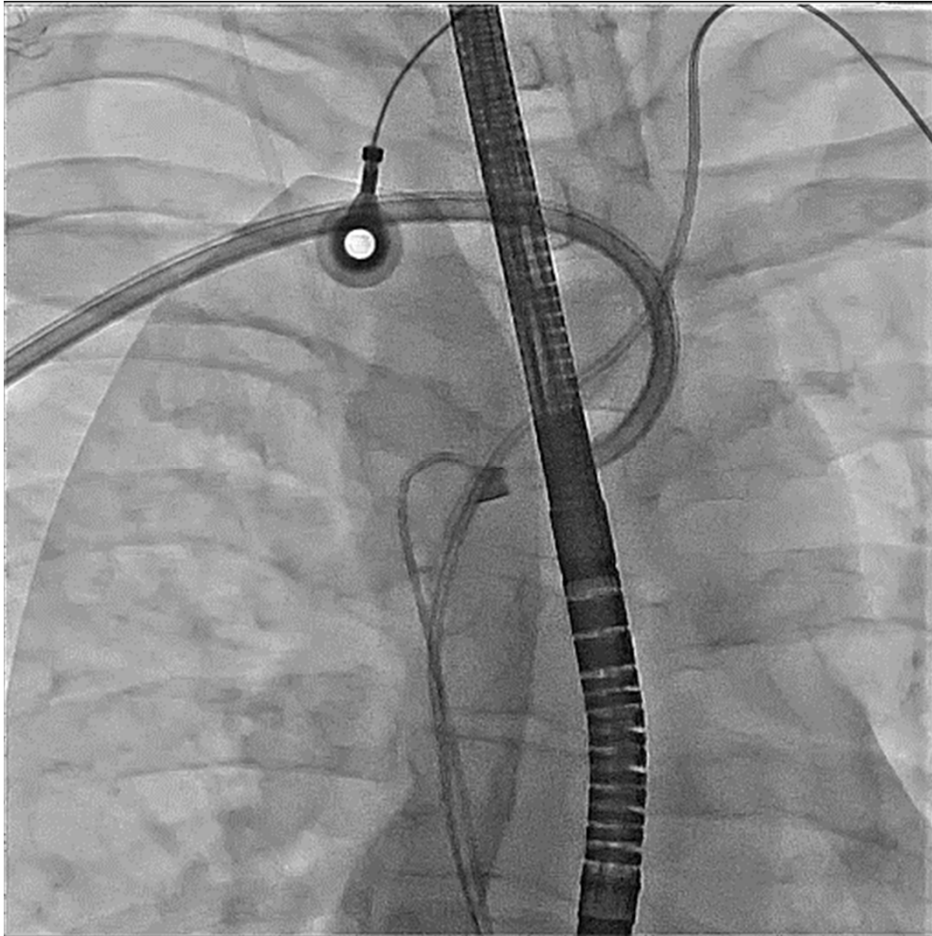


Tools

- Locking stylet :
LLD EZ
- Specialized sheath :
Laser sheath



2nd Lead



Tools

- Locking stylet :
LLD EZ
- Specialized sheath :
12 Fr. Laser sheath



2nd Lead (cont.)



Tool

- Specialized sheath :
9 Fr. Rotating
mechanical sheath

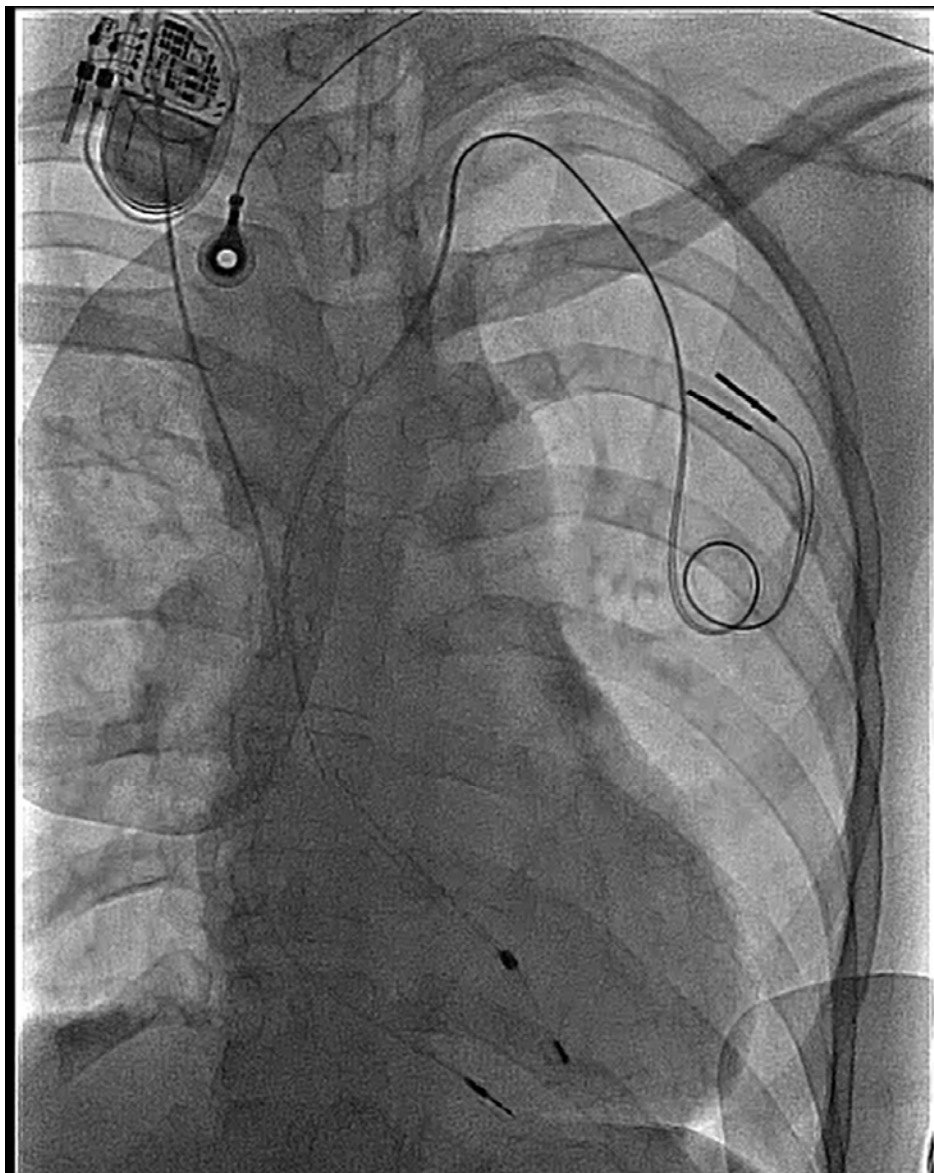
Calcified extracted lead



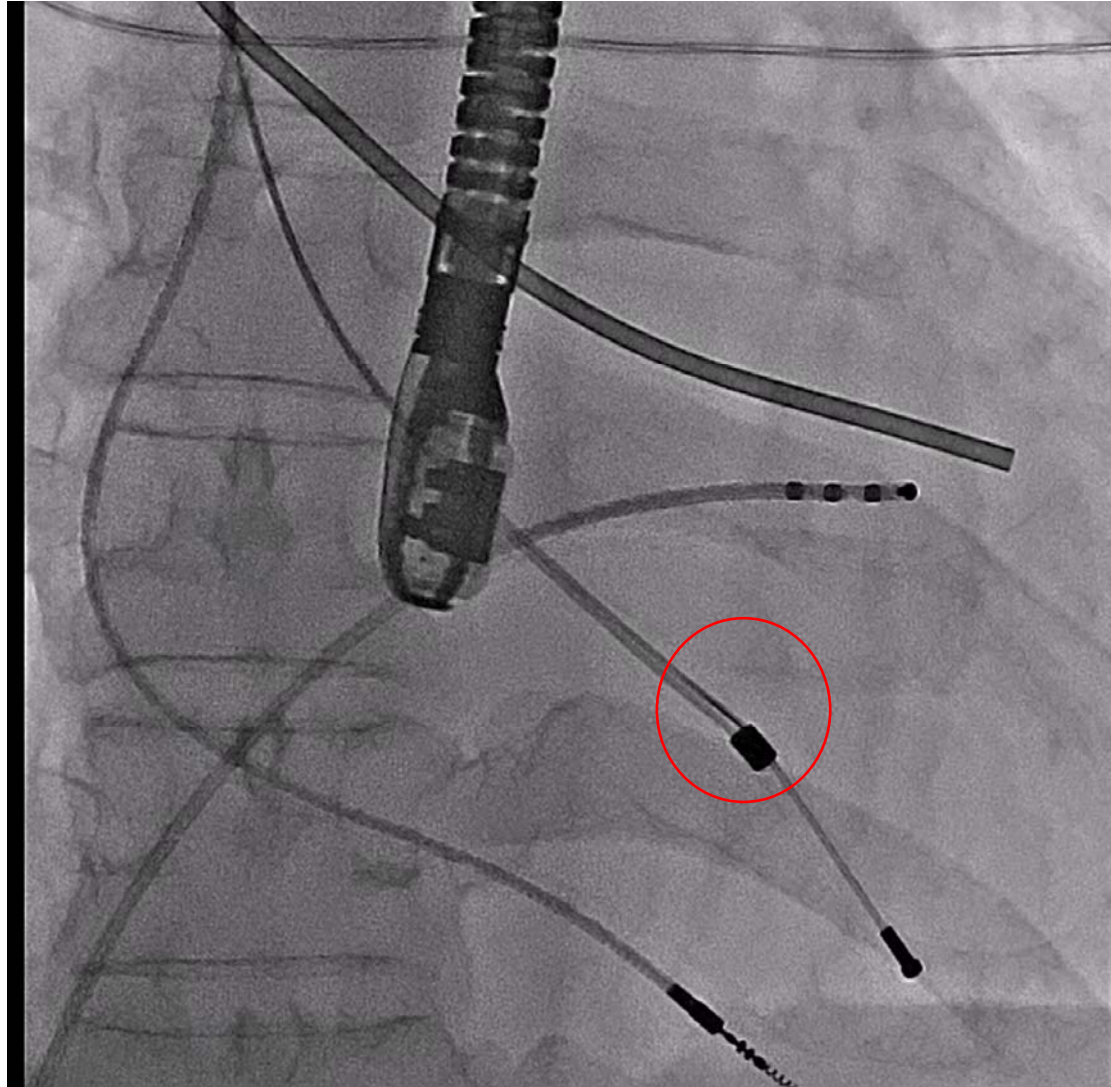
NS1

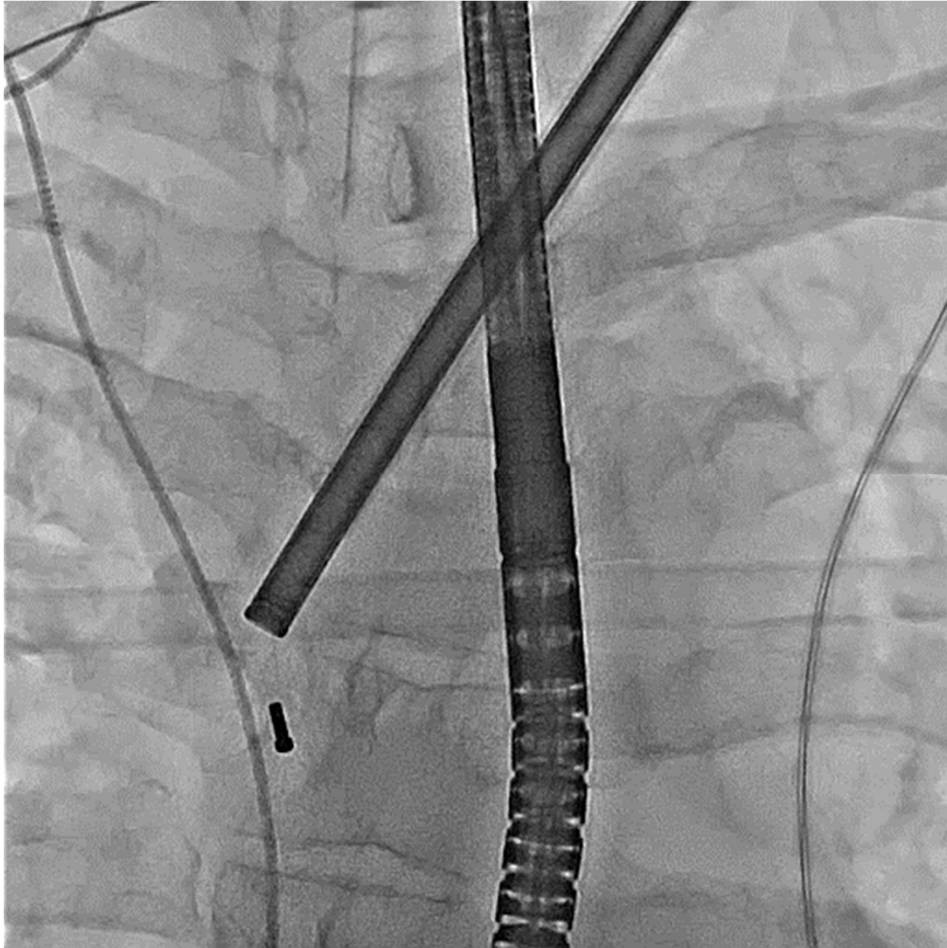
KHRS 2021

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2nd Lead extract procedure





Tool

- Locking stylet :
LLD EZ
- Specialized sheath :
11 Fr. Mechanical
rotating sheath

Extracted lead



AP-R

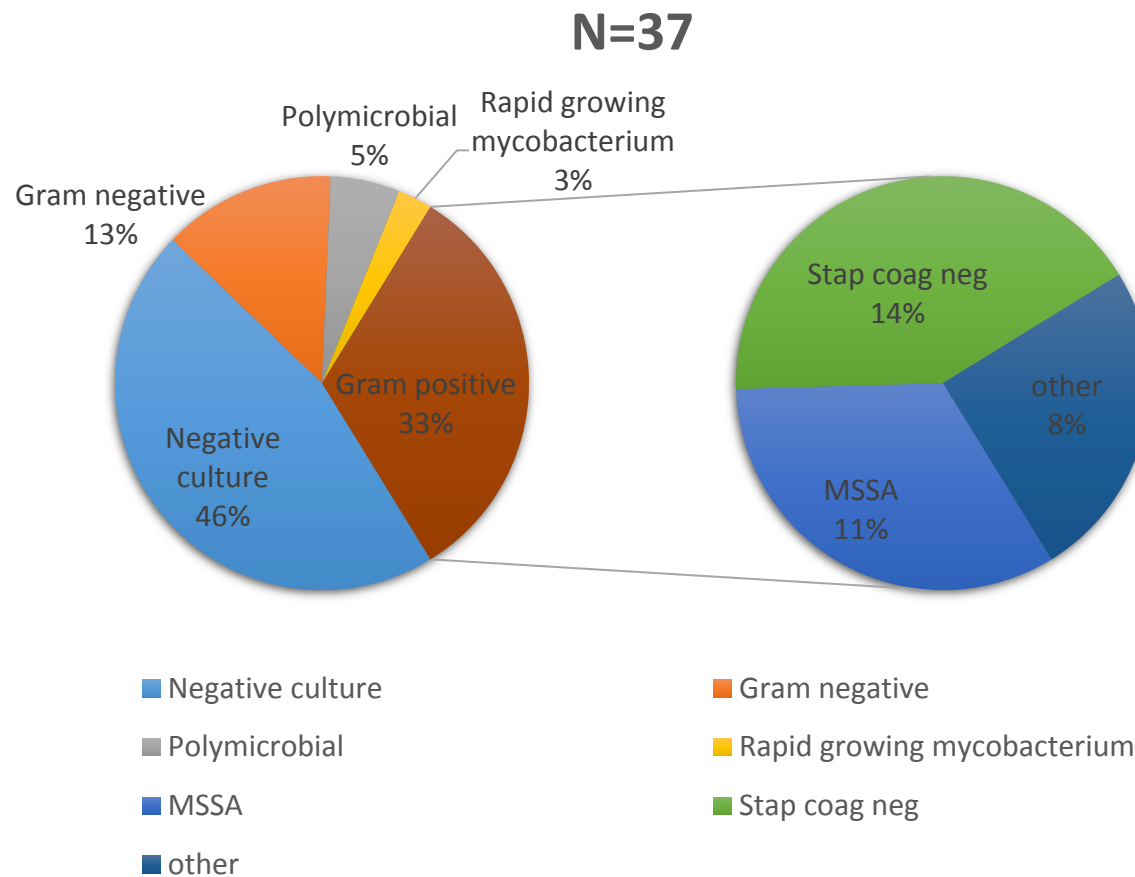
CHEST (upright)
7/19/2010, 9:23:05 P
1907199CCCR01



Z:0.3
C:204
W:409



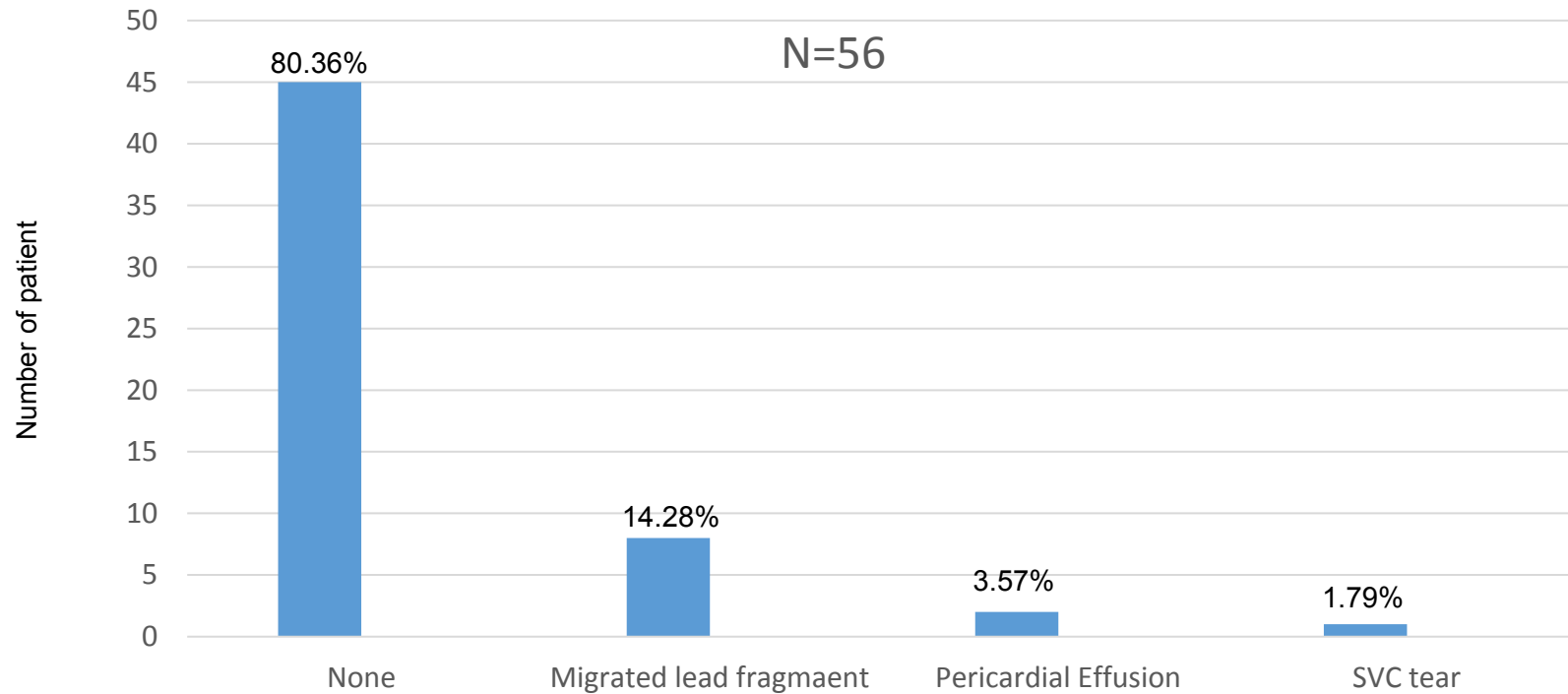
Microbiology of CIED infection



Microbiology of transvenous lead extraction in Ramathibodi hospital
in 2008-2020

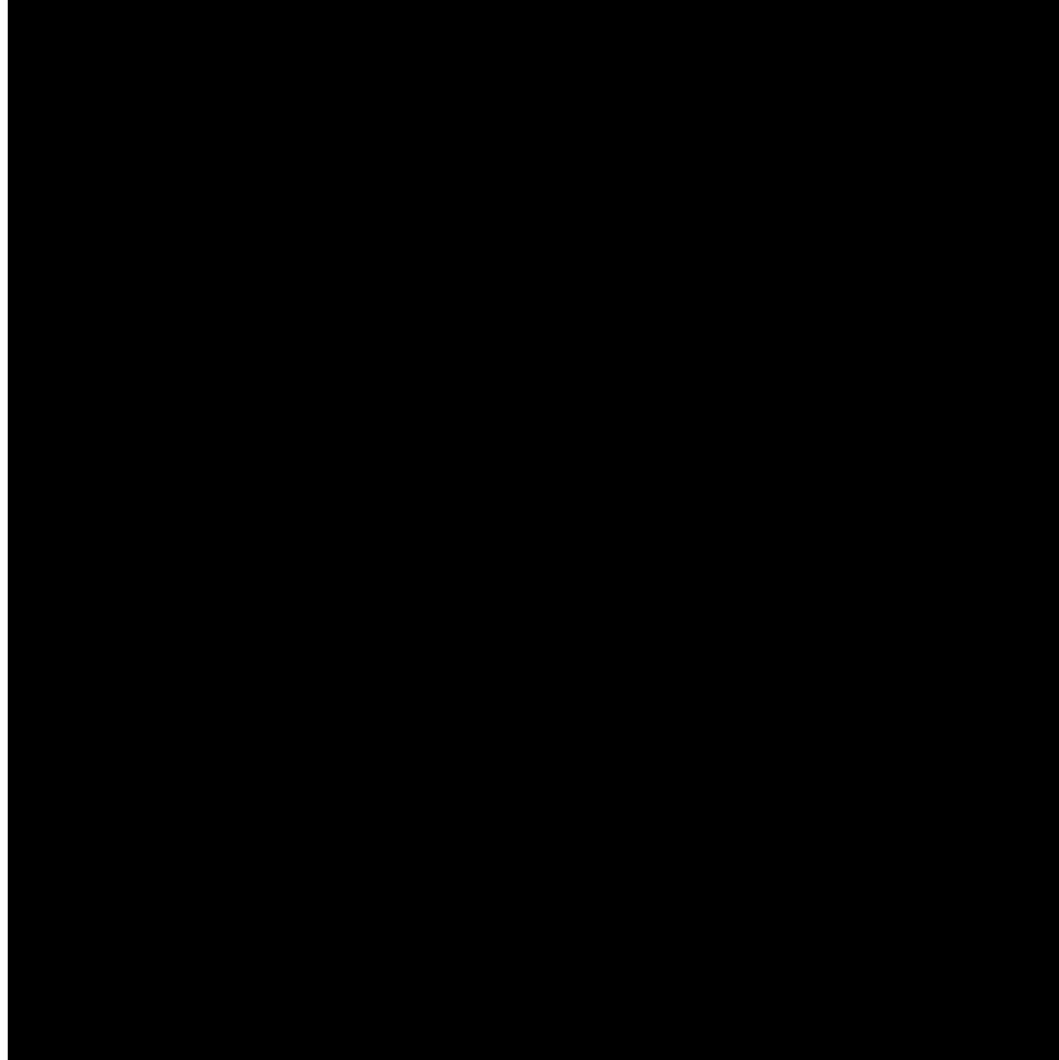


Complication



Complication of transvenous lead extraction in Ramathibodi hospital
in 2008-2020

Snaring





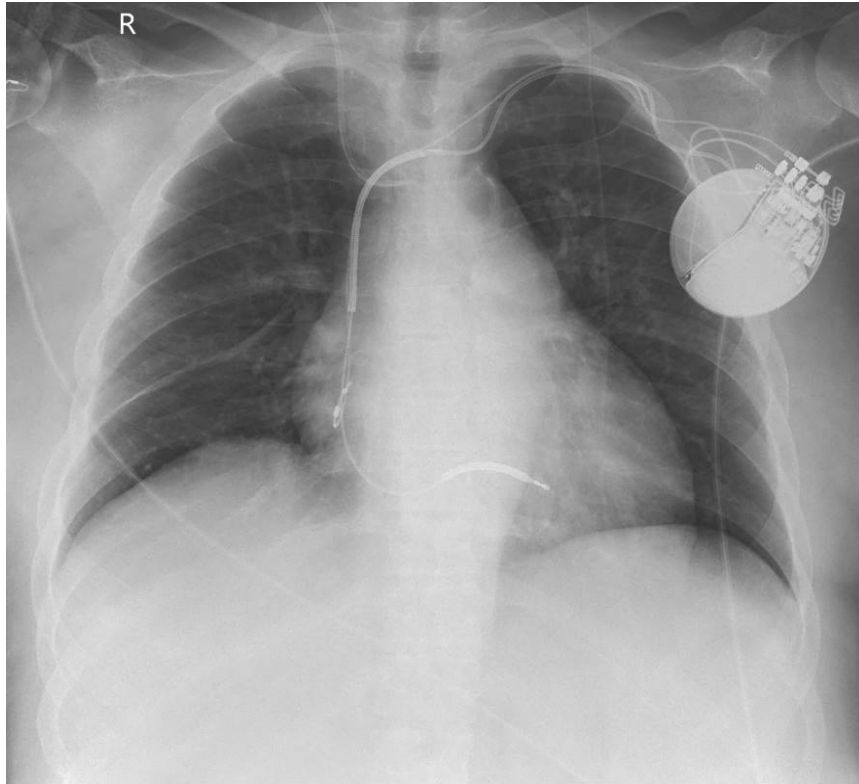
Definition of success

Term	Definition
Nonfunctional lead	A lead that is not usable due to electrical dysfunction, regardless of whether it is connected to the CIED or not.
Abandoned lead	A functional or nonfunctional lead that is left in place and is not connected to the CIED.
Lead removal procedure	A procedure involving the removal of a pacing or defibrillator lead using any technique, regardless of time since implantation.
Lead explant procedure	Lead removal procedure where all leads were removed without tools or with implantation stylets and all removed leads were implanted for less than 1 year.
Lead extraction	Lead removal procedure where at least one lead removal required the assistance of equipment not typically employed during lead implantation or at least one lead was implanted for greater than 1 year.
Definitions for extraction procedures	
Complete procedural success	Lead extraction procedure with removal of all targeted leads and all lead material from the vascular space, with the absence of any permanently disabling complication or procedure-related death.
Complete procedural success rate	Extraction procedures where there is complete procedural success/total number of extraction procedures
Clinical success	Lead extraction procedures with removal of all targeted leads and lead material from the vascular space or retention of a small portion of the lead (<4 cm) that does not negatively impact the outcome goals of the procedure.
Clinical success rate	Extraction procedures where there is clinical success/total number of extraction procedures
Failure	Lead extraction procedures in which complete procedural or clinical success cannot be achieved, or the development of any permanently disabling complication, or procedure-related death.
Failure rate	Failed extraction procedures/total number of extraction procedures.
Lead removal with clinical success	Leads with attempted removal where the entire lead is taken out of the body or with retention of a small portion of the lead material (<4 cm) that does not negatively impact the outcome goals of the procedure.
Lead removal with clinical success rate	Number of leads removed with clinical success during a lead extraction/total number of leads with attempted removal.

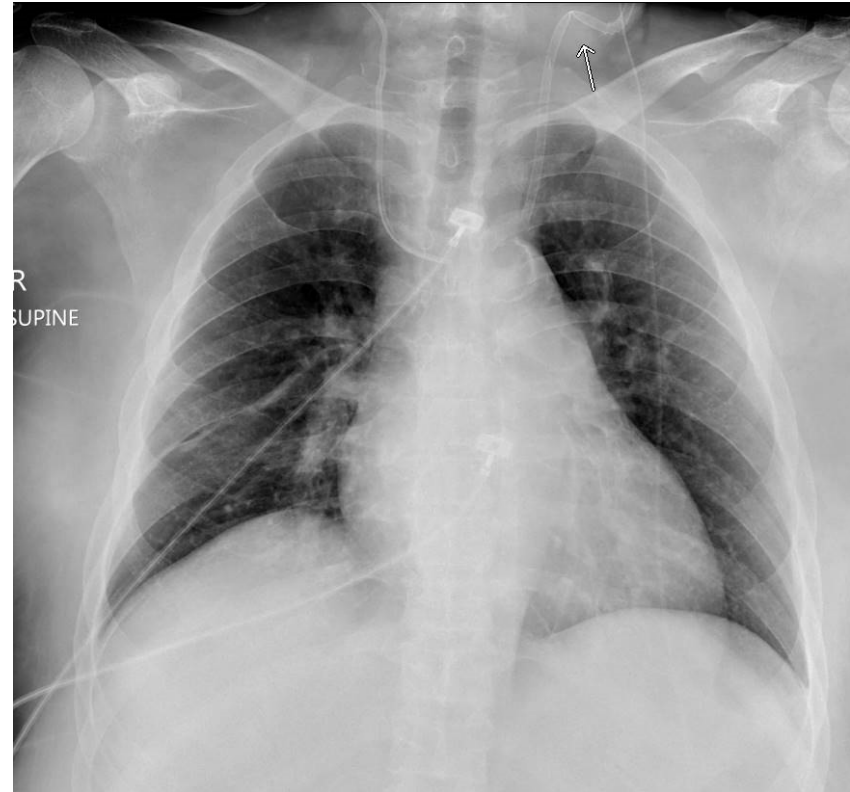
CIED = cardiovascular implantable electronic device.



Complete procedural success



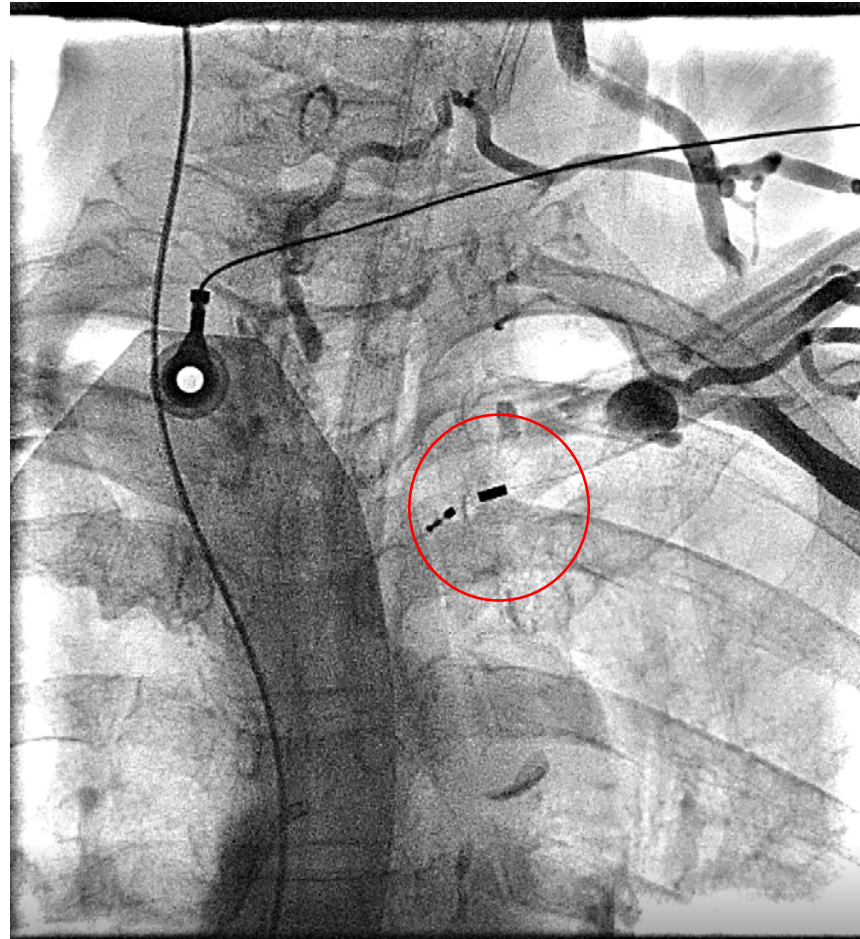
Preprocedural



Postprocedural



Clinical success





Procedural outcome

Procedural outcome N=56	
Complete procedural success n,%	54 (96.42%)
Clinical success n,%	1(1.79%)
Procedural failure n,%	1(1.79%)
Duration of operation minutes mean,SD	159.70±72.22
Fluoroscopic time mean,SD	12.46±12.56
Length of stay days mean,SD	14.72±18.21
Reimplatation n,%	28(50%)

Procedural outcome of transvenous lead extraction in Ramathibodi hospital in 2008-2020



Conclusion

- The lead extraction should perform follow the guideline.
- The lead extraction in our center is an effective procedure to treat patients with chronic CIED infection.
- The lead extraction knowledge of team should be continue learning for a benefit of the patients.

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