

Lead Extraction : Case Based Approach

BY

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Lead Extraction: Basic Information Before starting

- History
- A:The Patient
 - Age, Sex, general condition of the pt
 - indication of pacing
 - Underlying heart disease
 - Dependency on Pacing
 - Indication for Extraction How urgent???
 - Presence of heart failure or ischemia

Lead Extraction: Basic Information Before starting

B:The Lead(S)

- Age of the leads
- No of leads
- Type and size of the leads
- History of previous trials of extraction

Indications

Infection

Class I

1. Complete device and lead removal is recommended in all patients with definite CIED system infection, as evidenced by valvular endocarditis, lead endocarditis or sepsis. **(Level of evidence: B)**

Chronic Pain

Class IIa

1. Device and/or lead removal is reasonable in patients with severe chronic pain

Indications

Thrombosis or Venous Stenosis

Class I

1. In patients with clinically significant thromboembolic events associated with thrombus on a lead or a lead fragment. **(Level of evidence: C)**

Functional Leads

Class I

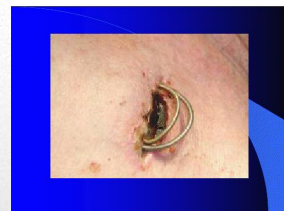
1. In patients with life threatening arrhythmias secondary to retained leads. **(Level of evidence: B)**

Non Functional Leads

Class I

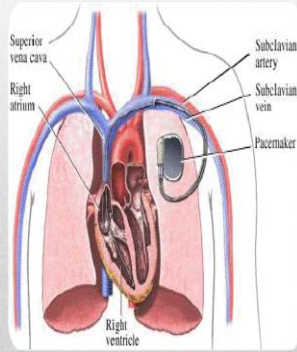
1. In patients with life threatening arrhythmias secondary to retained leads or lead fragments. **(Level of evidence: B)**

History of the the Patient

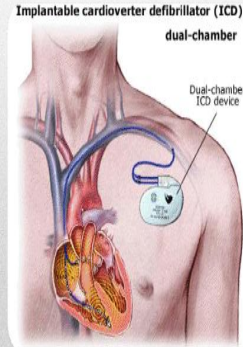


History of the Leads

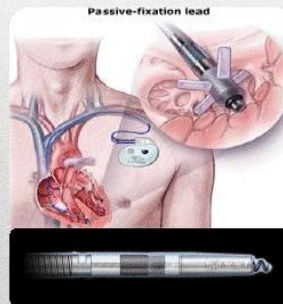
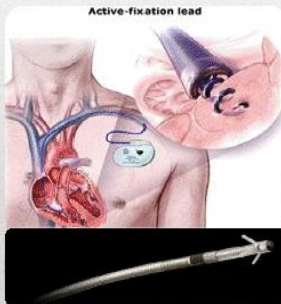
Pacemaker & Leads



ICD & leads



Types of Leads



Preparations for Lead Extraction

Personnel :

Primary Operator: A physician performing the lead extraction who is properly trained

Cardiothoracic surgeon: well versed in the potential complications

Anesthesia support

Technician :Personnel capable of operating fluoroscopic equipment

“Scrubbed” assistant : (nurse/technician/physician)

Non “scrubbed” assistant

Echocardiographer

Extraction Environment

- Team approach
- Spectrum of tools
- Spectrum of techniques
- Plan, train, and practice for an emergency

Complications

Intra-procedural complication:

Any event related to the performance of a procedure

Post-procedural complication:

Any event related to the procedure that occurs or **becomes evident within 30 days following the intra-procedural period.**

Major complication:

Any of the outcomes related to the procedure which is **life threatening or results in death.**

Minor complication:

Any undesired event related to the procedure that requires **medical intervention or minor procedural**

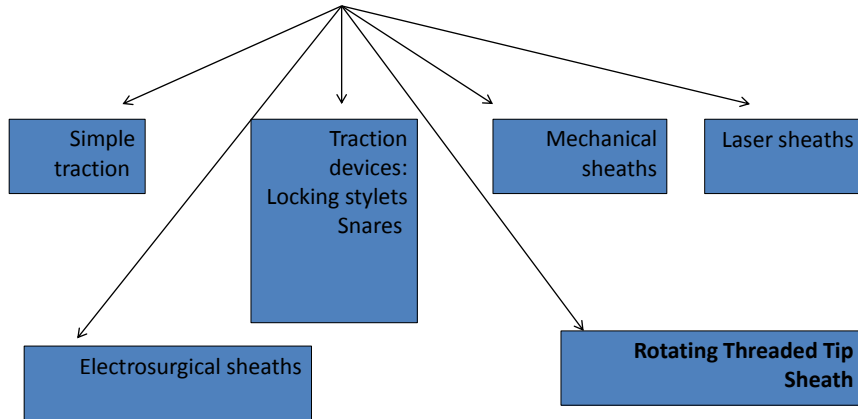
Complications

Predictors of major complications

- Implant duration of oldest lead
- Female gender
- ICD lead
- Use of laser

Extraction tools and techniques

extraction tools



Extraction tools and techniques

Rotating Threaded Tip Sheath (evolution sheath):

Sheaths that are equipped with a rotationally powered mechanism that bore through and disrupt fibrotic attachments with a threaded screw mechanism at the sheath tip



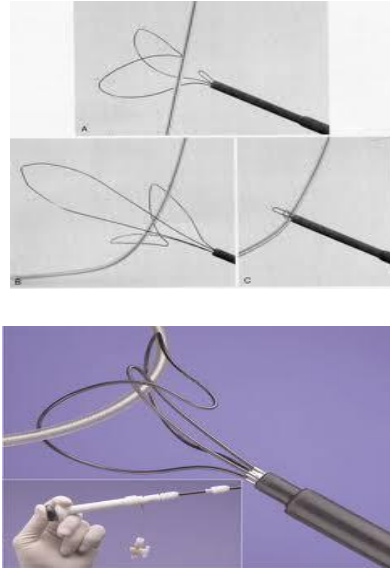
Extraction tools and techniques

Traction Devices:

Snare(needle `s eye snare):

- Used mainly for free floating or with the leads with no free end

- Can be used in jugular or femoral Approaches



European heart rhythm association EP network survey

- Total number of patients: (3081 patients,5299 leads)in 2011
- Percentage of extracted leads

Right atrial leads	Right ventricle leads	Coronary sinus leads	ICD leads	Free floating leads
32 %	31 %	9.5 %	24.5%	2.5%

European heart rhythm association EP network survey

Success rate :

- Complete success :in 88 % of patients
- Partial success : in 7 % of patients
- Failure : in 5 % of patients

European heart rhythm association EP network survey

major complication rate :

- <1% in 63 % of centers
- 1-2% in 27%of centers
- 2-5% in 7.5%of centers
- >5% in 2.5%of centers
- **Death :**
- 0% in 54% of centers
- <0.5%in 36%of centers
- 0.5-2%in 10 %of centers

Ain Shams practice of lead extraction

Based on Ain Shams University experience of lead extraction :

Total number of patients (19 patients,33 leads)in 2012,2013.

Right atrium	Right ventricle	ICD lead	CS lead
12(36%)	17(52%)	2(6%)	2(6%)

Manual traction	Locking stylets	Mechanical sheaths	Powered sheaths evolution	Snares
13 (39%)	16(49%)	15(45%)	8(24%)	2(6)

Transfemoral approach	Transjugular approach
1 (3%)	1(3%)

Ain Shams practice of lead extraction

Success rate :

- Complete succes: in 85 % of patients (16 patients)
- Partial success : in 15 % of patients(3 patients)
(incomplete removal of all targets leads with retained parts of leads).

Complications:

- Death 2 patients (APO in DCM pt, Infective endocarditis in AVR pt)
- Hematoma at the neck (Internal Jugular approach)
- Hypovolemic shock requiring Blood transfusion 2 pts.

A male patient 50 years , DCM , EF 30%, CRT-D

Indication of Extraction: Pocket Infection and skin erosion.

Extracted leads : right atrial , right ventricular defibrillator lead and coronary sinus lead

Duration of implantation : 6 years

Methods of extraction : locking stylet and powered evolution sheath



Internal Jugular approach :

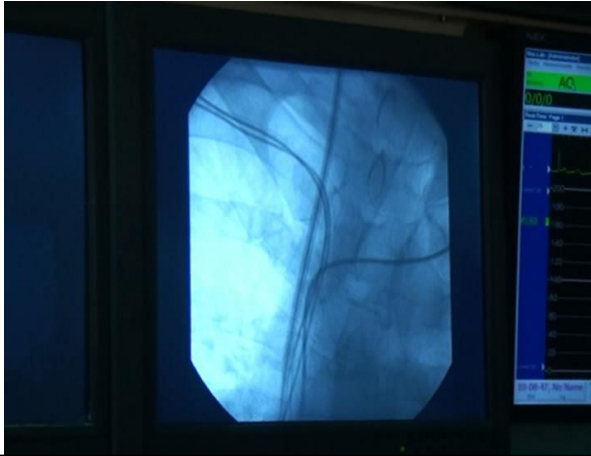
Patient : male patient 45 years ,DDD pacemaker for CHB.

Extracted leads : right ventricular lead

Duration of implantation : 4 years

Methods of extraction : transjugular snare

Type of complication : postprocedural , hematoma developed at the neck that resolved with conservative methods.



Our practice in lead extraction complication

- **Minor complication:**
- **Incomplete removal without sequelae**

Patient : female patient 20 years

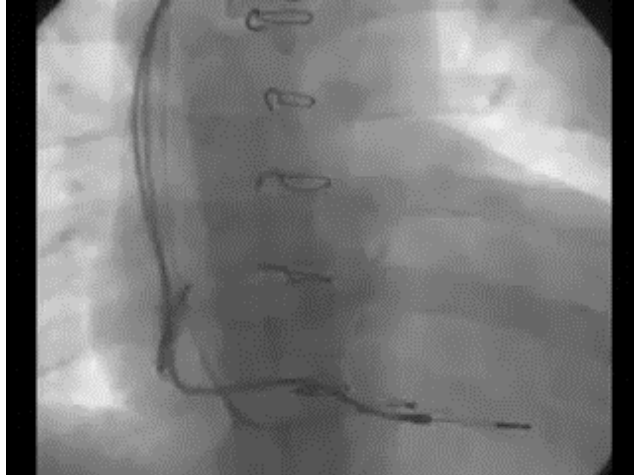
Extracted leads : right atrial and right ventricular leads

Duration of implantation : 6.5 years

Methods of extraction : locking stylets and mechanical sheath and evolution sheath

Type of complication : intraprocedural , after complete removal of the atrial lead ,and during removal of the ventricular lead it was cut and dragged to Inferior vena cava by a snare and left there. Anticoagulation was continued bec of prosthetic aortic valve

Mona lead extraction video



Conclusions **Lead Extraction : Case Based Approach**

Lead Extraction can be AVOIDED by proper Lead placement and prevention of pacemaker infection during implantation of pacemakers and ICDs.

TEAM work with proper training of the team is the key of success of lead extraction.

PLANNING for each lead extraction and preparation of different tools and different approaches are Mandatory.

PREPARATION for serious complications during the procedure can save the life of the patient.

Thank you