



The Leading Suspect

Hemothorax due to myocardial perforation by pacemaker lead

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Introduction

More than 2.5 million cardiac devices (ICD and pacemakers) were implanted in the United States from 1990 to 2002.¹ The most commonly seen complications include lead dislodgment, pocket hematoma, pneumothorax, and infection. Perforation of the right ventricular wall and hemothorax are rare complications occurring at less than one percent of cardiac pacemaker implantations.^{.2}

Case Description

Pacemaker implantation:

- 71yo female with remote ischemic CVA, hypertension, and sick sinus syndrome
- Elective outpatient pacemaker implantation for symptomatic bradycardia.
- Post-operative chest X-ray shows properly placed leads within the cardiac border and no effusions.
- Discharge summary notes pacemaker interrogation shows normal function

Pneumonia Admission:

- 6 weeks after implantation
- Admission: left-sided chest pain, dizziness, and shortness of breath.
- D-dimer 0.76, lactate 3.2, WBC 12.6, 86% PMN
- TTE without pericardial effusion,
- Diagnosed with sepsis due to presumed LLL pneumonia with associated effusion (Figure 1).

Hemothorax Admission:

- Admission: persistent chest pain, fatigue, new lightheadedness & pleural effusion (Figure 2).
- Pleural fluid & serum findings suggestive of hemothorax (see adjacent).
- Chest CT confirms RV wall penetration with pacemaker lead (Figure 3).
- EP performs RV lead extraction and replacement. CT surgery in OR as back-up and for chest tube placement.
- Discharged on hospital day #6 after chest tube removal.

Follow-up:

- Two-week follow-up with surgery demonstrates complete resolution of effusion and symptoms

Imaging

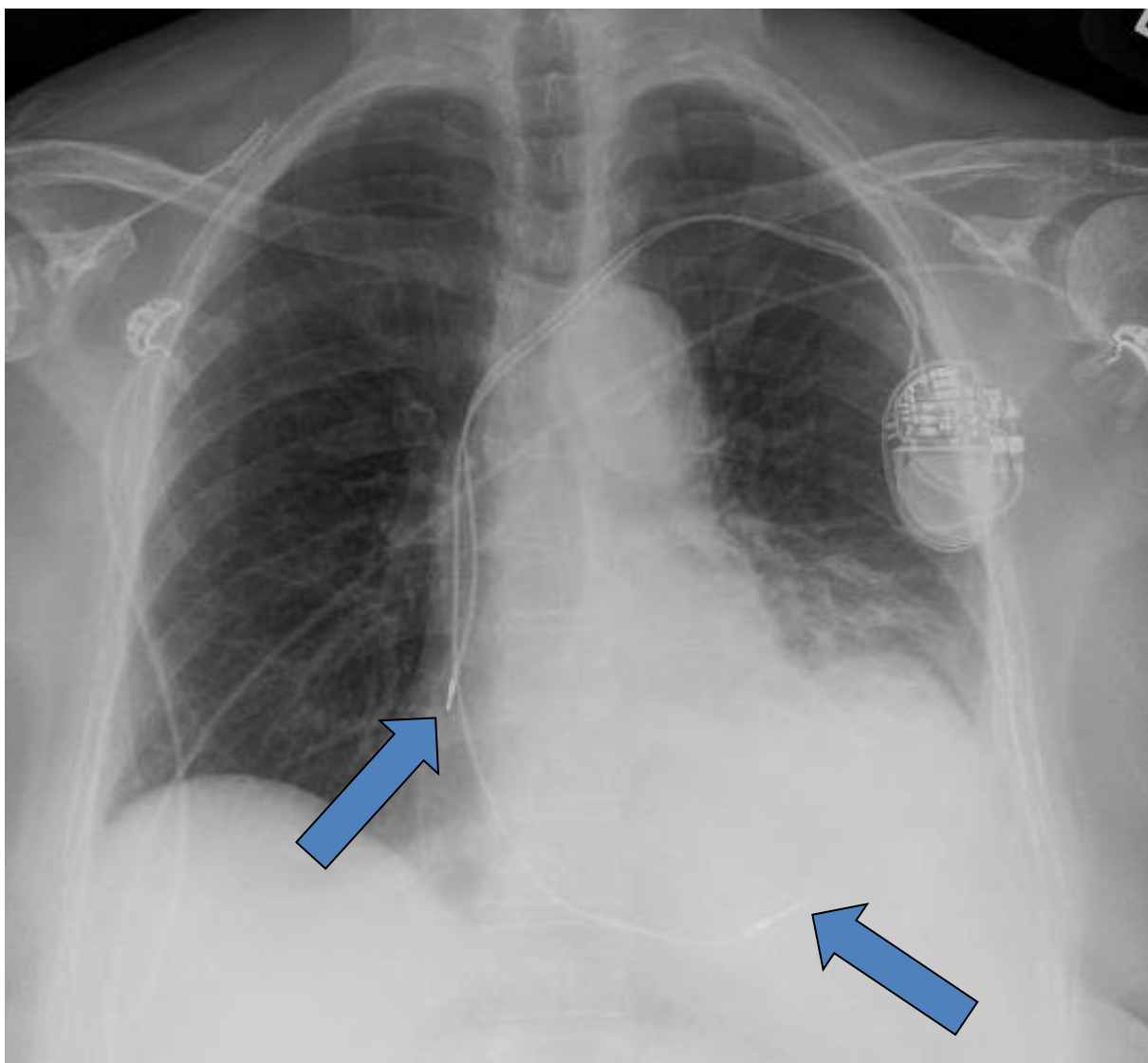


Figure 1. Pneumonia Admit Radiograph
Portable radiograph shows cardiomegaly without pulmonary edema. The pacemaker and right ventricular lead are visible (Arrows). A small to moderate left pleural effusion is visible and presumed to be lobar pneumonia.

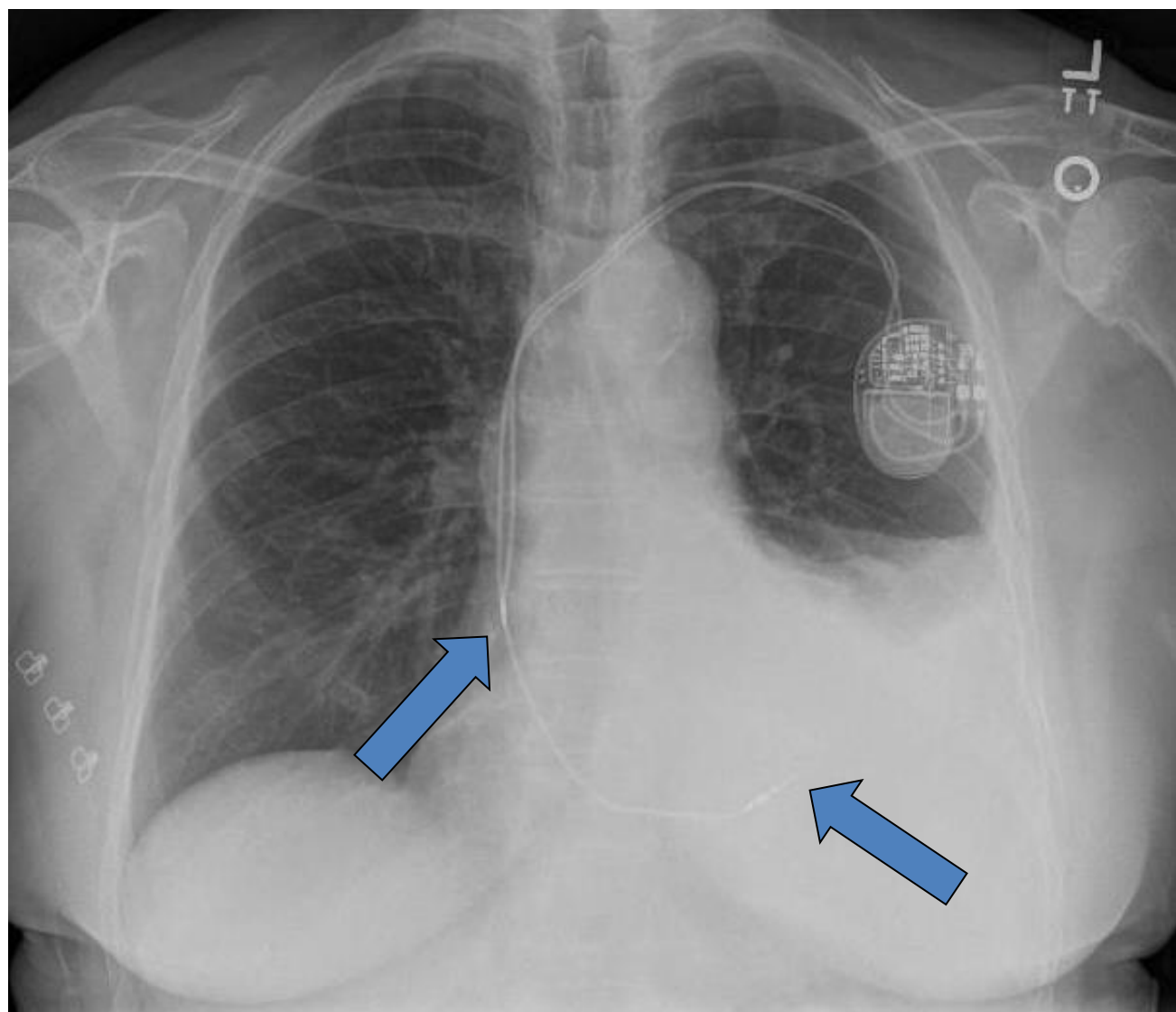


Figure 2. Effusion Admit Radiograph
The pacemaker remains unchanged (Arrows) with slight enlargement of left sided pleural effusion despite antibiotic therapy.

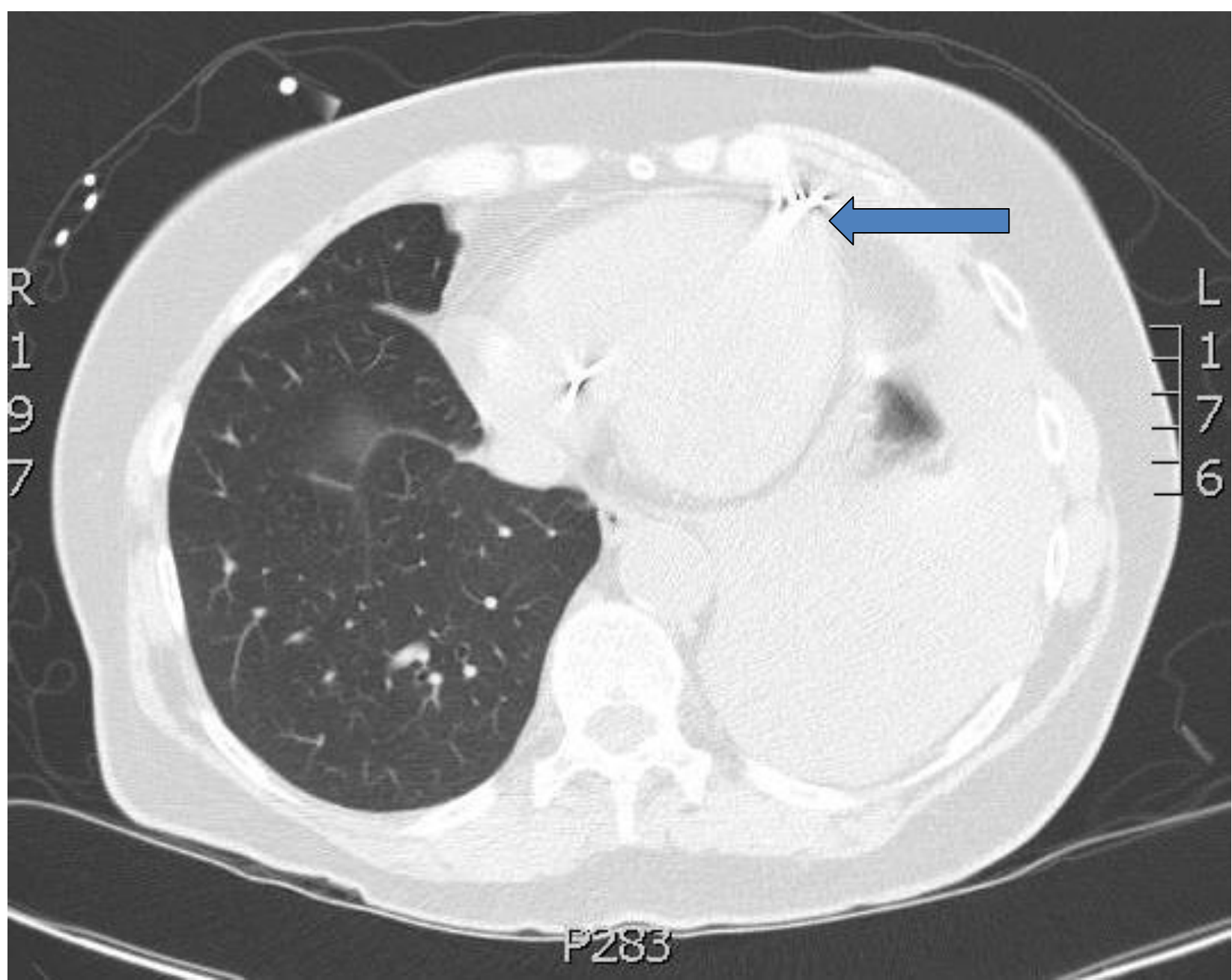
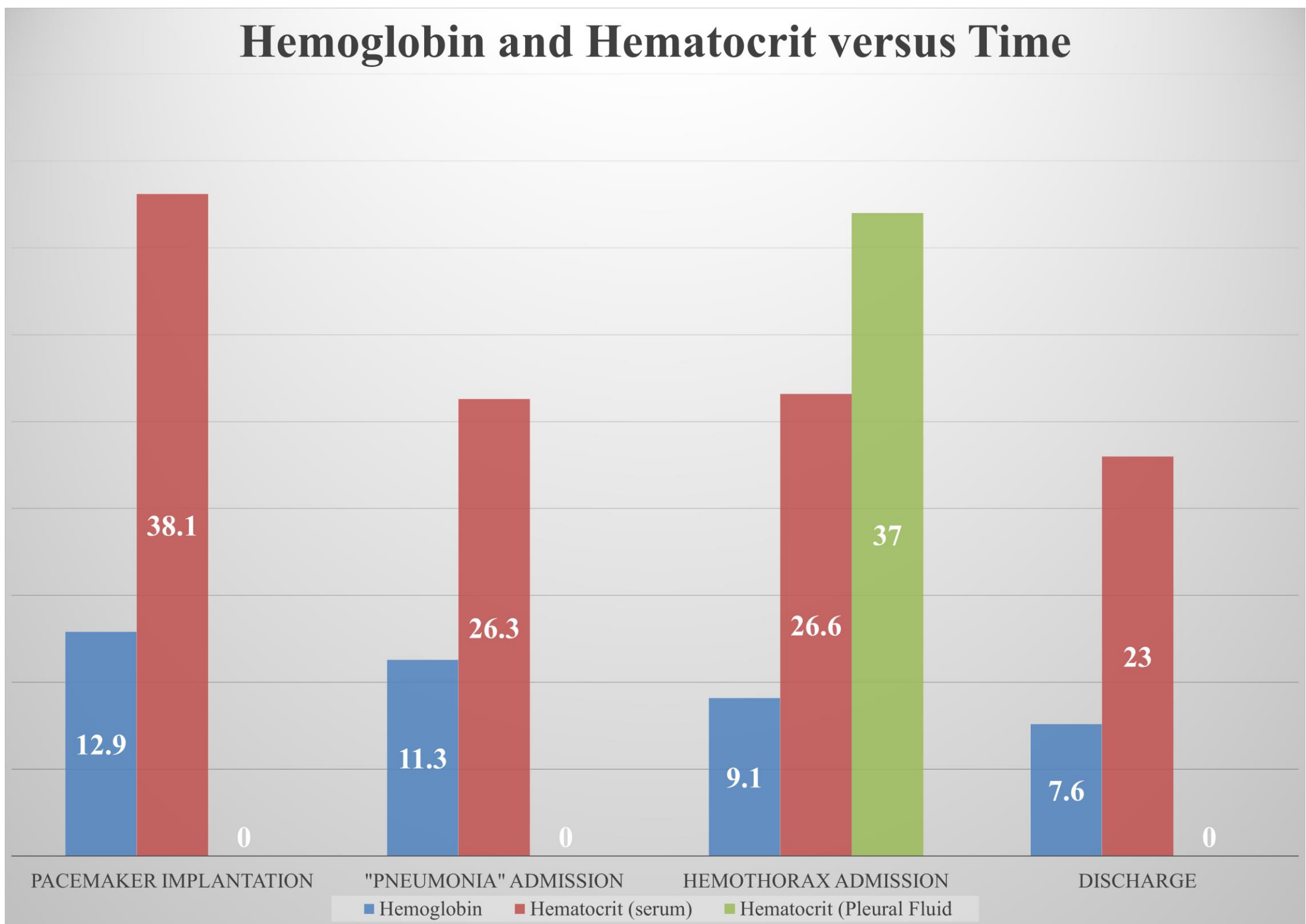


Figure 3: CT chest with contrast
CT chest demonstrates normal contours of the heart without pericardial effusion. The dual-lead pacemaker's right ventricular lead (Arrow) extends beyond the right ventricle into the pericardial space, where a moderate amount of intermediate density fluid is noted consistent with pericardial effusion.

Laboratory Data



Discussion

- Complications of pacemaker implantation may be characterized as either acute, subacute, or late/delayed.
 - Acute complications occur within 24 hours, (often intraoperatively)
 - Subacute complications occur 24 hours to one month after implantation
 - Delayed complications occur greater than one month after implantation⁵
- Risk factors predictive of a higher perforation risk include;⁵
 - Advanced age
 - Female sex
 - Increased lead stiffness and caliber size
- Ventricular perforation as a complication of pacemaker lead placement migration requires a high index of suspicion since the clinical, radiographic, and electrophysiologic manifestations may be subtle or completely absent.³
- Management involves repositioning leads if functional or extraction of malfunctioning leads via percutaneous venous or open chest lead extraction (Figure 4).

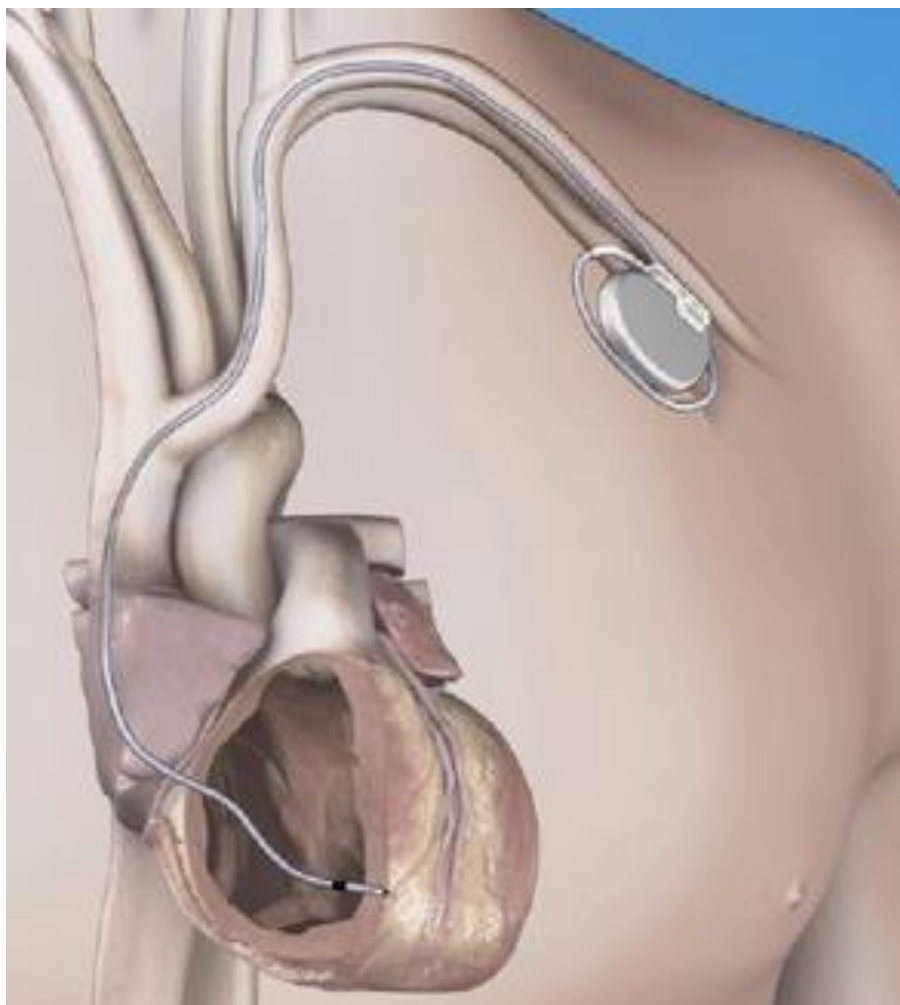


Figure 4: Medtronic pacemaker

- Drainage of pericardial effusion is generally limited to those with tamponade physiology.

Pearls

- Lead migration is a potentially life-threatening phenomenon.
- It may present along a clinical continuum, either with profound hemodynamic instability on one extreme, or asymptomatic pacemaker malfunction. Hemothorax is a rare complication.
- Chest tomography, pacemaker interrogation for change in impedance or pacing parameters, echocardiogram, and thoracentesis may be necessary to confirm the diagnosis.

References

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