

# Lead extraction complications

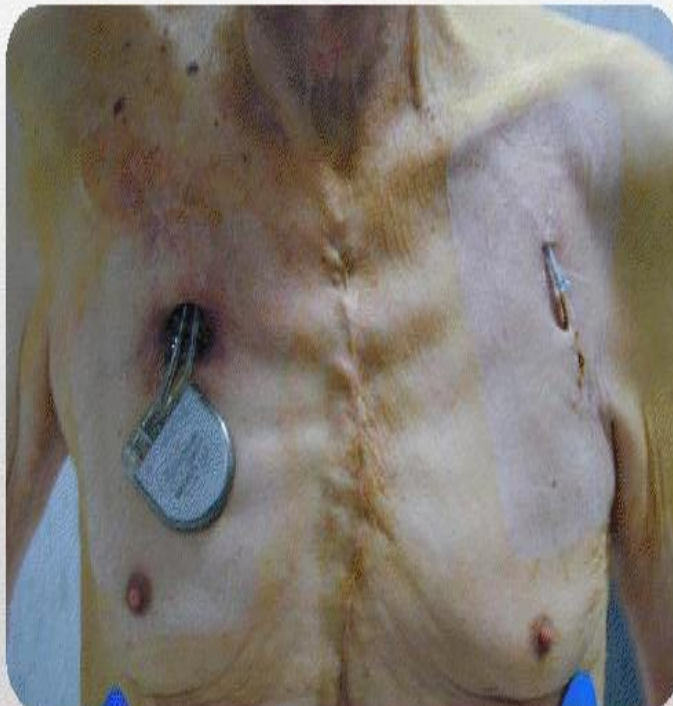
**The dark side of the  
coin**

Dr Mervat Aboulmaaty  
Professor of cardiology  
Ain Shams University  
CARDIOALEX 2013

# introduction

- Lead extraction is increasingly required and is directly related to the increased numbers of cardiac implantable electronic devices (CIEDs).
- The removal of such systems is potentially a high-risk procedure so the penetration of transvenous lead extraction techniques into general use was slow due to the potential for fatal complications.

# Introduction



# Classification of complication

- **Intra-procedural complication:**

Any event related to the performance of a procedure that occurs or **becomes evident from the time the patient enters the operating room until the time the patient leaves the operating room.** This includes complications related to the preparation of the patient, the delivery of anesthesia, and opening and closing the incision.

- **Post-procedural complication:**

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

# Classification of complication

- **Major complication:**

Any of the outcomes related to the procedure that :

- **results in death or life threatening.**
- **causing persistent or significant disability**
- **requires significant surgical intervention**

- **Minor complication:**

Any undesired event related to the procedure that:

- **requires medical intervention or minor procedural**
- **does not limit persistently**
- **does not threaten life or cause death**

# Major complication

1. Death
2. Cardiac avulsion or tear requiring thoracotomy, pericardiocentesis, chest tube, or surgical repair)
3. Vascular avulsion or tear (requiring thoracotomy, pericardiocentesis, chest tube, or surgical repair)
4. Pulmonary embolism requiring surgical intervention
5. Respiratory arrest or anesthesia related complication leading to prolongation of hospitalization
6. Stroke
7. Pacing system related infection of a previously non-infected site

## Minor complications

1. Pericardial effusion not requiring pericardiocentesis or surgical intervention.
2. Hemothorax not requiring a chest tube
3. Hematoma at the surgical site requiring reoperation for drainage
4. Arm swelling or thrombosis of implant veins resulting in medical intervention
5. Vascular repair near the implant site or venous entry site

## Minor complications

6. Hemodynamically significant air embolism
7. Migrated lead fragment without sequela
8. Blood transfusion related to blood loss during surgery
9. Pneumothorax requiring a chest tube
10. Pulmonary embolism not requiring surgical intervention





## **Predictors of major complication**

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

## Current European practice in complication

Total number of patients: (3081 patients, 5299 leads) in 2011 in 81 centers according to EHRA network survey

All 81 centers reported major complications

### **Incidence of complication :**

<1% in 63 % of centers

1-2 % in 27 % of centers

2-5% in 7.5% of centers

>5% in 2.5 % of centers

### **Incidence of death :**

0% in 54 % of centers

<0.5% in 36 % of centers

0.5-2% in 10 % of centers

## Complication according to FDA's Manufacturers and User Defined Experience (MAUDE)

Between 1995 and 2008, 57 deaths and 48 serious cardiovascular injuries •

Of the 105 events, 27 deaths and 13 injuries occurred in 2007–2008. •

23 deaths were linked with excimer laser or mechanical dilator sheath •  
extractions

The majority of deaths and injuries involved ICD leads, and most were caused •  
by lacerations of the right atrium, superior vena cava, or innominate vein.

62 patients underwent emergency surgical repair of myocardial perforations •  
and venous lacerations.

35 (56%) survived. •

## Our practice in lead extraction

Based on Ain Shams University experience in lead extraction :

**Total number of patients** (16 patients,27 leads )in 2012,2013.

Right atrium	Right ventricle	ICD lead	CS lead
10(37%)	14(52%)	2(7.3%)	1(3.7%)

Manual traction	Lockingstyle ts	Mechanical sheaths	Powered sheaths evolution	Snares
8 (29%)	15(55%)	15(55%)	8(29%)	2(7.4)

Transfemoral approach	Transjugular approach
1(3.7%)	1(3.7%)

## Our practice in lead extraction complication

- **Major complication:**

- **Death**

**Patient :** 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 stylets and powered evolution sheath

**Type of complication :** intraprocedural , the patient developed acute pulmonary odema then death









## Our practice in lead extraction complication

- **Minor complication:**

- **Transient arrest**

**Patient** : male patient 60 years , ICM, dual chamber ICD.

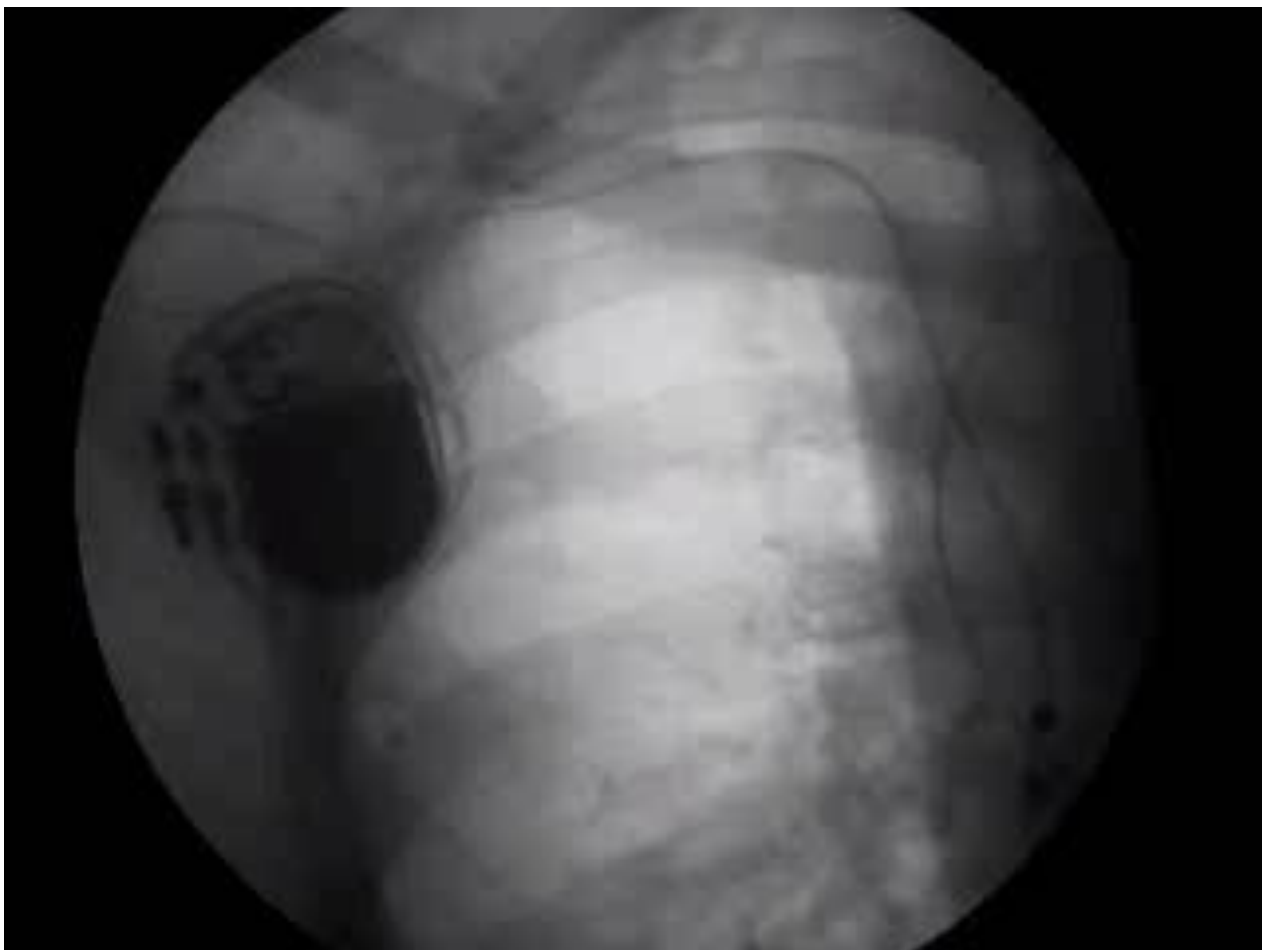
**Indication of Extraction**: Pocket Infection and skin erosion.

**Extracted leads** : right atrial , right ventricular ICD leads

**Duration of implantation** : 7 years

**Methods of extraction** : locking stylets and powered evolution sheath

**Type of complication** : intraprocedural , during traction of the ICD lead the right ventricle was everted into tricuspid valve with electromechanical arrest that resolved with stopping traction .



## Our practice in lead extraction complication

- **Minor complication:**
- **Hematoma at the entry site**

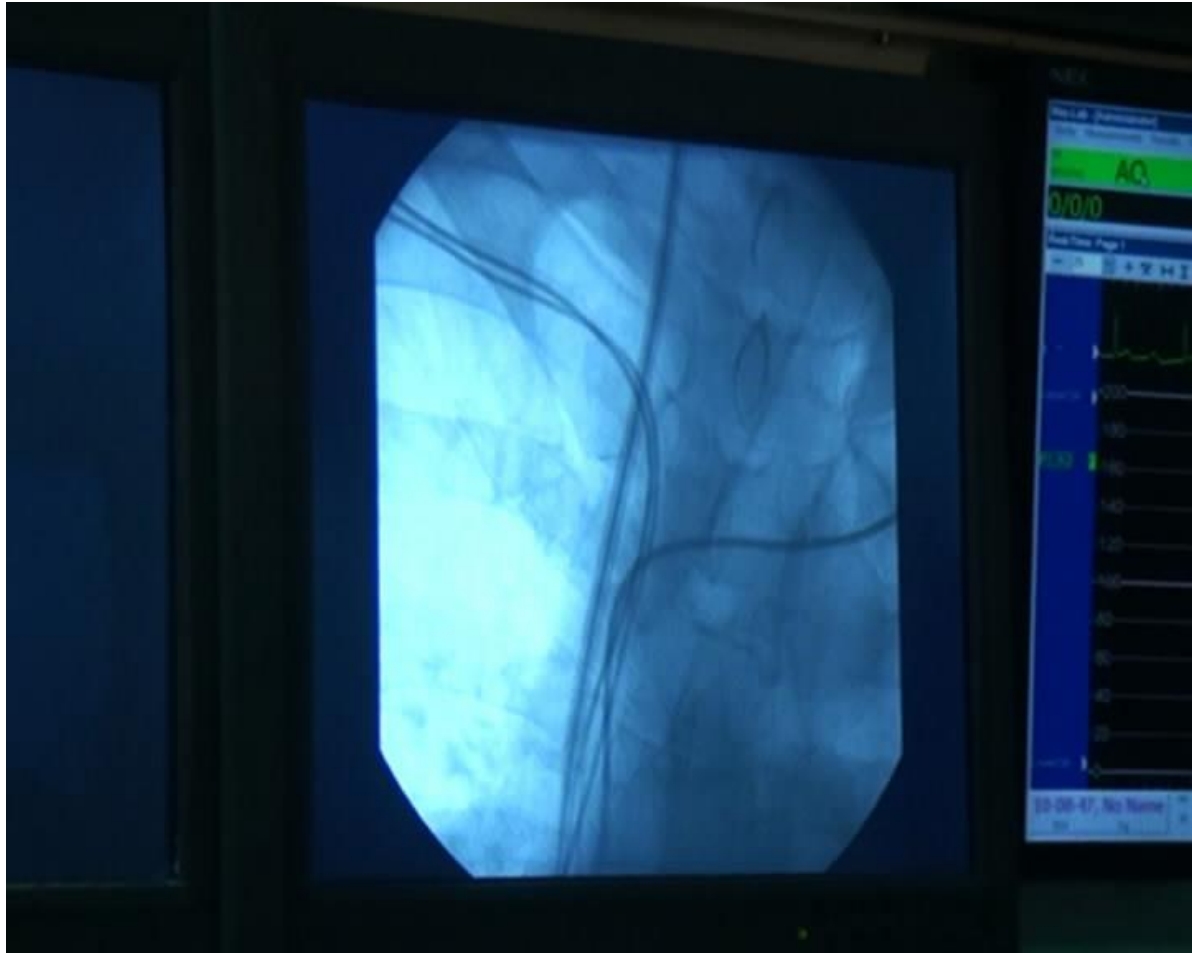
**Patient :** male patient 45 years ,DDD pacemaker for CHB.

**Extracted leads :** right ventricular lead

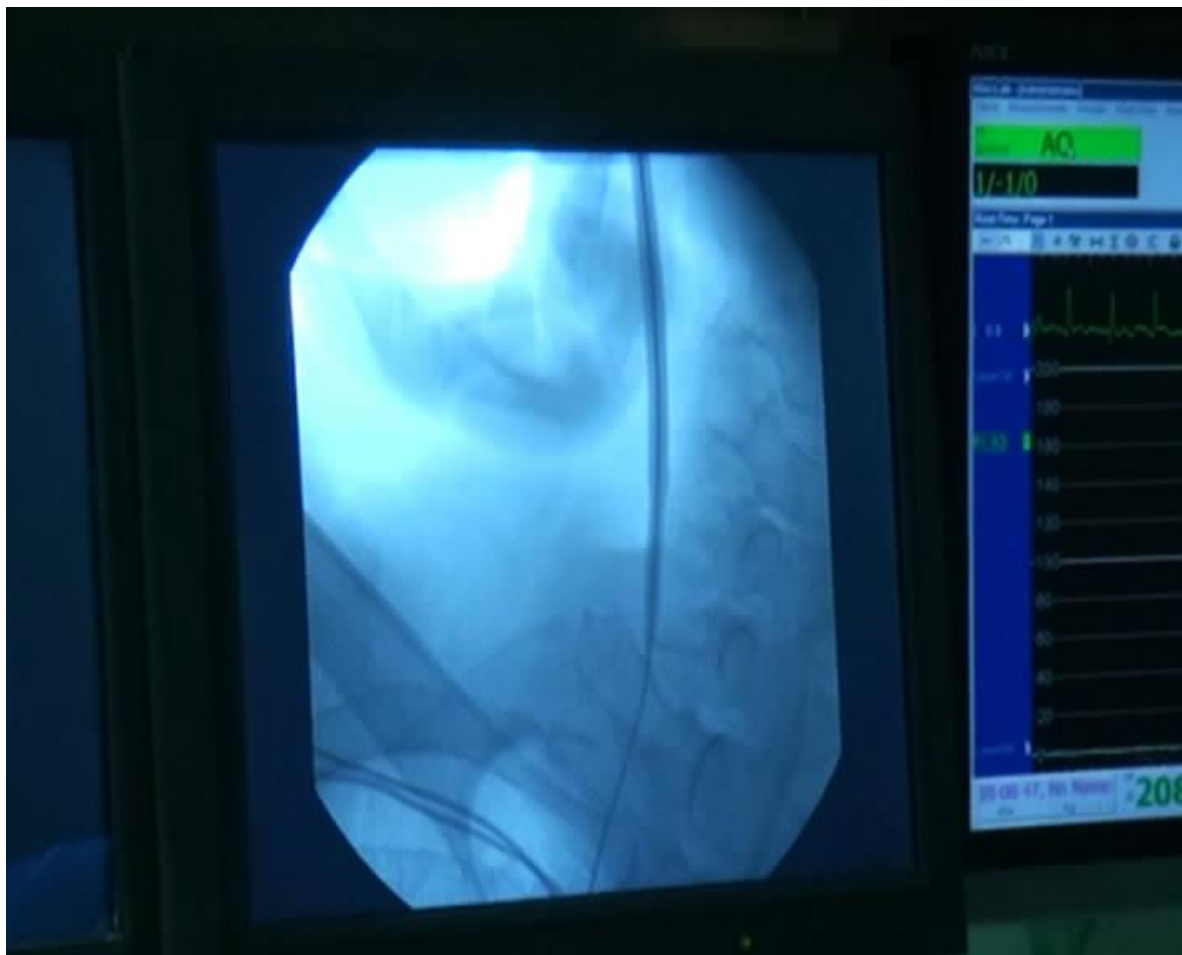
**Duration of implantation :** 4 years

**Methods of extraction :** transjugular snare

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



# Internal Jugular approach for lead removal



## Our practice in lead extraction complication

- **Minor complication:**
- **Hypovolemic shock requiring blood transfusion**

**Patient :** female patient 28 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 :** postprocedural , hypovolemia that resolved with fluids and blood transfusion .

## Our practice in lead extraction complication

- **Minor complication:**
- **Hypovolemic shock requiring blood transfusion**

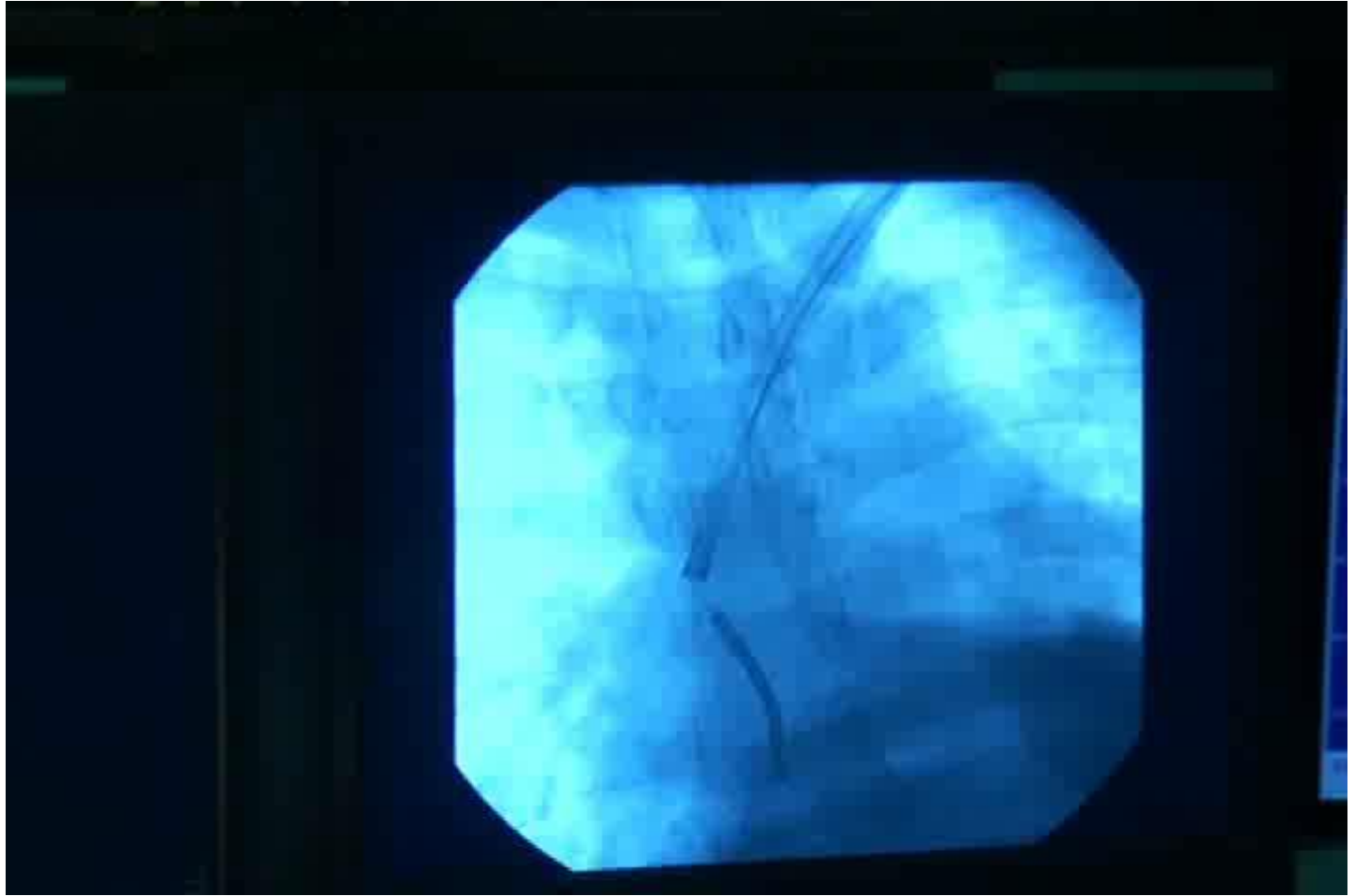
**Patient :** female patient 28 years

**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 :** postprocedural , hypovolemia that resolved with fluids and blood transfusion .





## Our practice in lead extraction complication

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

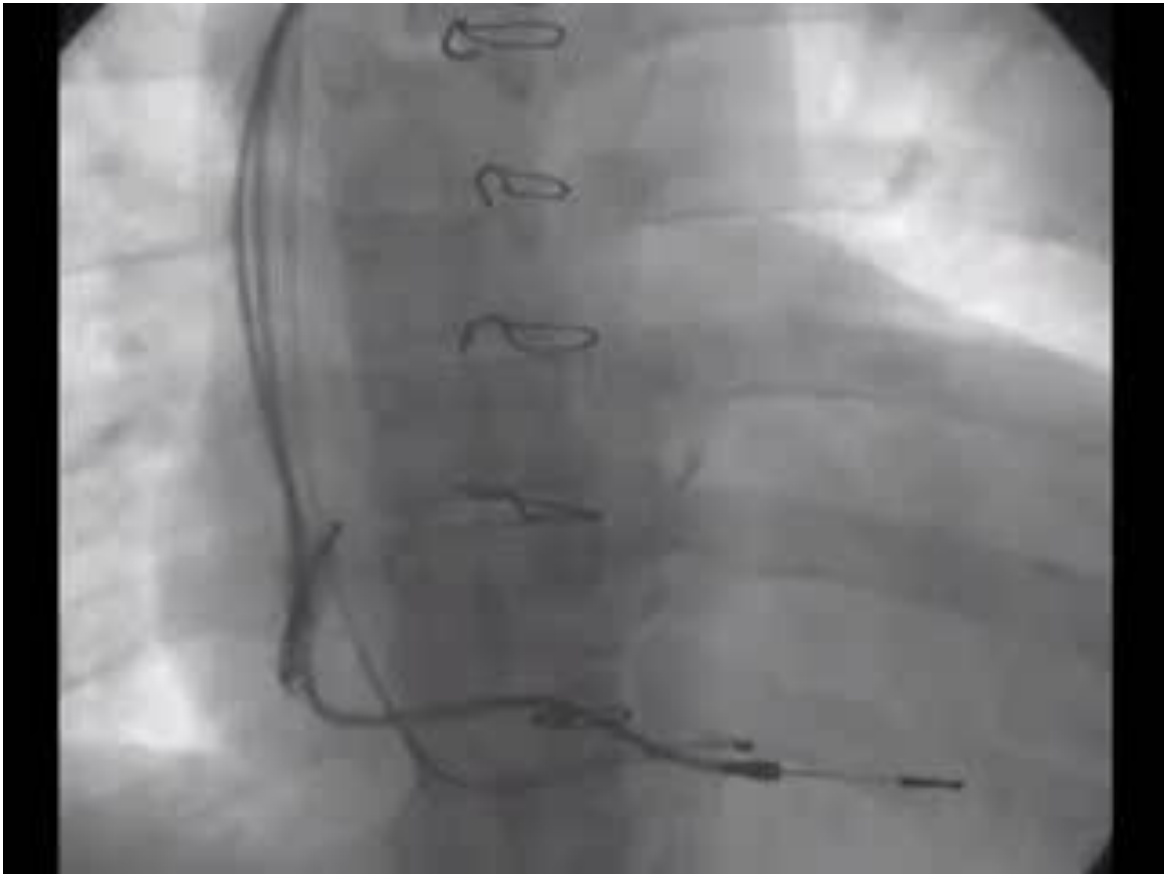
**Patient** : same patient

**Extracted leads** : incomplete removal of the right atrial lead after Complete removal of right ventricular lead.

**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 ventricular lead ,and during removal of the atrial lead it was cut  
The atrial lead was amalgamated to the right atrial appendage.



## Our practice in lead extraction complication

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

**Patient** : female patient 20 years

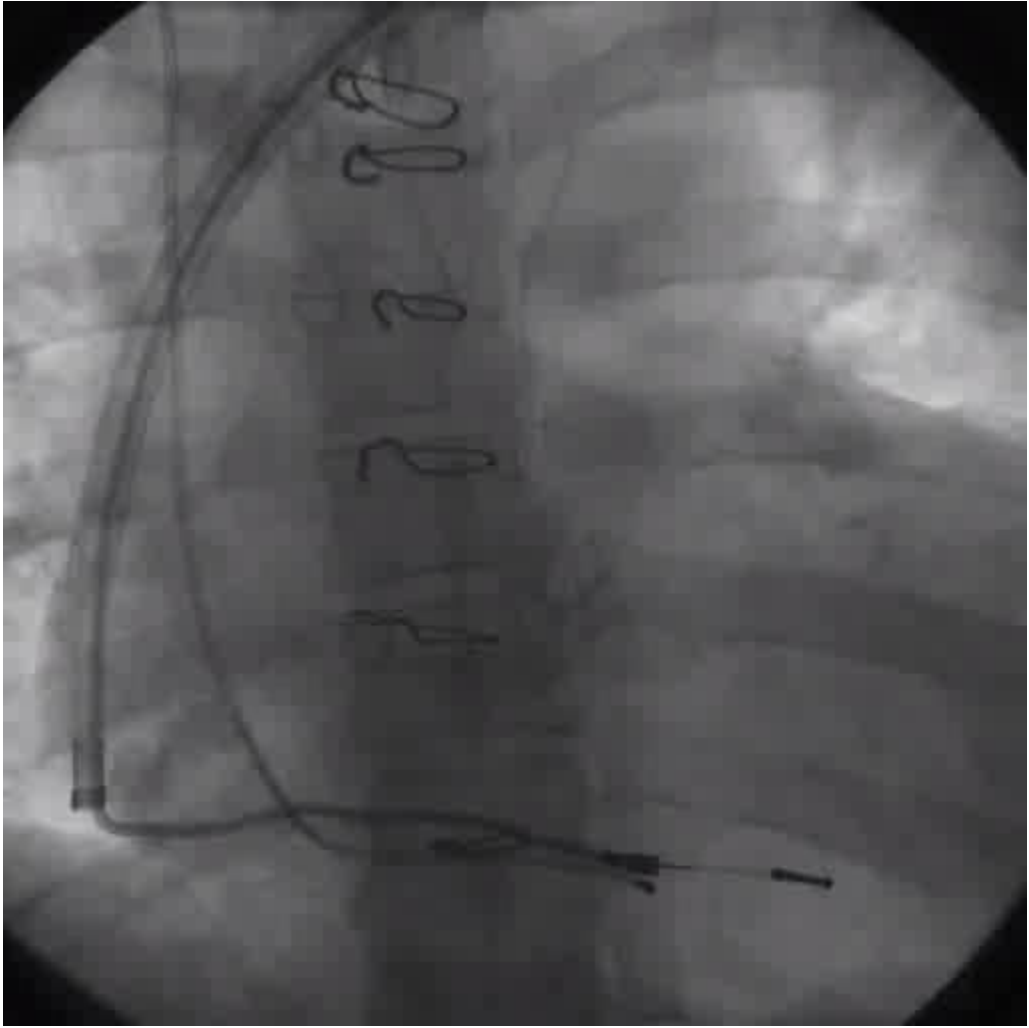
**Extracted leads** : right atrial and right ventricular leads

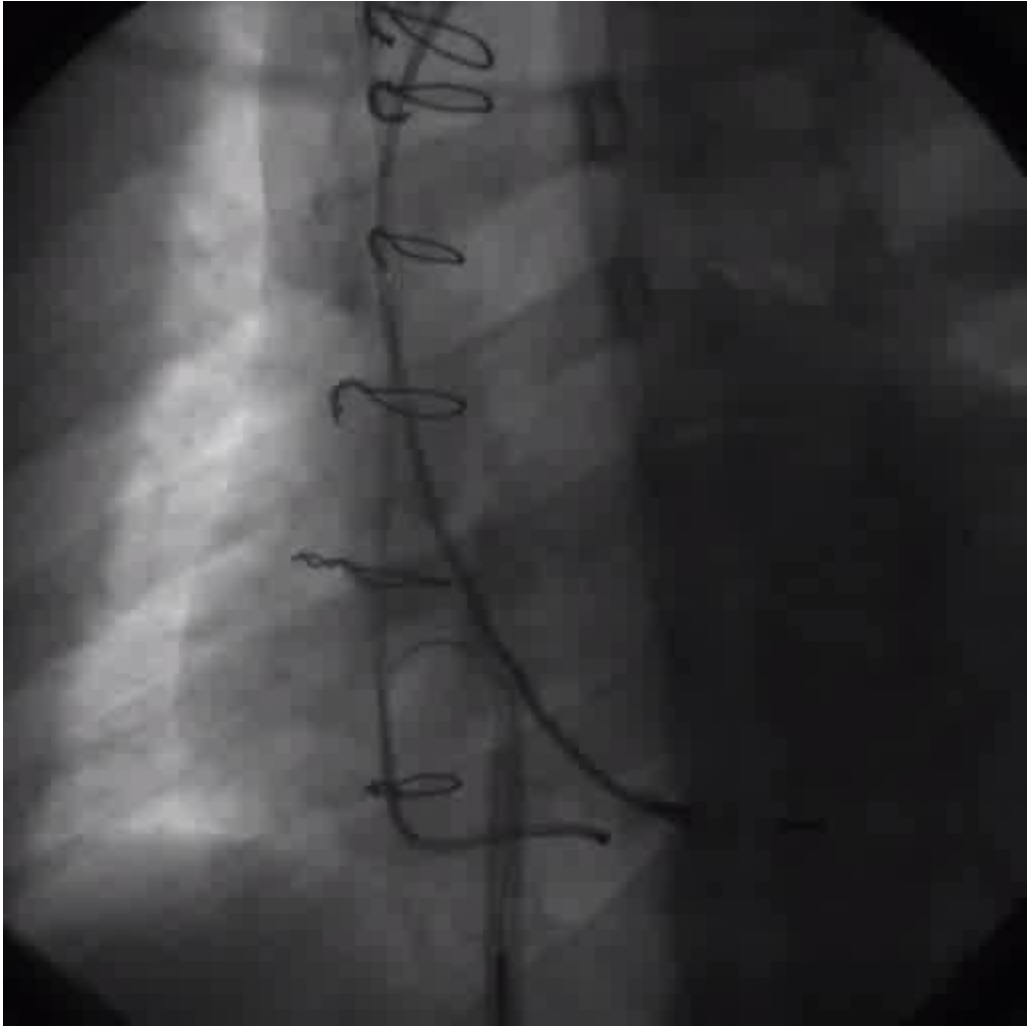
**Duration of implantation** : 6.5 years

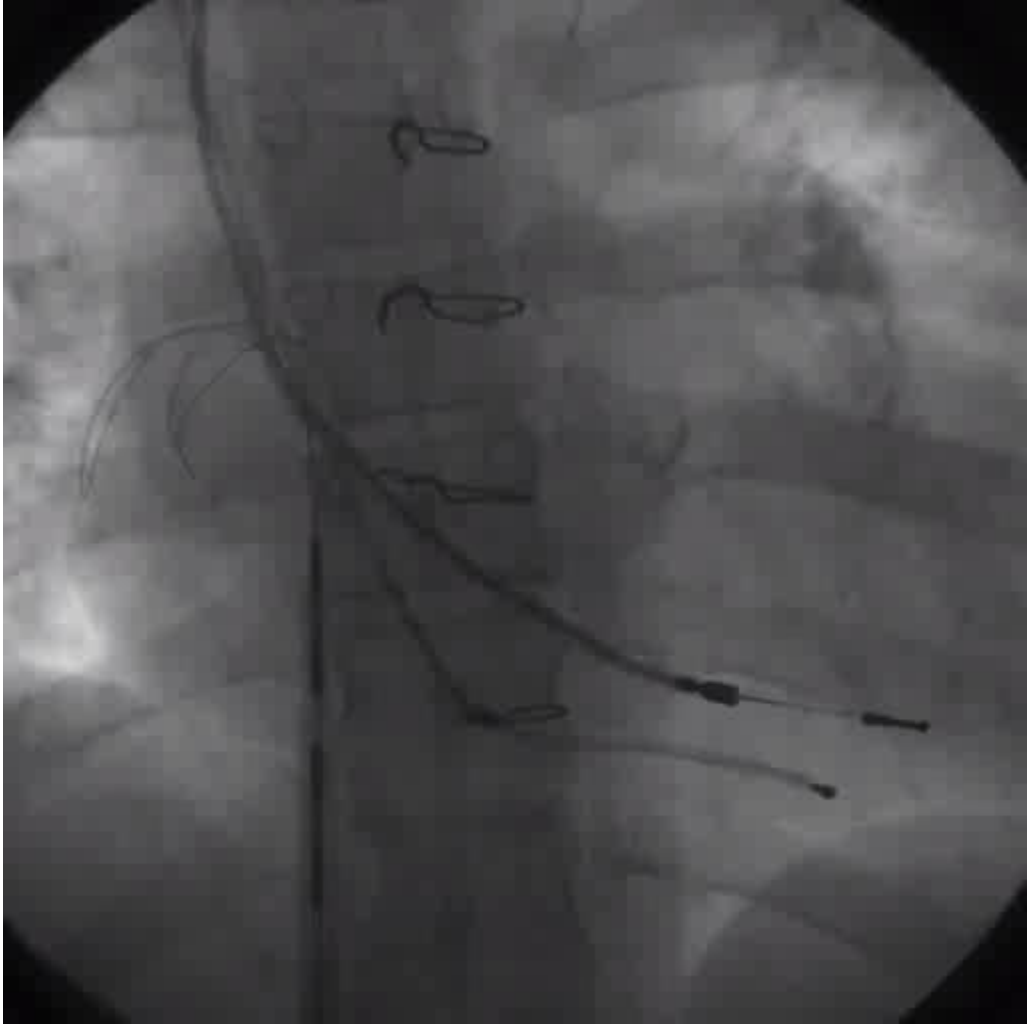
**Methods of extraction** : locking stylets and mechanical sheath and evolution sheath

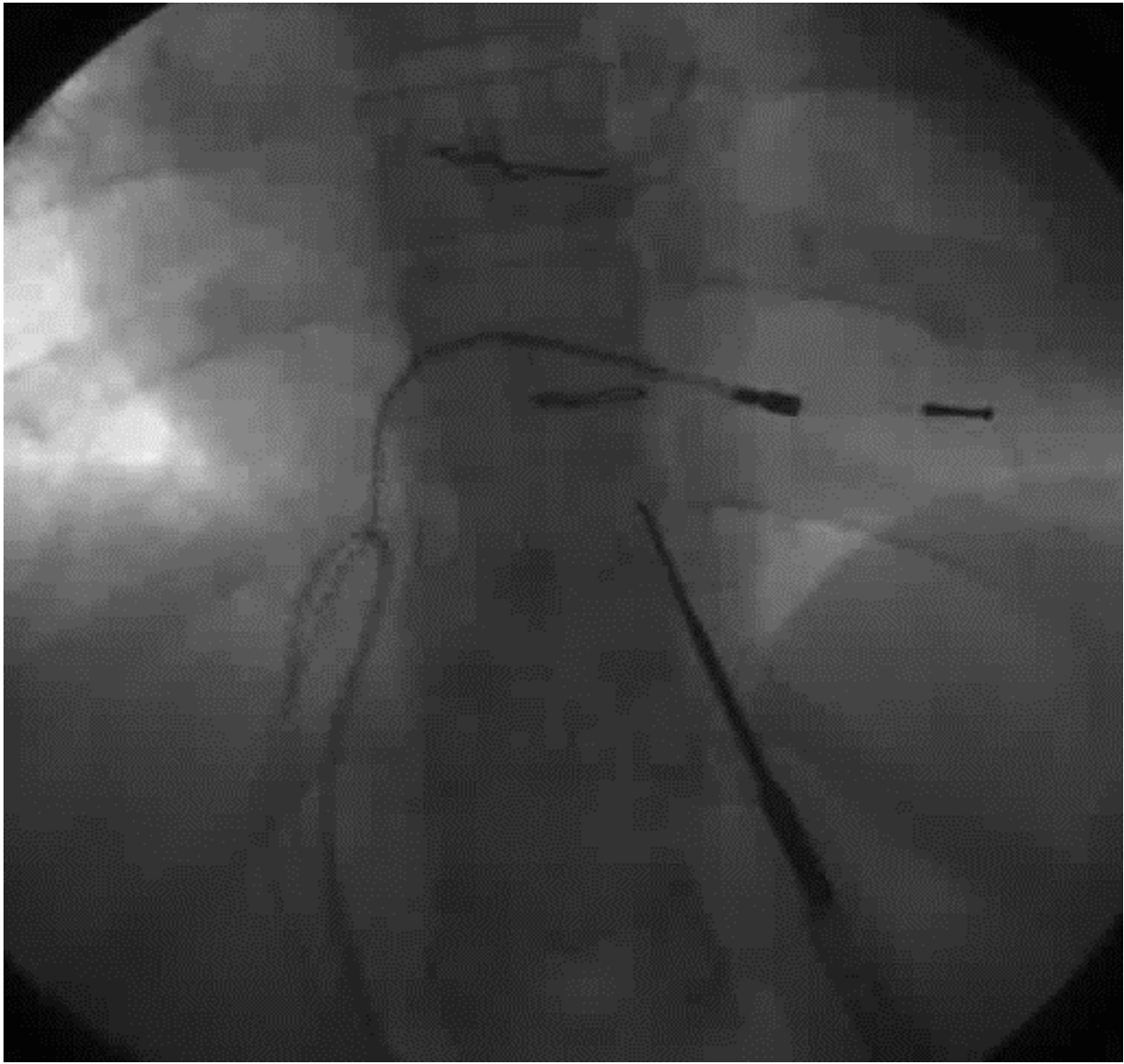
**Type of complication** : intraprocedural , after complete removal of the atrial lead ,and during removal of the ventricular lead it was cut and dragged to Inferior vena cava by a snare and left there. Anticoagulation was continued bec of prosthetic aortic valve













# Conclusions

Complications of Lead Extractions can be very minimal and can be Fatal

Preparation for the serious complication during the procedure can save the life of the patient.

Thorough monitoring and follow up is the key of success.

