



Südame raudvara

Hendrik Vaaks // Rad2 // 2023

Tänane masterplaan

Klapiproteesid/annuloplastika ja angioplastika

Elektrilised kardiosstimulaatorid

Vereringet toetavad seadeldised

Kodadega seotud seadeldised

Harvaesinevad lahendused

Klapiproteesid/annuloplastika

Kardiokirurgilised (bio- / mehaanilised proteesid)

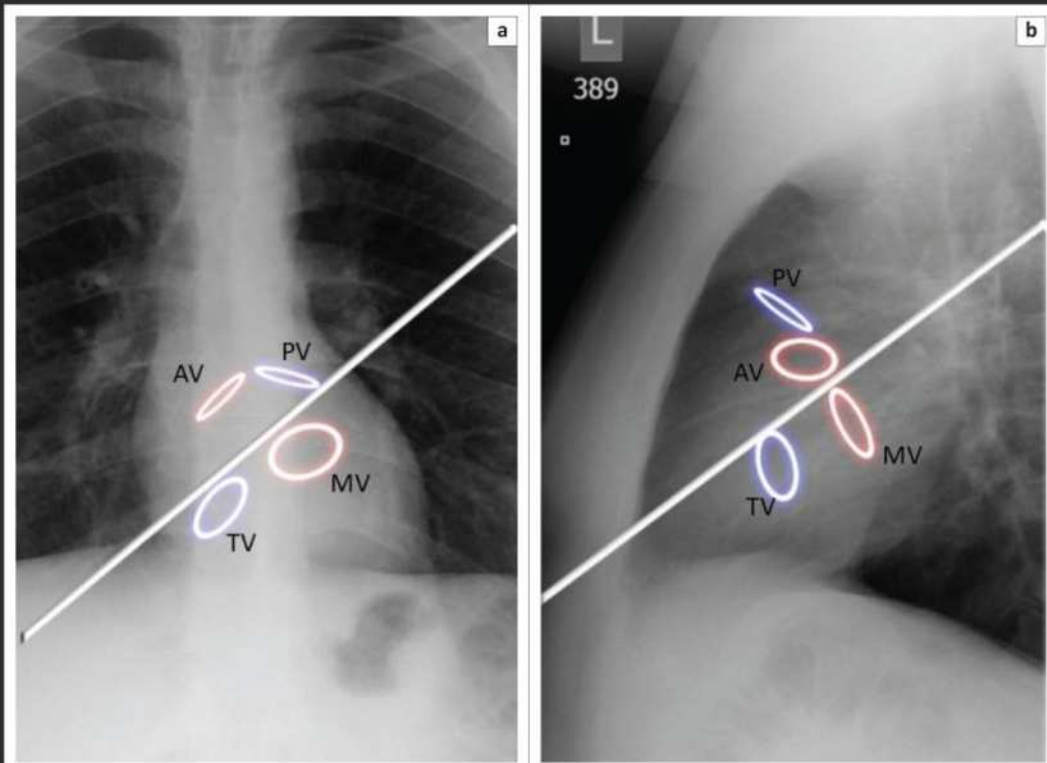
Kateetrikaudsed interventsioonid klappidel (MRT+ 1,5/3T)

TAVI

MitraClip

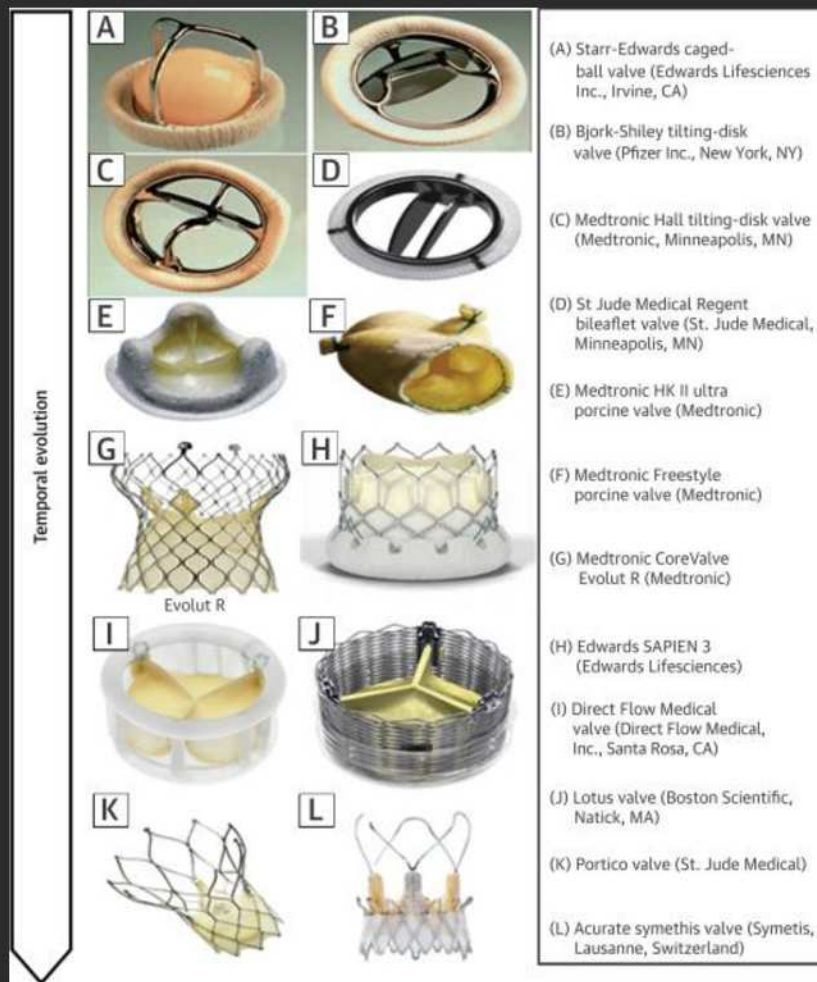
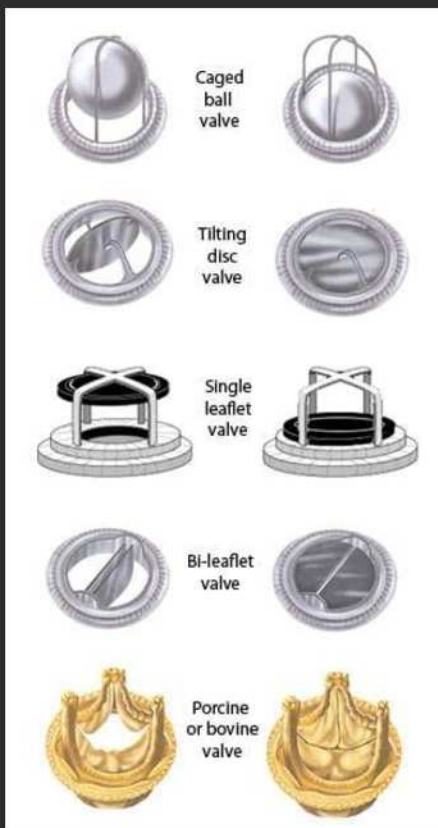
Annuloplastika (tugirõngad)

CABG ja PKI (LM, LAD, Cx, RCA + proksimaalne / distaalne)



Source: Reproduced with permission: Cressman S, Rheinboldt M, Klochko C, Nadig J, Spitzarmy D. Chest radiographic appearance of minimally invasive cardiac implants and support devices: What the radiologist needs to know. *Curr Probl Diagn Radiol.* 2019;48(3):274–288. <https://doi.org/10.1067/j.cpradiol.2018.05.006>

PV, pulmonary valve; AV, aortic valve; MV, mitral valve; and TV tricuspid valve.

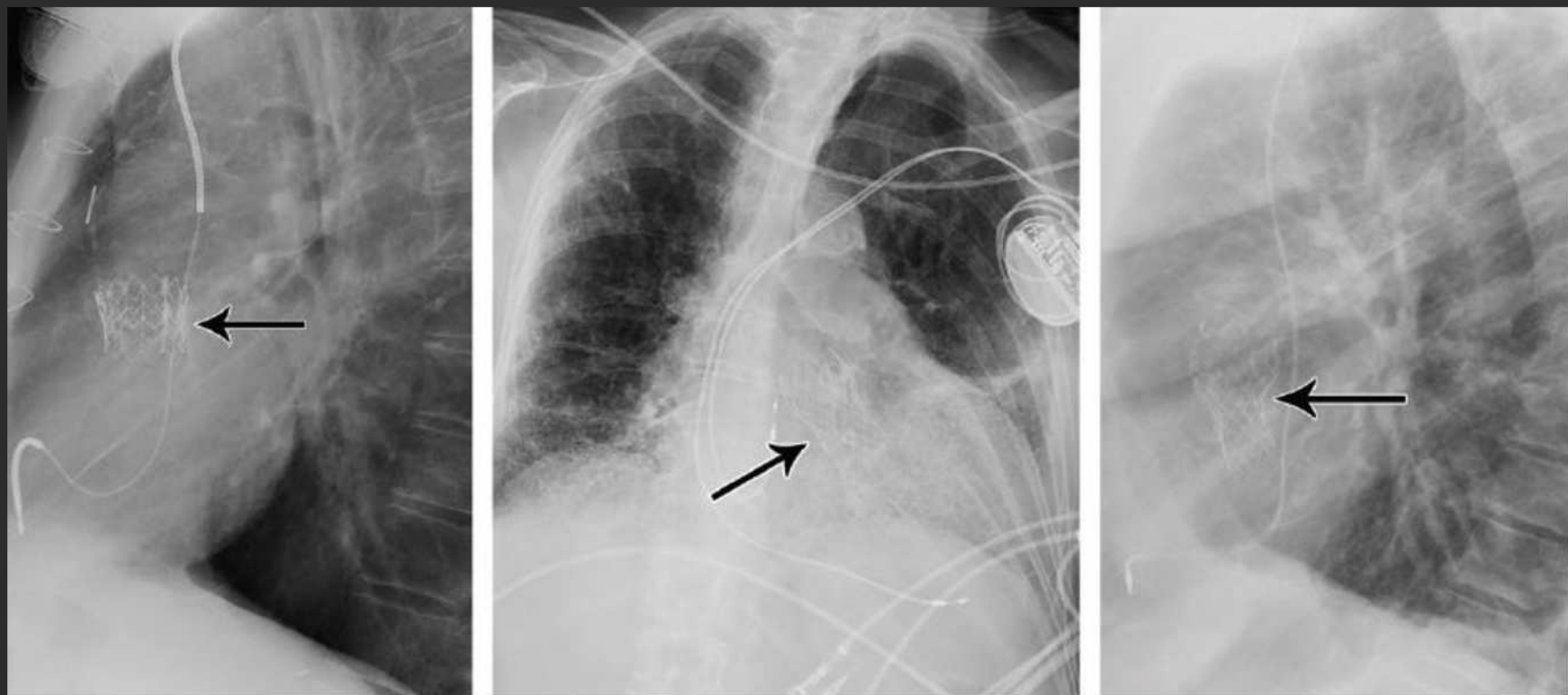




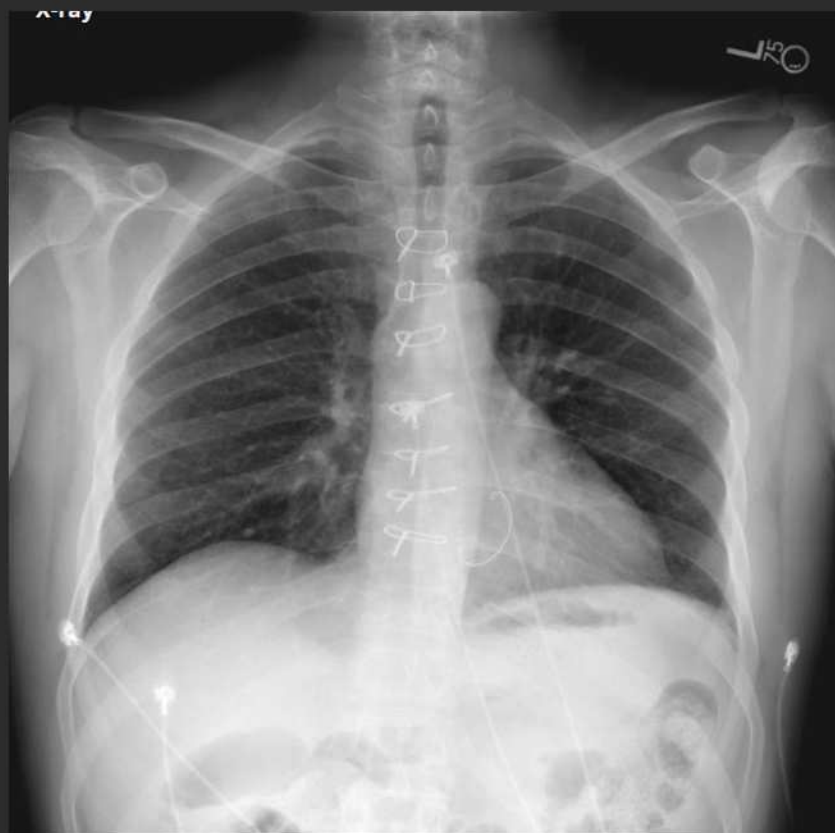
Disk- ja kuulprotees



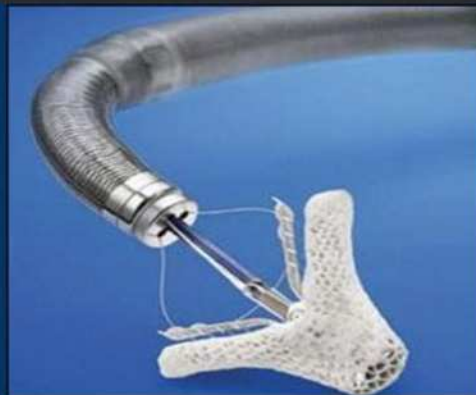
Kardiokirurgiline vs TAVI



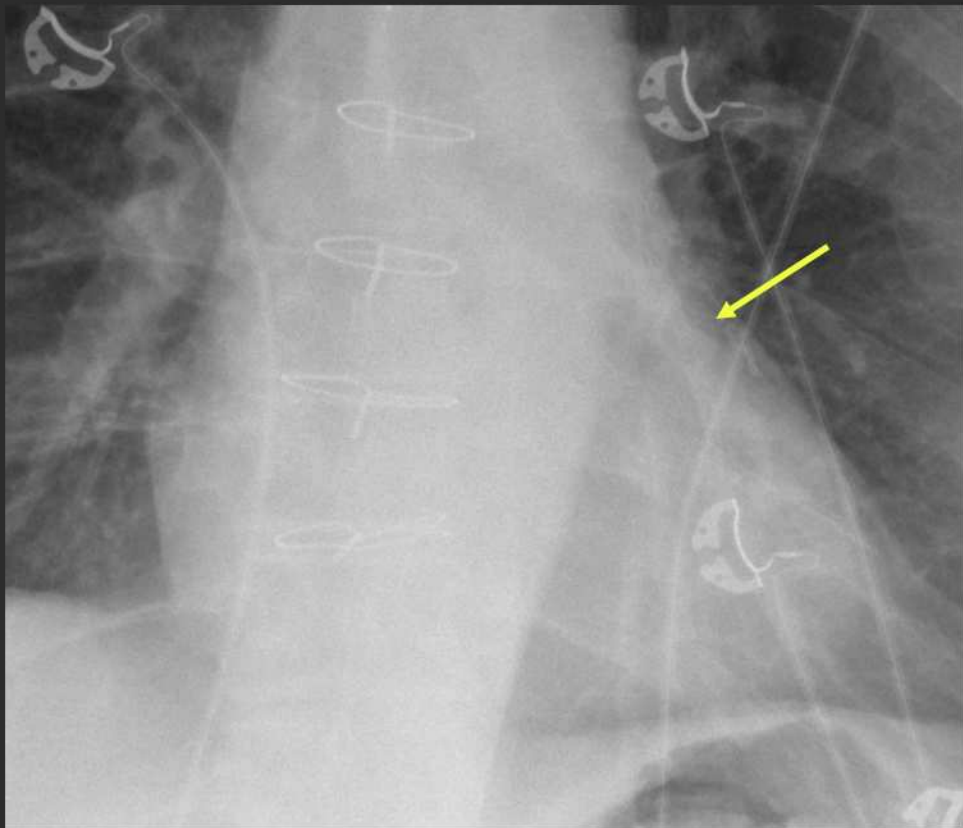
TAVI



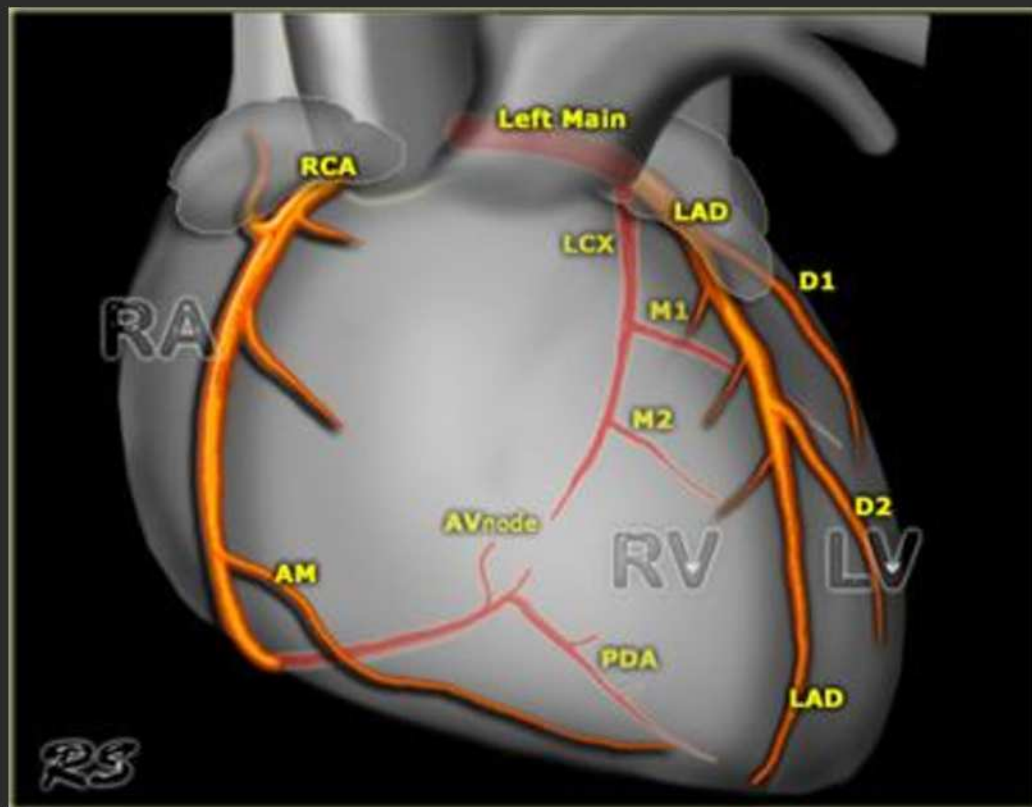
Annuloplastika & MitraClip



MitraClip



CABG vs PKI



Koronaaranatoomia

Elektrilised kardistimulaatorid (MRT+*)

Ajutine kardistimulaator (v. jugularise / subclavia / femoralise kaudu)

Püsikardistimulaator

Ühekambrilised

Kahekambrilised

CRT - cardiac resynchronising therapy ehk biventrikulaarne stimulatsioon

ICD - implantable cardiac defibrillator ehk automaatne defibrillaator

Epikardiaalsed elektroodid

Tüsistused

Varased

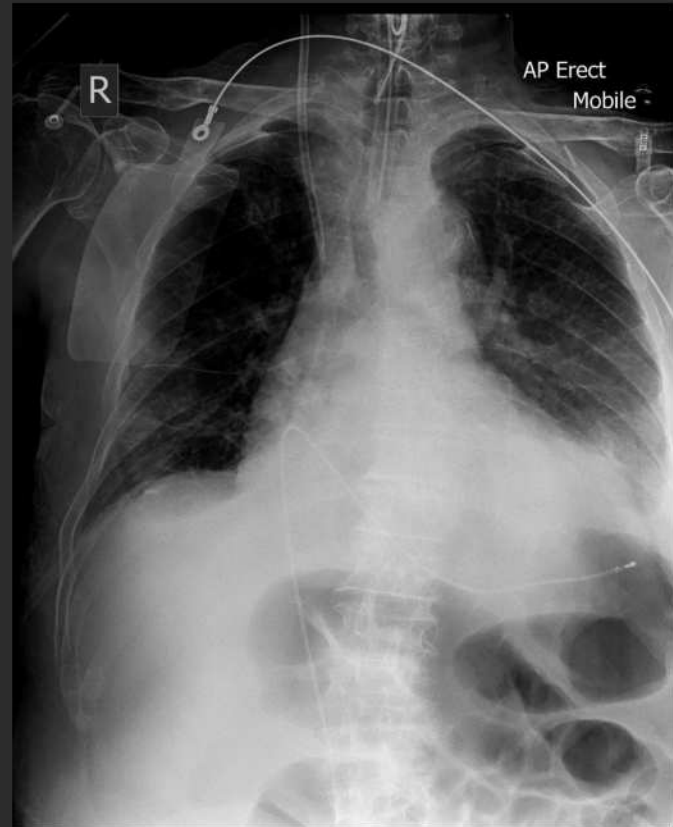
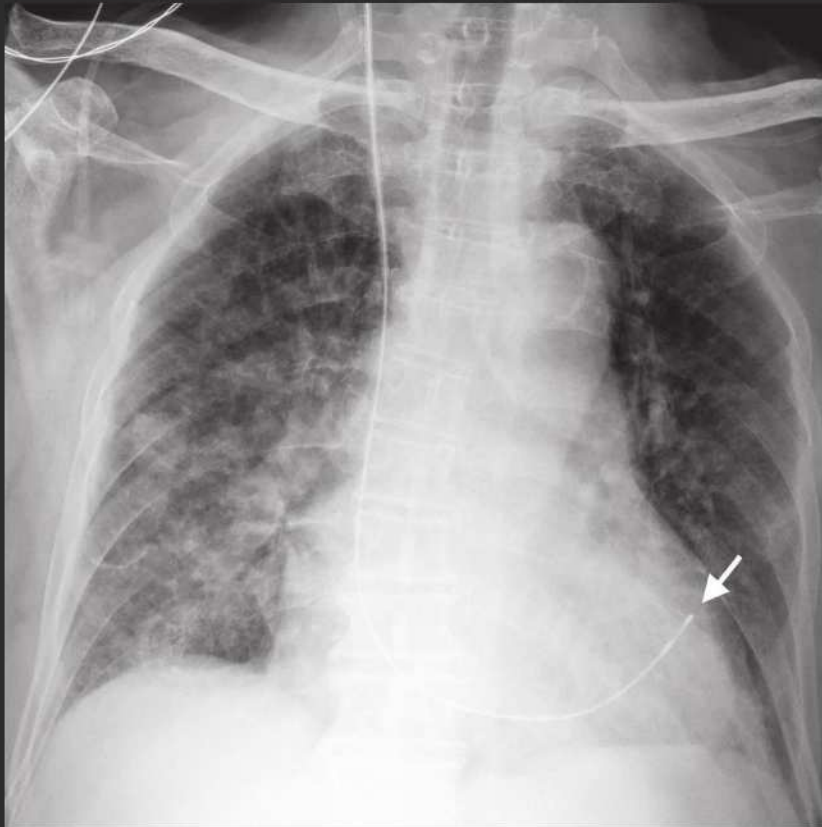
Pneumo-/ hemotooraks, õhkembol, anafülaksia

Varased/hilised

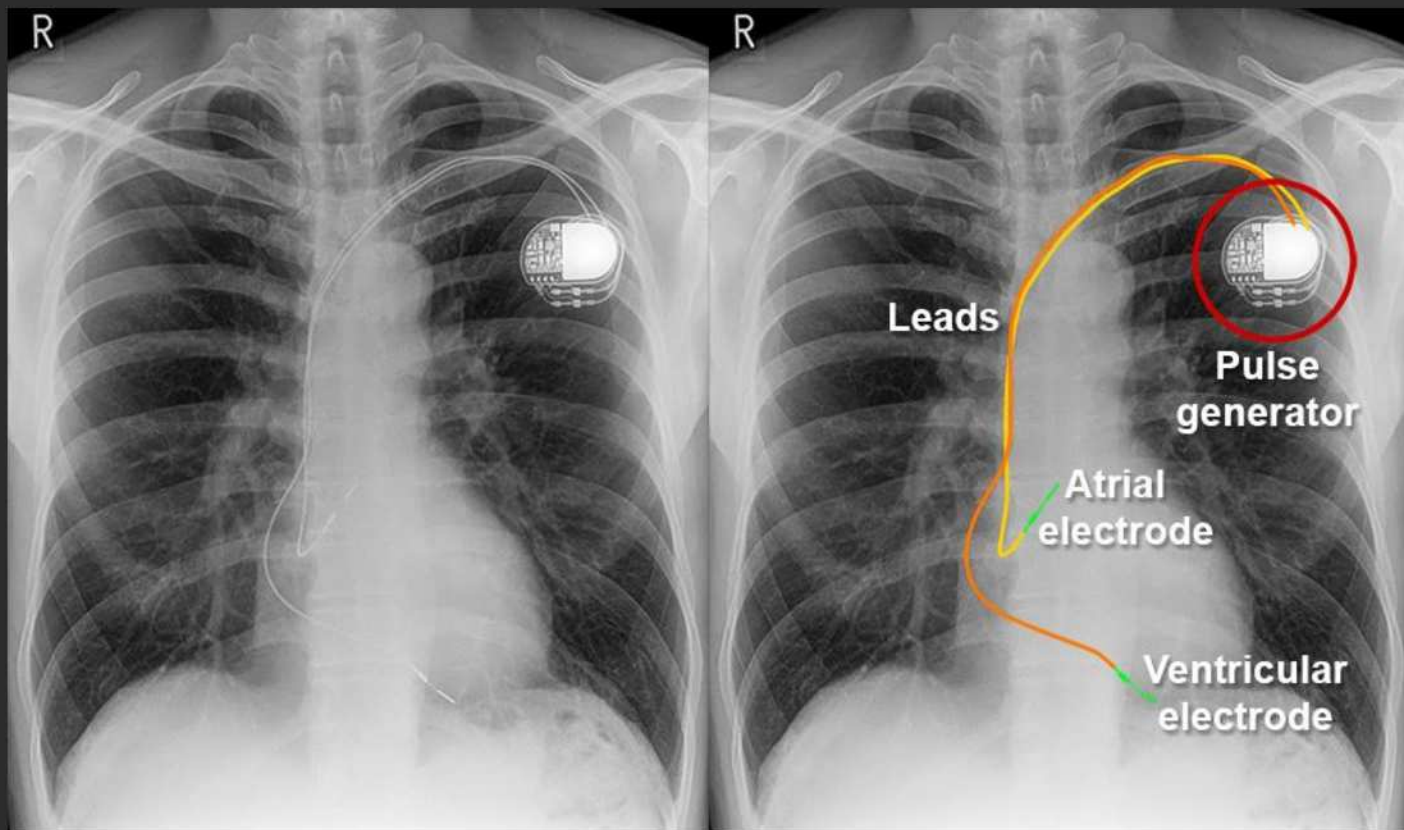
Hematoom, tromboflebiit, infektsioon, müokardi perforatsioon, elektroodi nihkumine, Twiddler's syndrome

Hilised

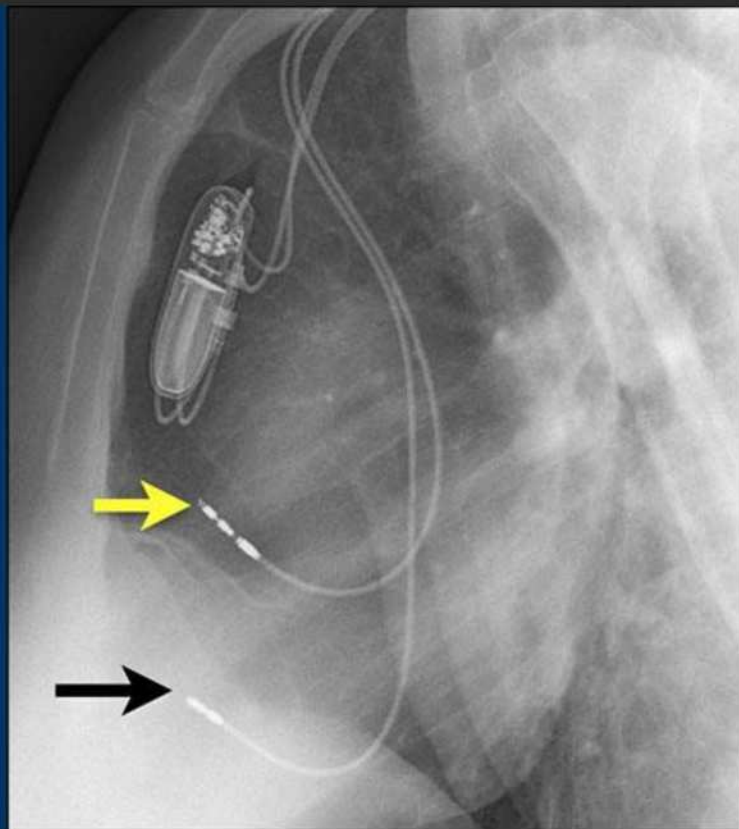
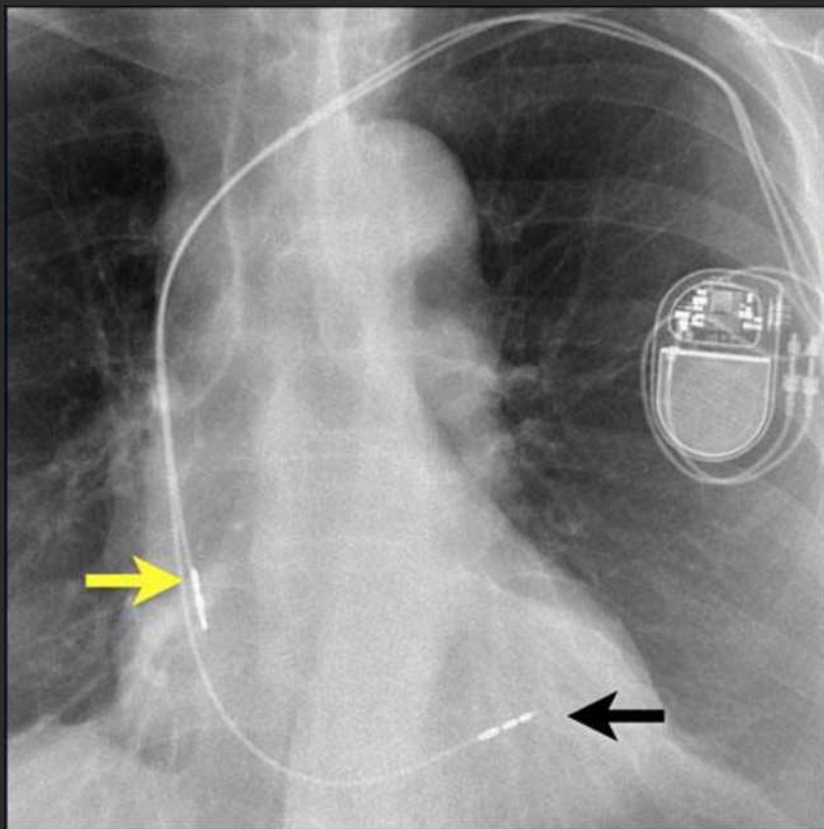
Tasku erosioon, AV-fistel, subclavian crush sündroom, kaabli murdumine, tromboos, endokardiit



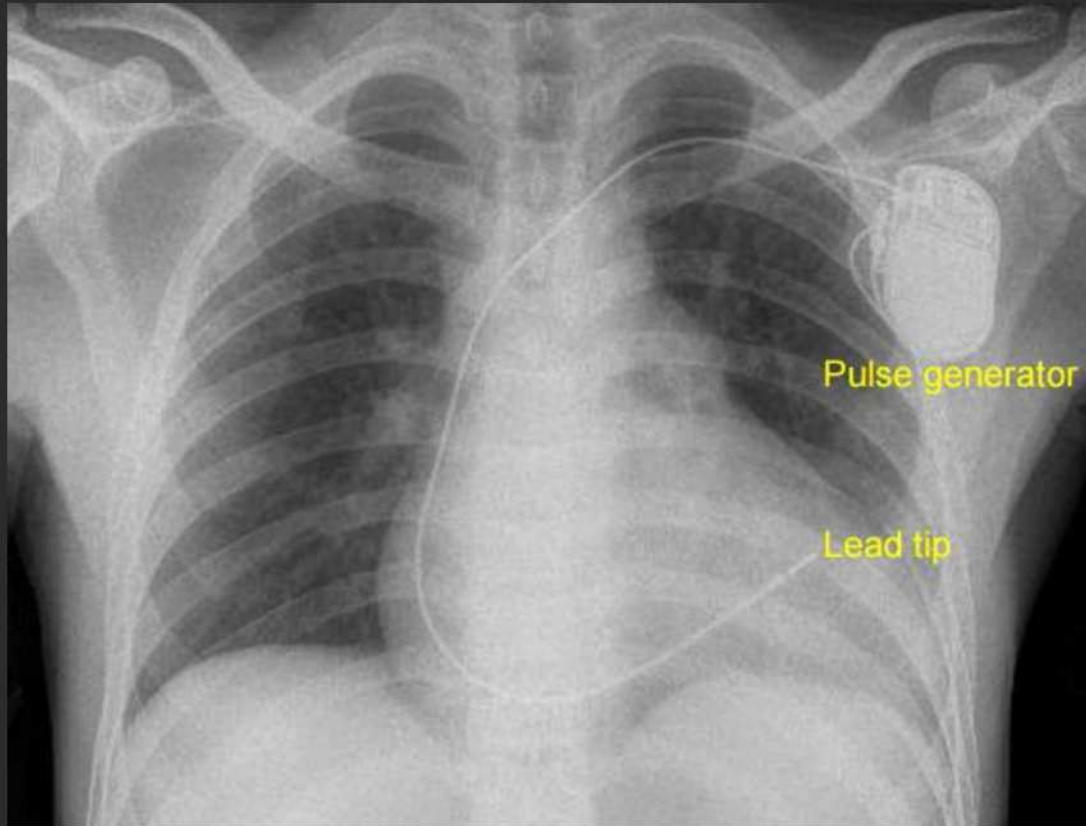
Ajutine kardistimulaator



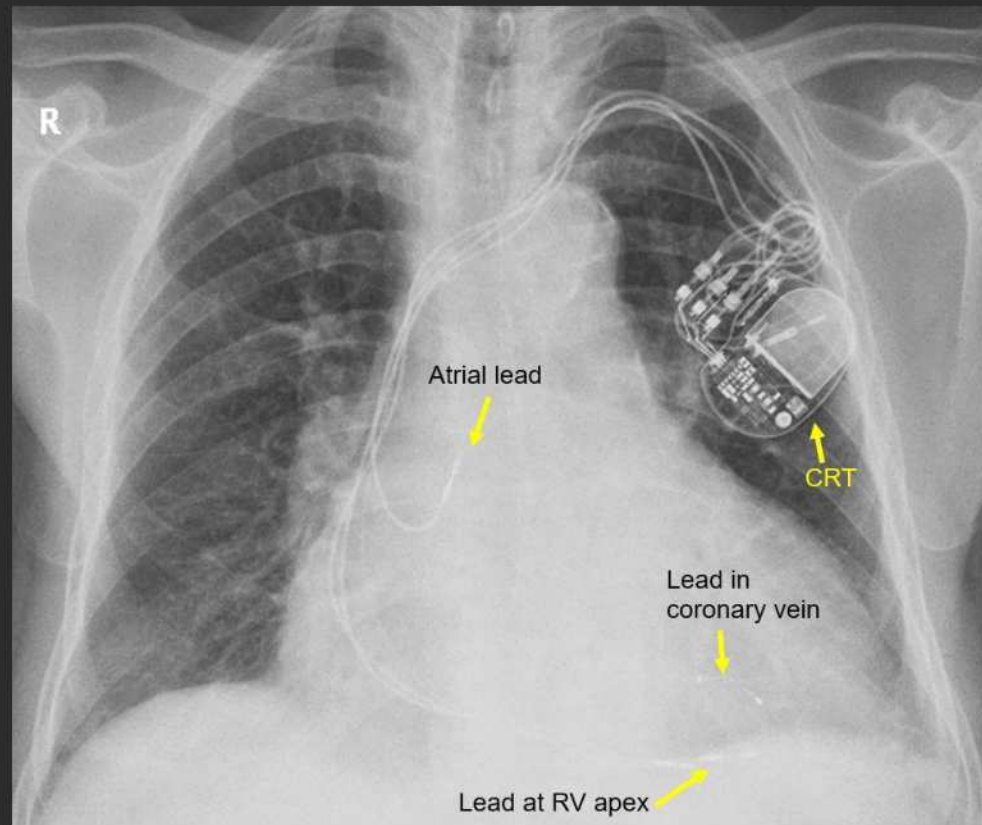
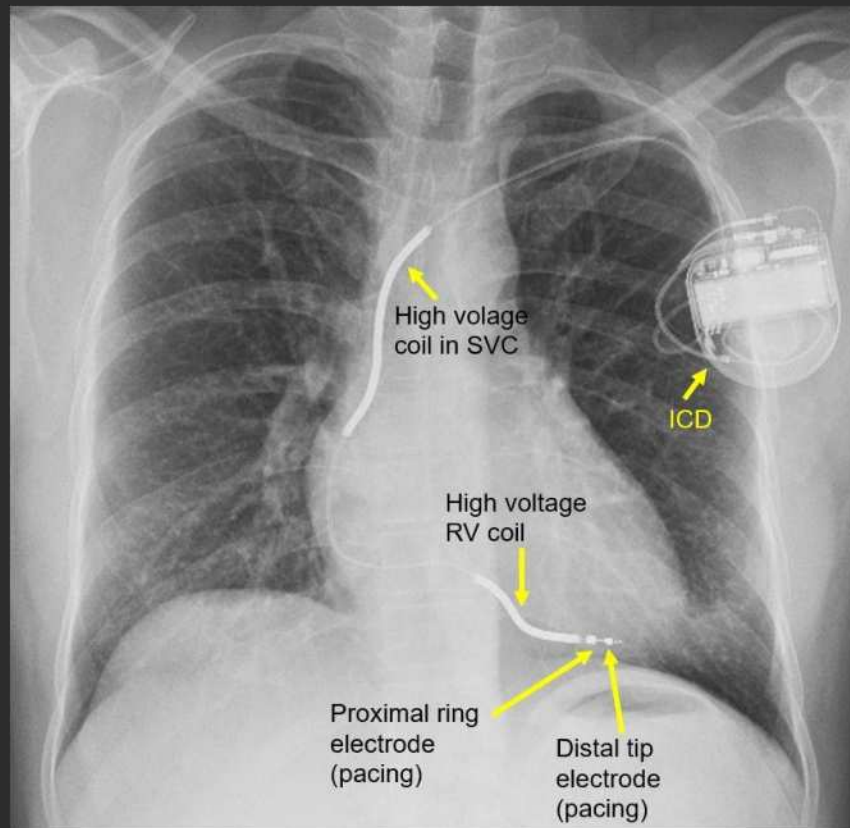
Kahekambriline EKS. Vatsakese elektrood apikaalsel.



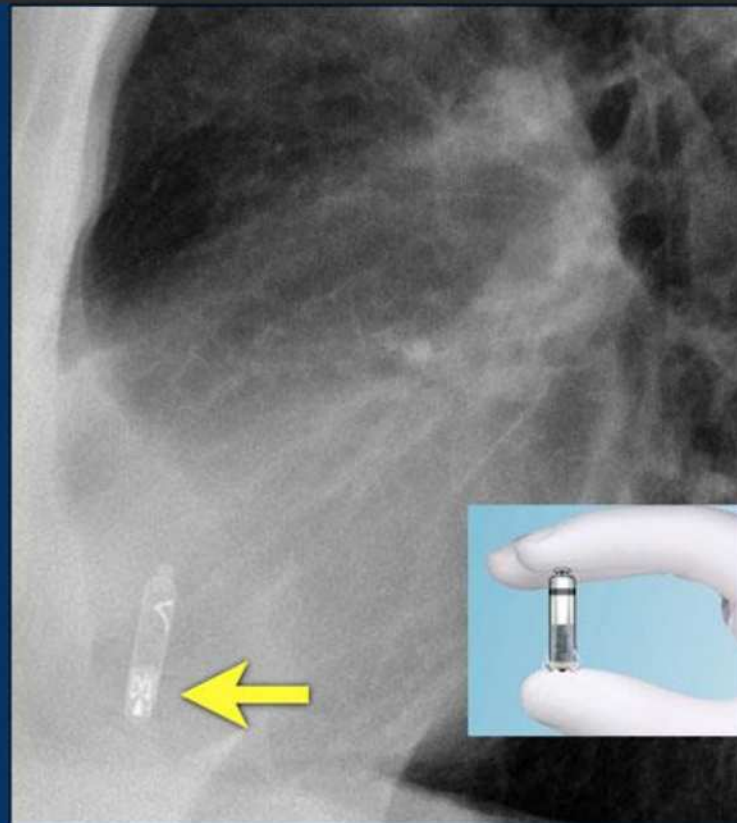
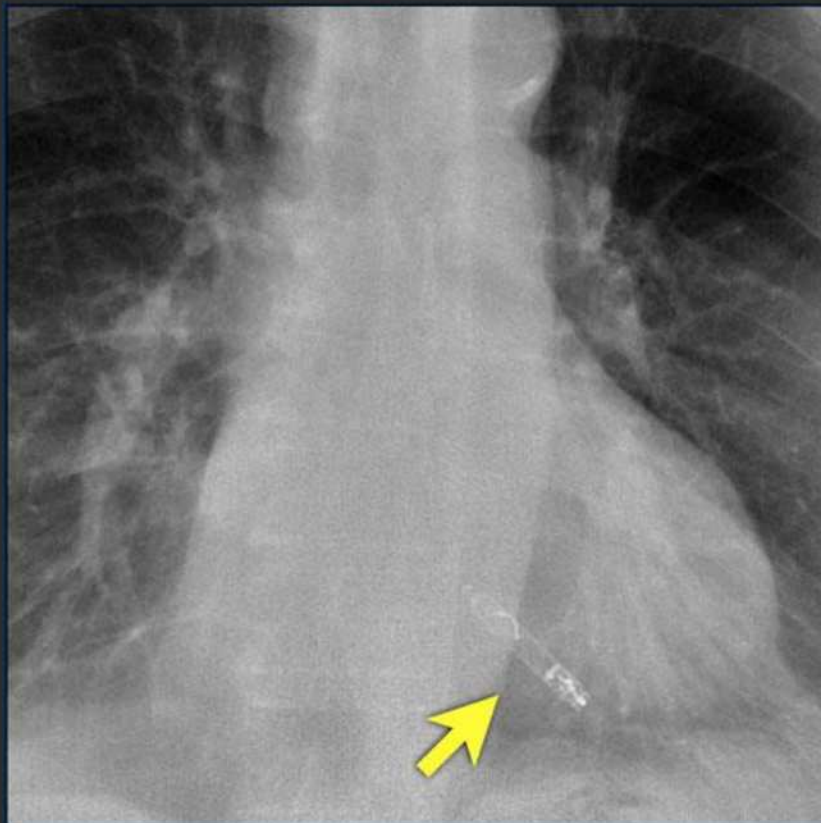
Kahekambriline EKS



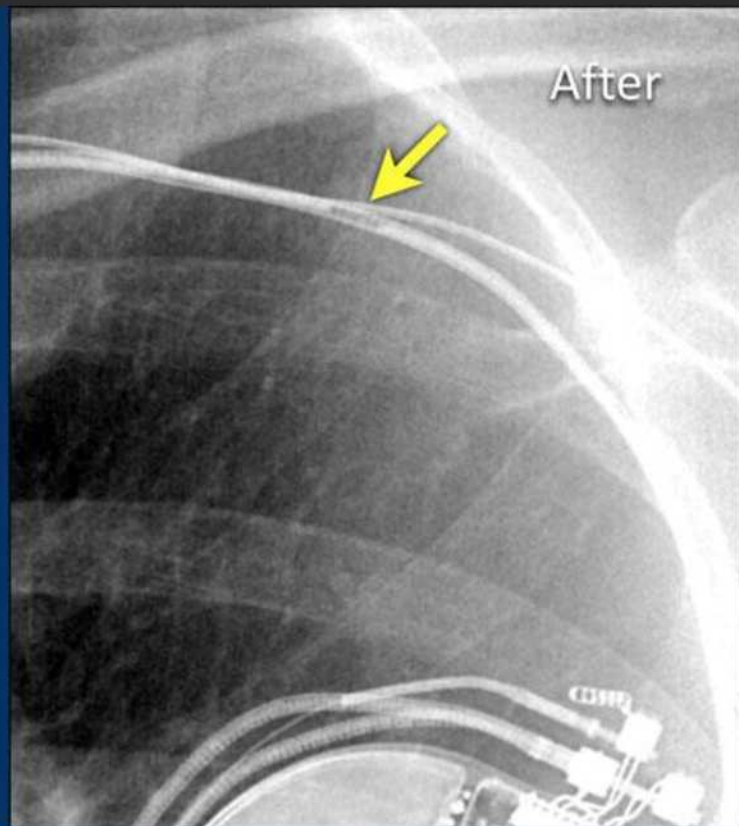
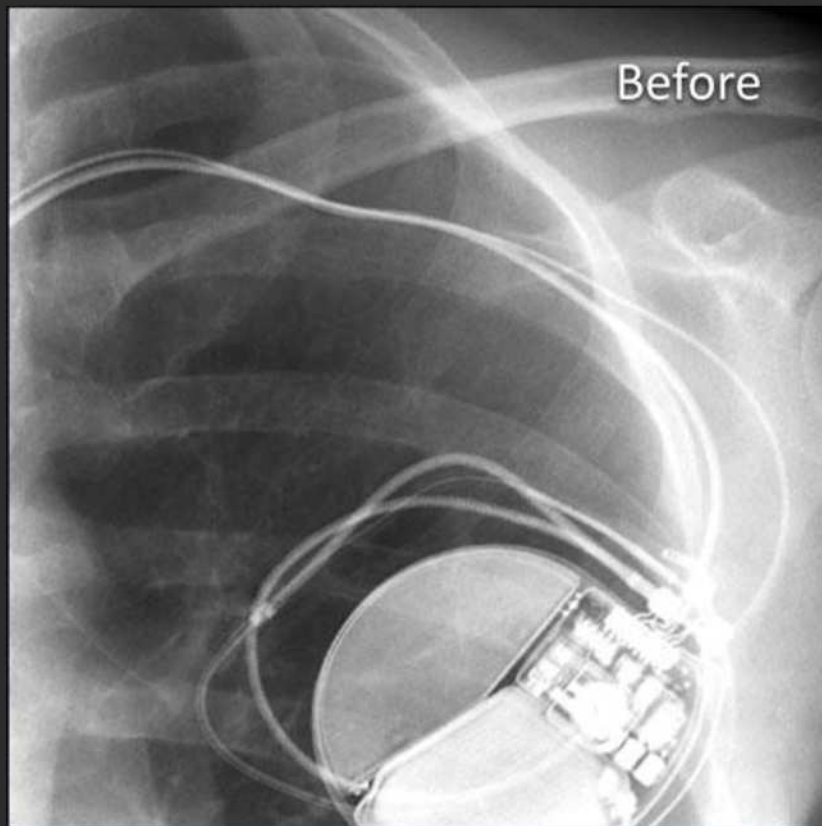
Ühekambriline EKS. Vatsakese elektrood septaalsel.



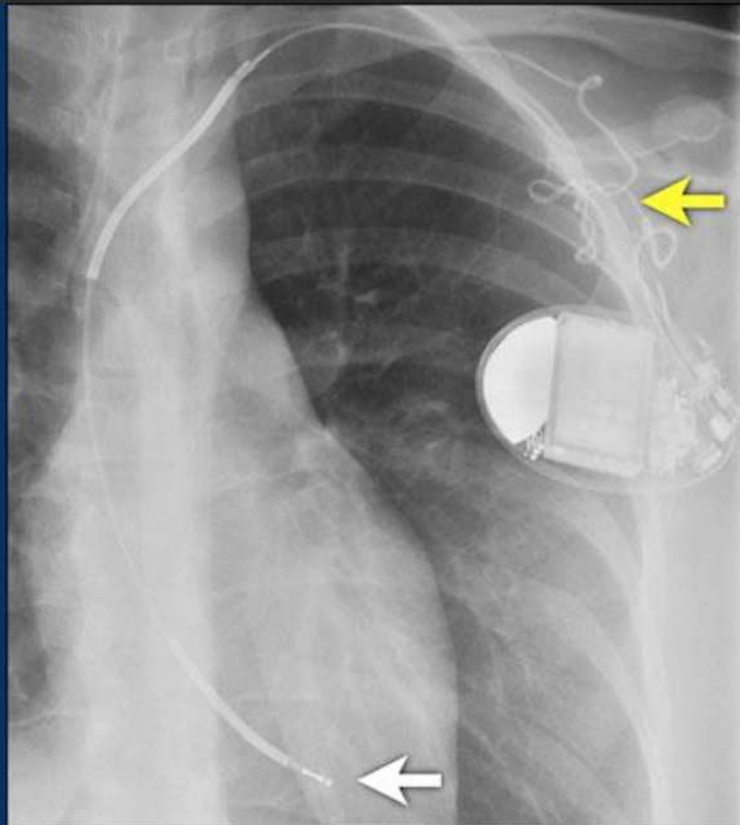
EKS ICD & CRT



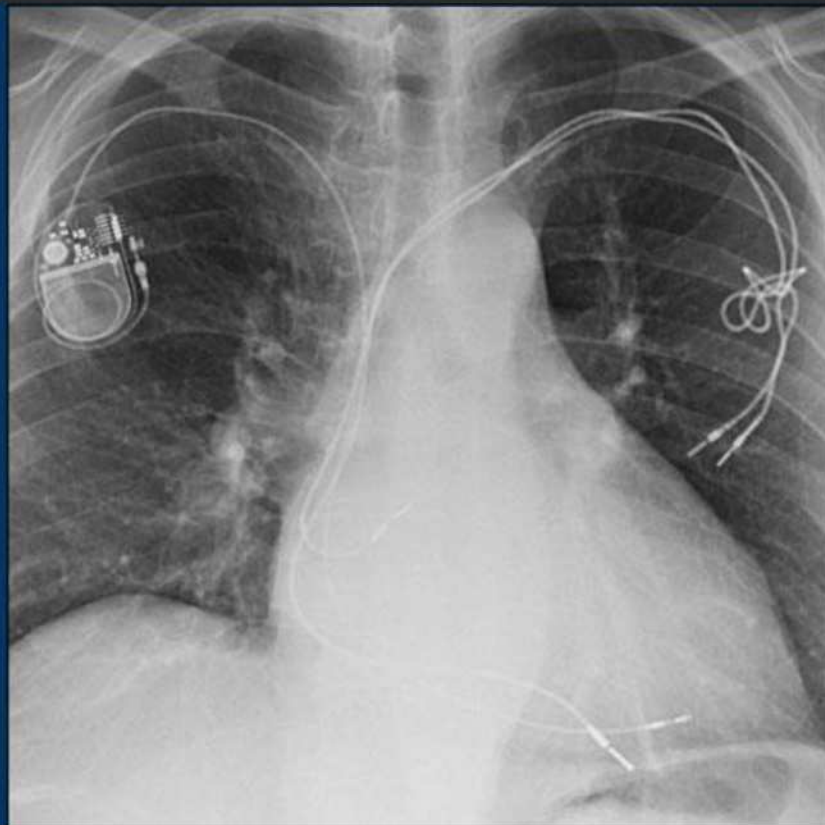
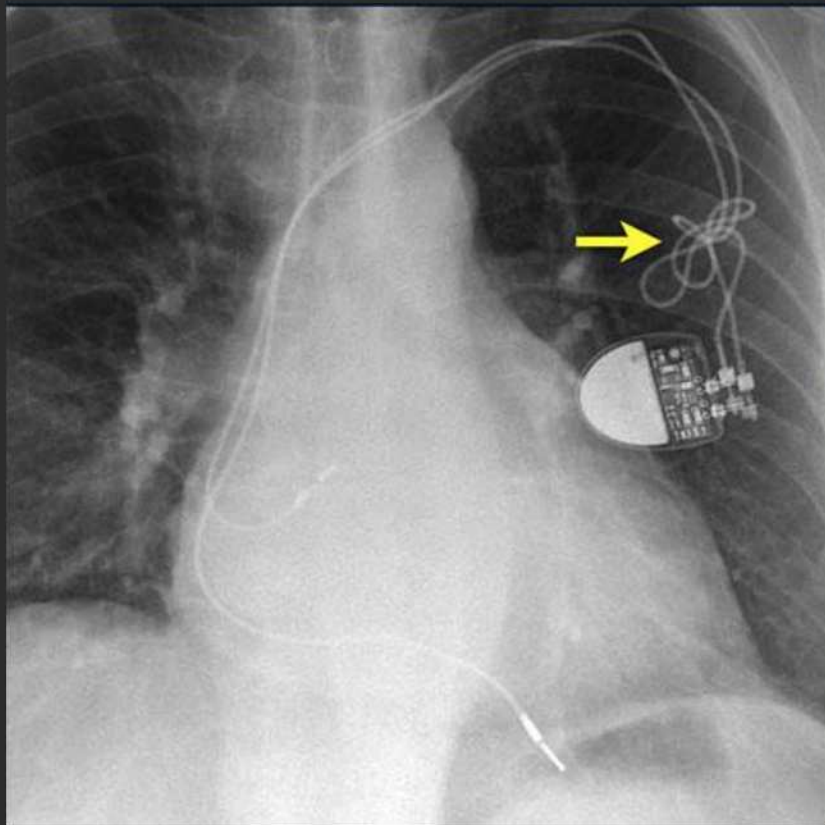
Kaablivaba EKS (Micra device)



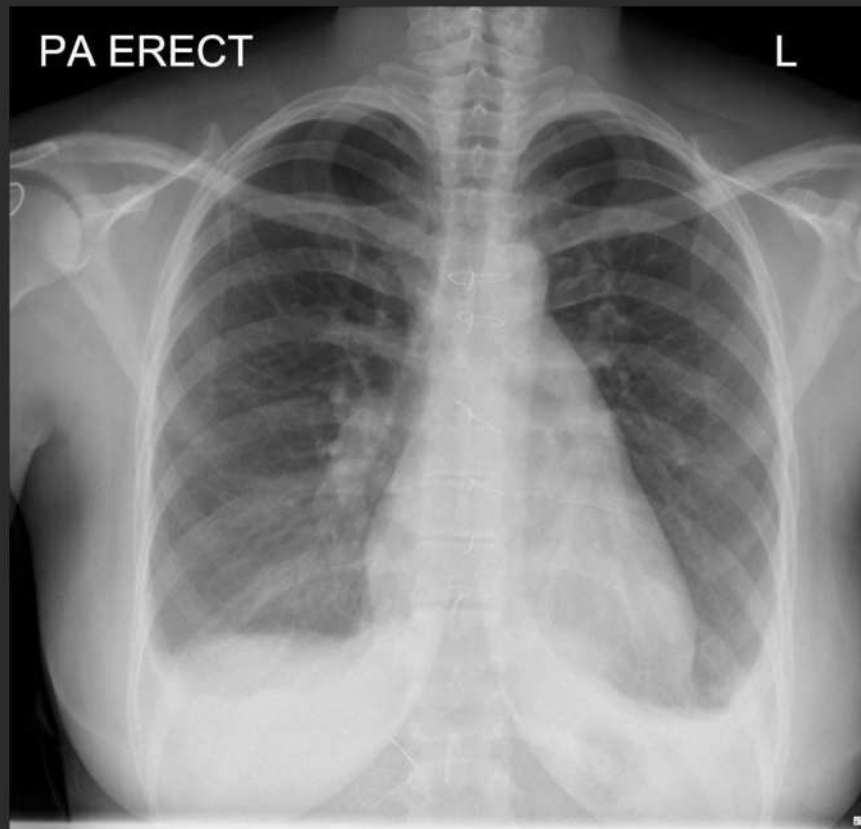
Kaabli murdumine



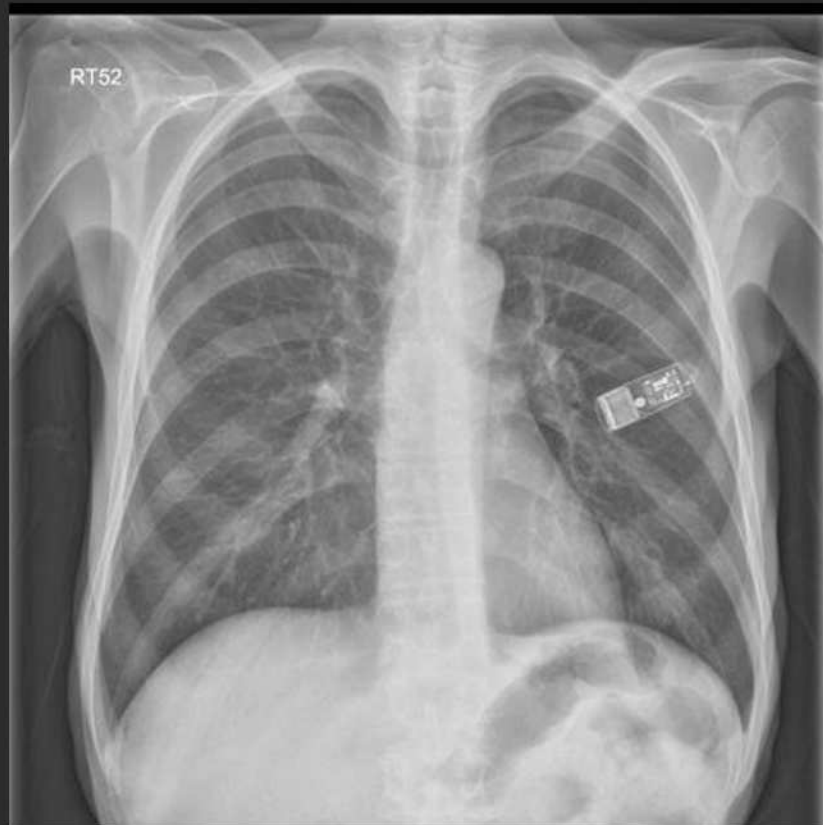
Twiddler's syndrome



Twiddler's syndrome



Epikardiaalsed elektroodid



Loop-recorder (diagnostiline aparaat, ei stimuleeri)

EKS ja MRT (programmeeritavus)

Position I	Position II	Position III	Position IV	Position V
Chamber(s)Paced	Chamber(s)Sensed	Response to Sensing	Rate Modulation	Multisite Pacing
O = None	O = None	O = None	O = None	O = None
A = Atrium	A = Atrium	T = Triggered	R = Rate Modulation	A = Atrium
V = ventricle	V = ventricle	I = Inhibited		V = ventricle
D = Dual (A+V)	D = Dual (A+V)	D = Dual (T+I)		D = Dual (A+V)

EKS ja MRT probleemkohad I

Nihkumine - ferromagneetilisi komponente minimaalselt ja ei oma efekti

Voolu genereerimine kaablis - sense kaabli mõjutused

Aparaadi reprogrammeerimine

- Reed switch (asünkroonne pace + ICD antitahhüarütmia väljas)

- Võib uuringu ajal ise end tagasi lülitada + proarütmilise R-on-T oht

- Power-on reset (EKS lülitub nõ toimepidevust säilitavale VVI režiimile)

Soojenemine - omab vaid tagasihoidlikku/ajutist mõju kaabli vooluparameetritele

EKS ja MRT probleemkohad II

MRT uuring < 6 (-12) nädalat peale paigaldust - olulisi kõrvalekaldeid pole leitud

Hüljatud kaablid - pigem ei oma kliinilist mõju, kuid kogemusi vähe

Olulist kliinilist mõju pole täheldatud ka korduvate uuringute vähendamisel või SAR parameetri piiramisel.

Stimulaatorsõltuvad patsiendid

ELEKTROFÜSIOLOOGI KONSULTATSIOON ENNE JA PEALE UURINGUT

Vereringet toetavad aparaadid (MRT-)

Intraaortaalne kontrapulsaator (IABP)

Ajutised vatsakest abistavad seadmed (nn Impella)

Vasakut vatsakest abistav seade (LVAD)

Biventrikulaarsed abistavad seadmed

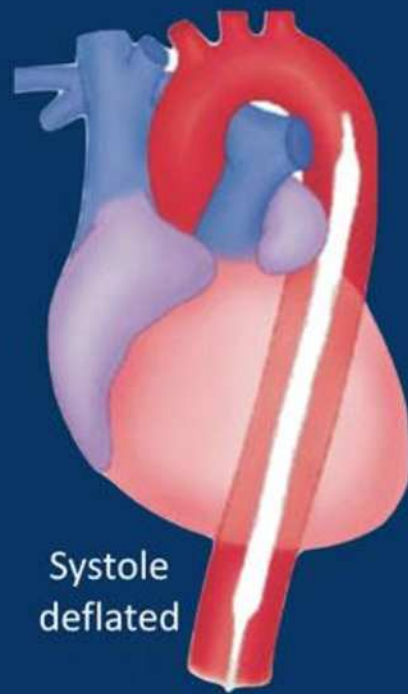
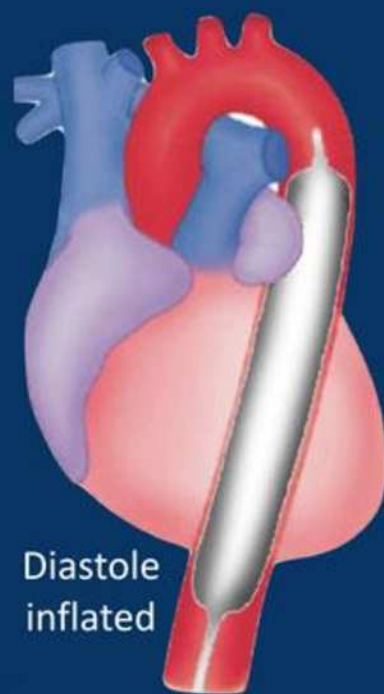
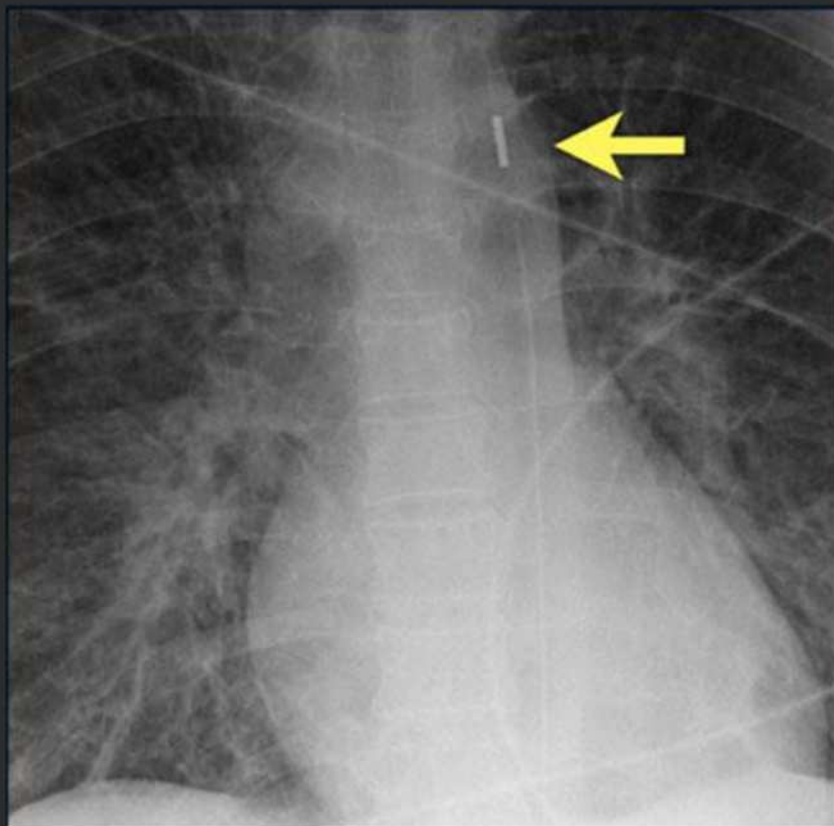
Tüsistused

IABP / Impella

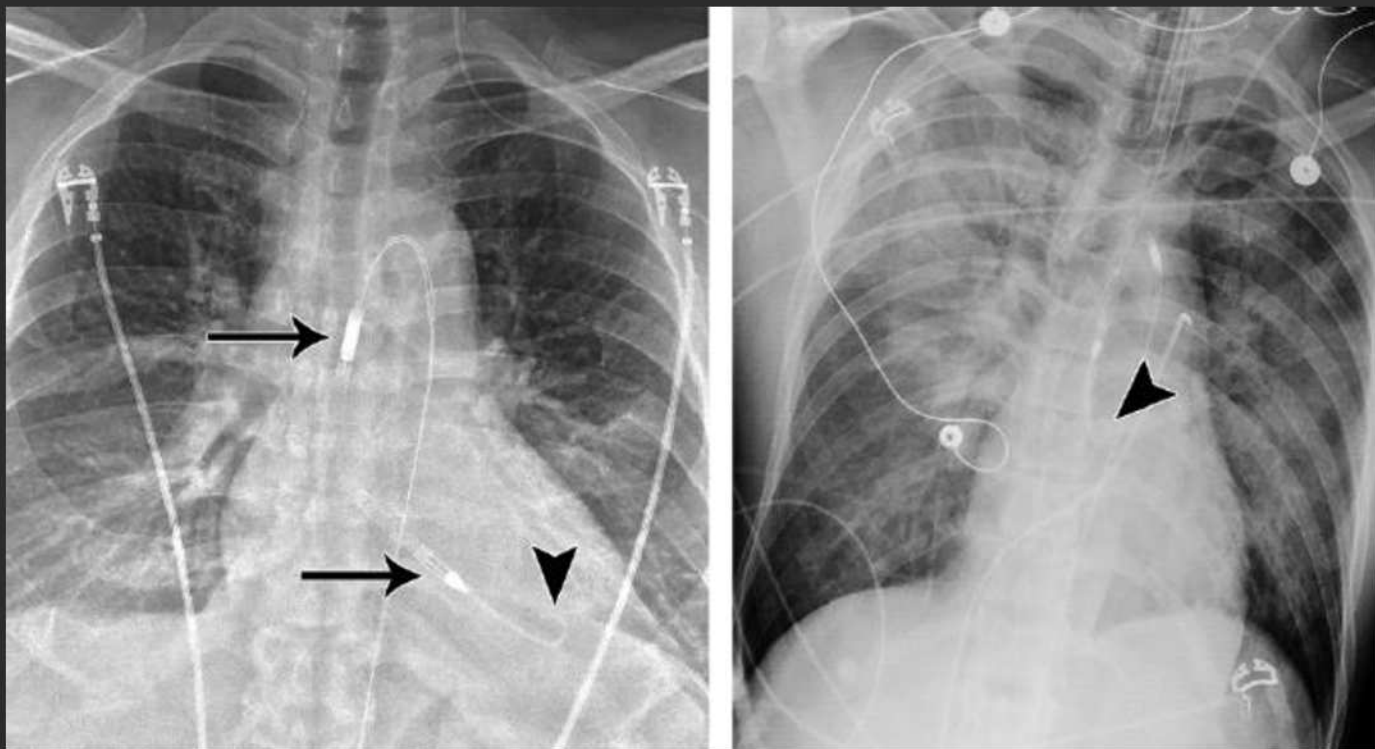
Arütmiaid, vatsakese perforatsioon, aordiklapi /-seina vigastus, kateeri purunemine

LVAD

Tromboos/emboolia, hemorraagia, parema vatsakese puudulikkus, südamerütmi häired, elundipuudulikkus, toitekaabli infektsioon/purunemine



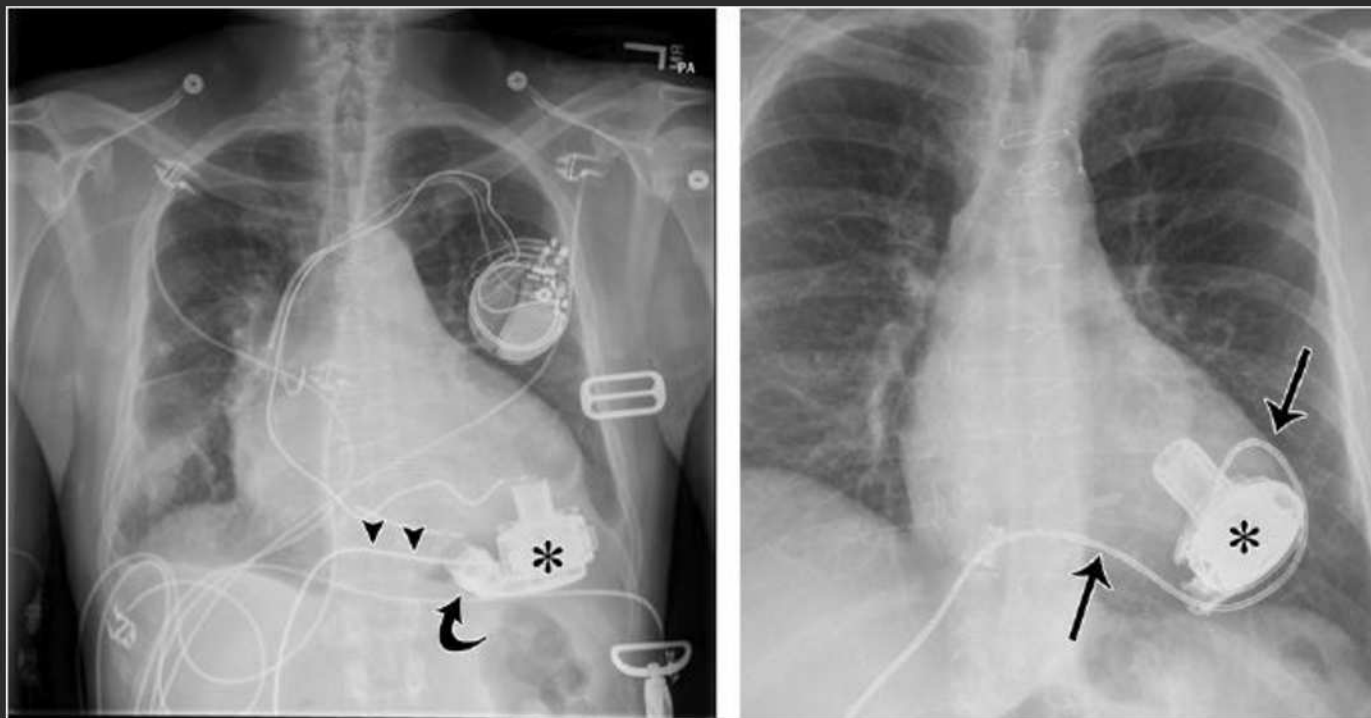
IABP



Impella norm vs nihkunud



HeartMate II (normis sissevoolu kanüüli nurk impelleri suhtes >55 kraadi)



III põlvkonna LVAD aparaadid (HeartMate 3, HeartWare)

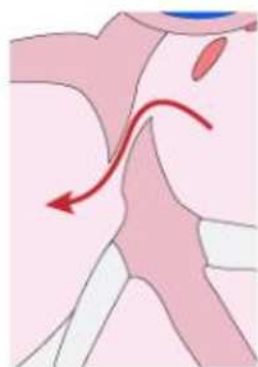
Kojaga seotud seadeldised (MRT+ 1,5/3T)

Kodade vaheseina oklusiooni seadeldis (levinum Amplatzer)

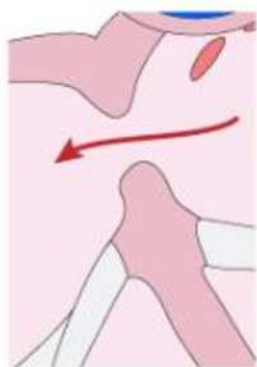
Vasaku koja kõrva sulgemise seade (nn Watchman)

Tüsistused

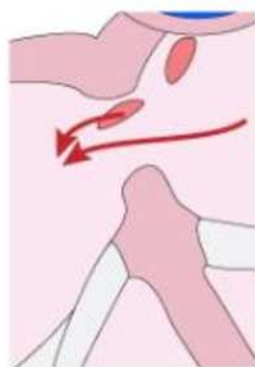
Malpositsioon, migratsioon



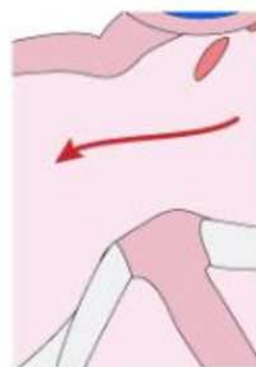
patent
foramen
ovalis (PFO)



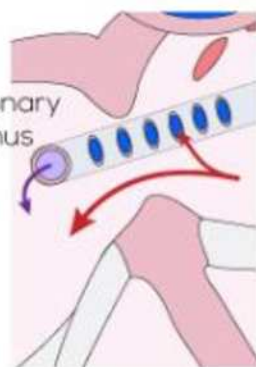
secundum



sinus venosus



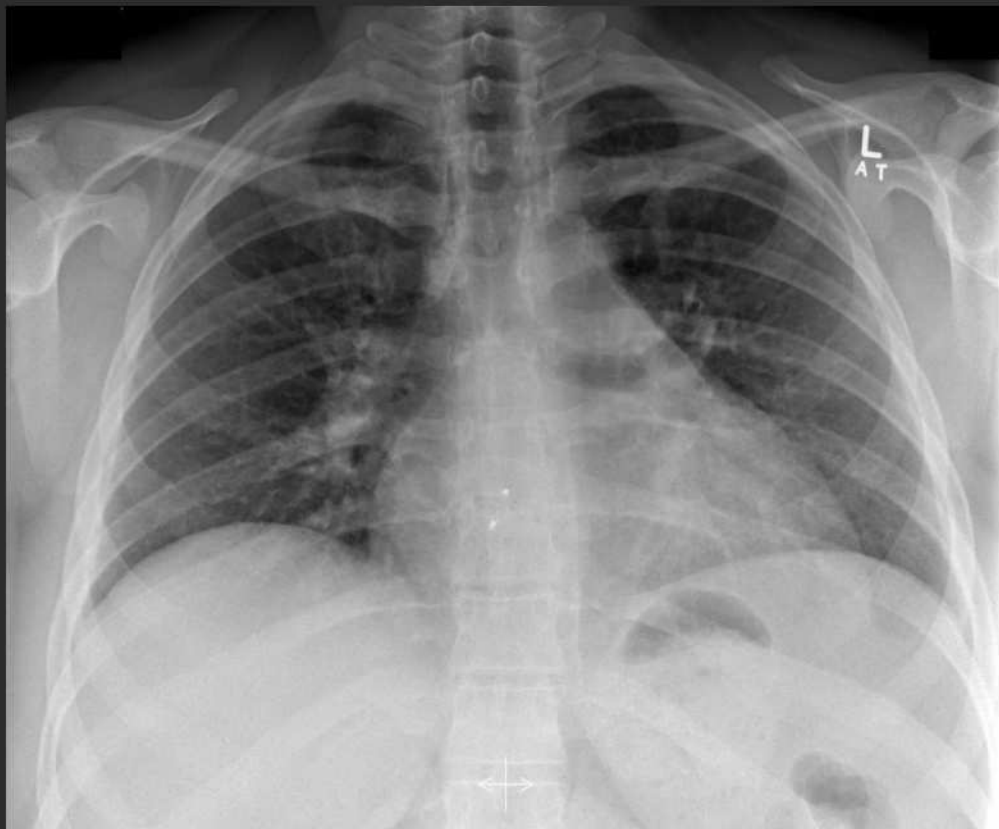
common atrium



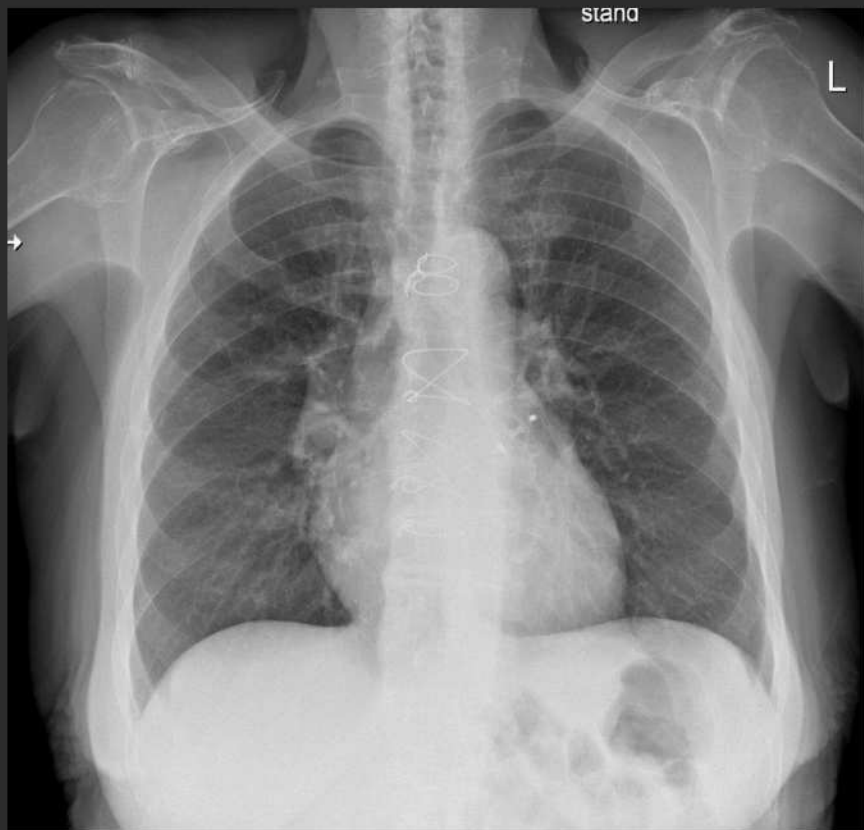
unroofed
coronary
sinus

ASD

Kodade vaheseina defektide tüübid



Amplatzer kodade vaheseina sulgemiseks



Vasaku koja kõrvakese sulgur



AtriClip (epikardiaalne vasaku koja kõrva sulgur)

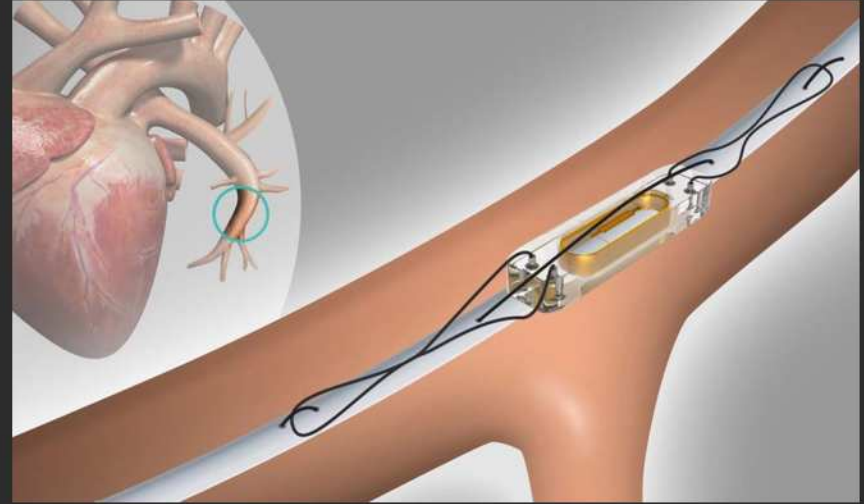
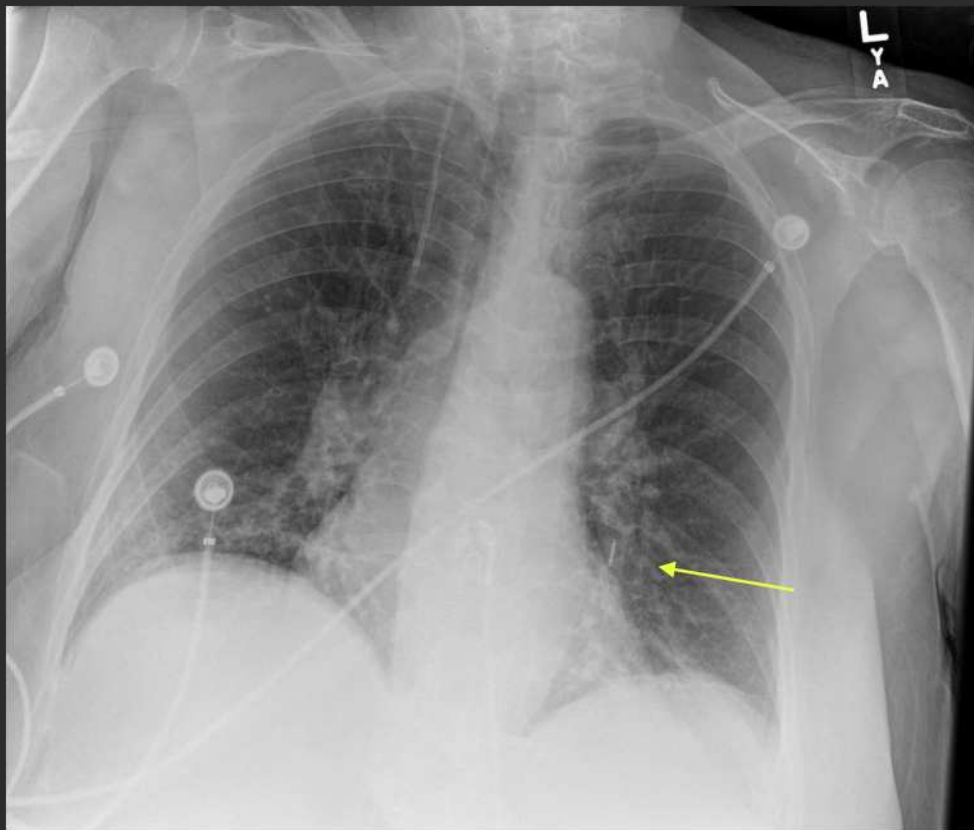
LISA - Harvaesinevad lahendused

Kopsuarteri rõhu monitooring (CardioMEMS)

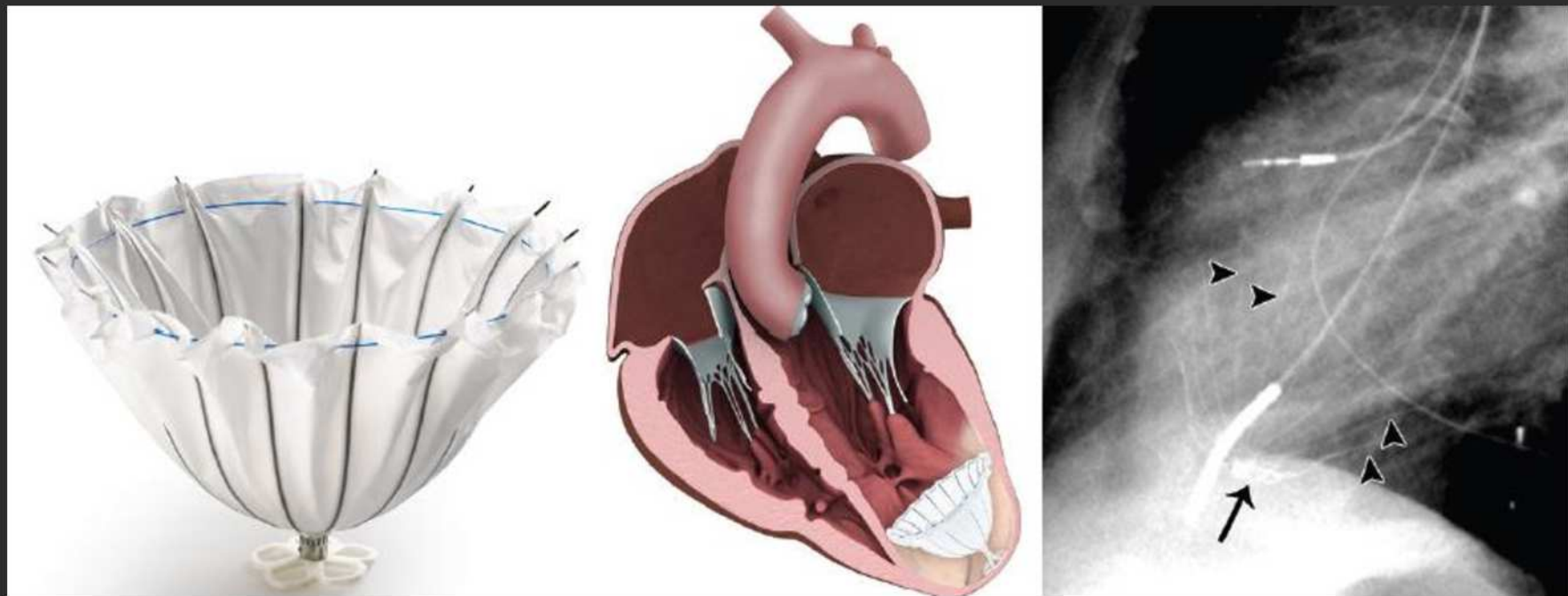
Parachute device

Epicardial patch

Cardiac restraint device



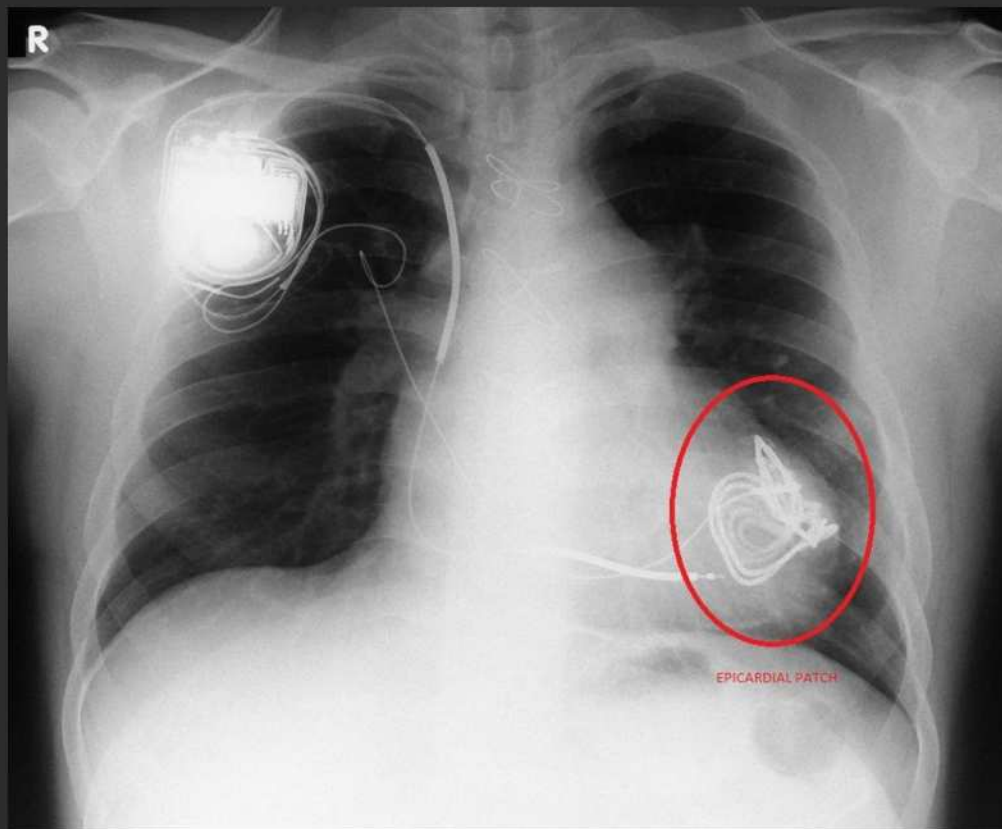
CardioMEMS



Parachute device



Parachute device



Epikardiaalne lapp

Tänan kuulamast!

Allikad

<https://pubs.rsna.org/doi/10.1148/rg.2018170096>

<https://pubs.rsna.org/doi/epdf/10.1148/radiol.2018180285>

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3345344/pdf/Dtsch_Arztebl_Int-109-0270.pdf

<https://radiopaedia.org/articles/medical-devices-in-the-thorax>

<https://radiologyassistant.nl/cardiovascular/devices/cardiovascular-devices>