ΚΥΗΣΗ ΚΑΙ ΚΑΡΔΙΑΓΓΕΙΑΚΕΣ ΠΑΘΗΣΕΙΣ: ΠΡΟΒΛΗΜΑΤΙΣΜΟΙ ΜΕΣΑ ΑΠΟ ΤΗ ΔΙΑΧΕΙΡΙΣΗ ΠΕΡΙΣΤΑΤΙΚΩΝ

Η έγκυος με ΟΣΣ

Μελετίδου Μαγδαληνή

Καρδιολόγος, Επιστημονικός Συνεργάτης Γ’ Καρδιολογική Κλινική ΑΠΘ

Case presentation

♀, 34 yo

Developed ***acute SOB & chest pain***, **on day 4 post-partum**

- No previous medical Hx
- 4 days ago: **delivery** (40w, 1st pregnancy) at district hospital
  → severe vaginal bleeding complication
  → **hypovolemic shock** (↓Hb 7,5g/dl), DIC

→ transfer to our tertiary hospital

→ admission to **ICU**, intubation - mechanical ventilation, transfusion (4 units RBC, 5 FFP, 15 units PLT, 5gr fibrinogen), inotropes, uterotonics

→ transfer to Maternity Ward on day 3

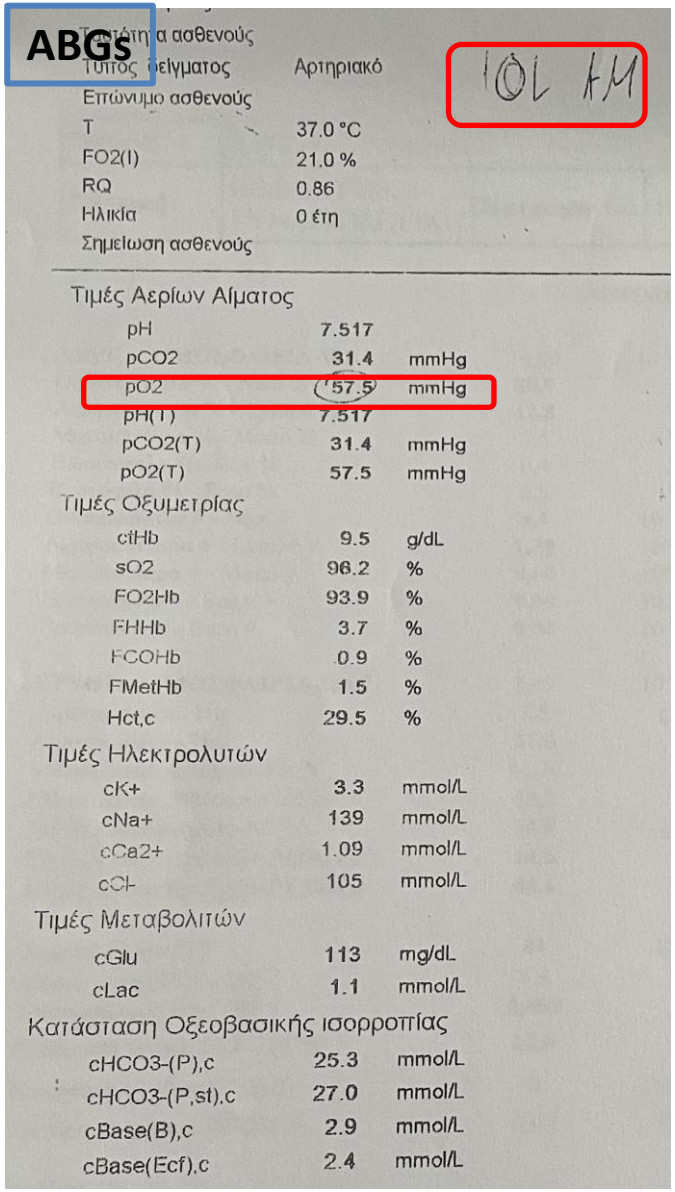
day 4 post-partum:

- **acute SOB (tachypnea, orthopnea) & chest pain**

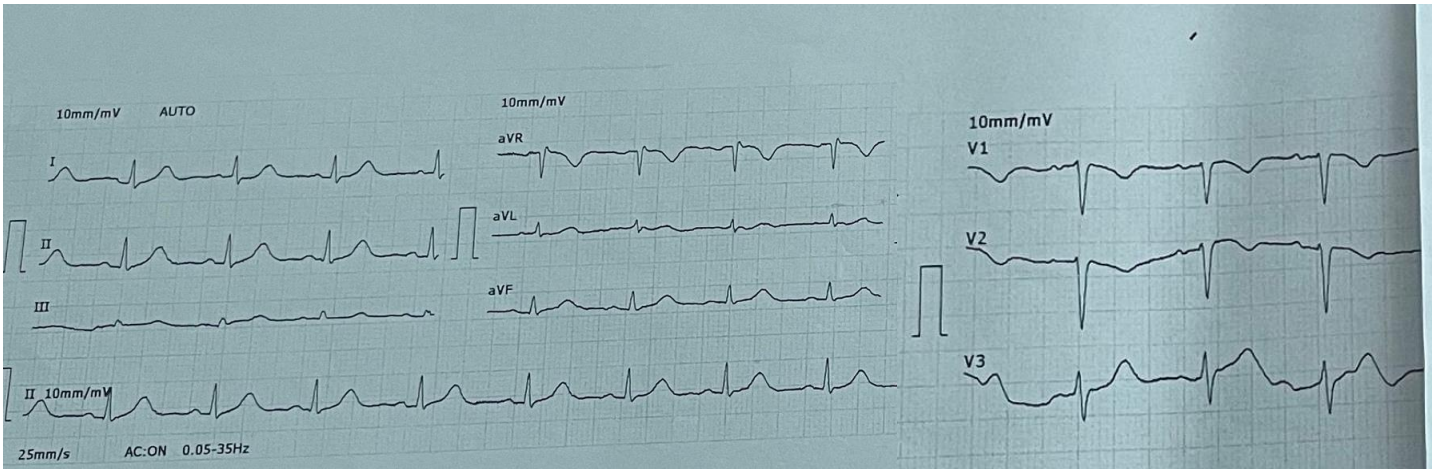
- S1S2 +mild SM
- ↓ resp. sounds, bilateral basal crackles

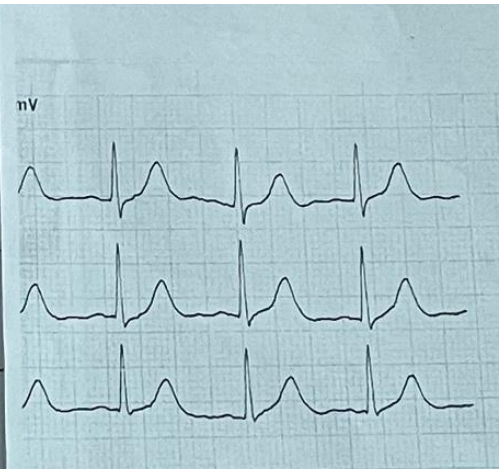
- BP: 128/75 mmHg

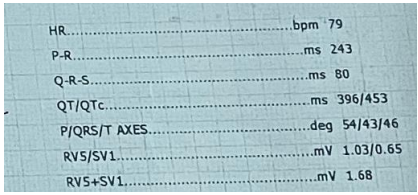
→ transferred to Cardiology CCU



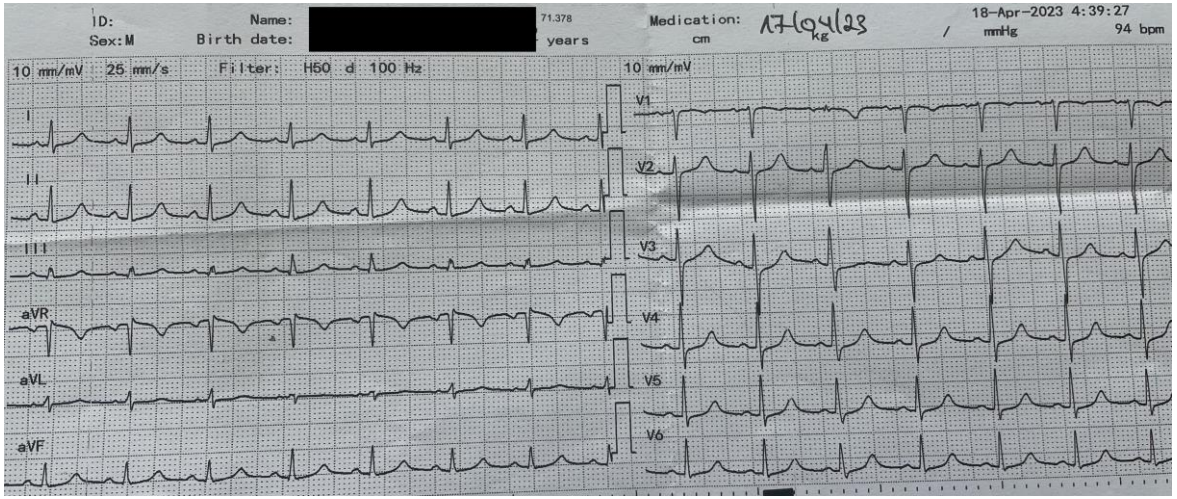
ECG (CCU)







SR, (-) T V1-V2, ήπια ↑QTc=453msec



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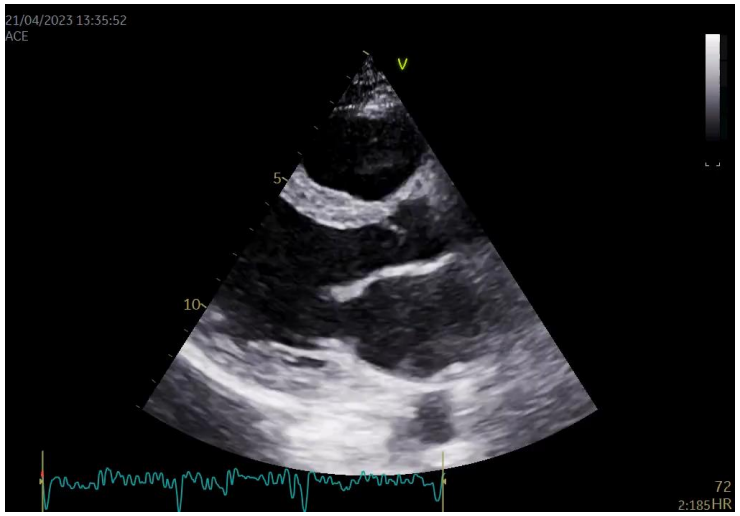
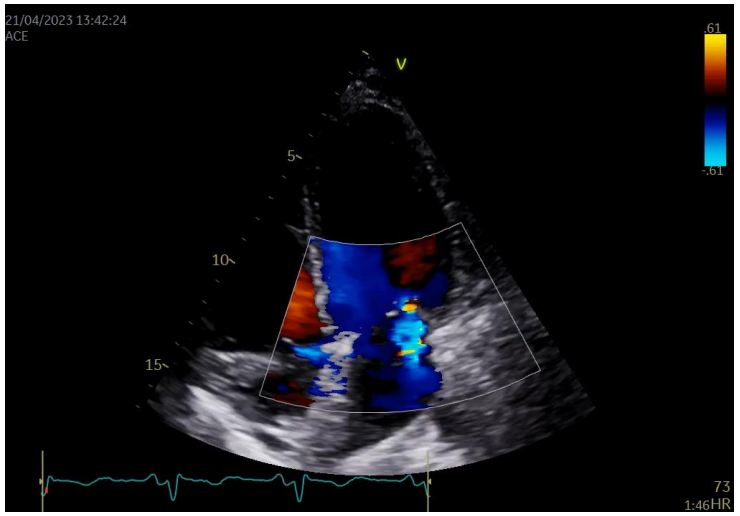
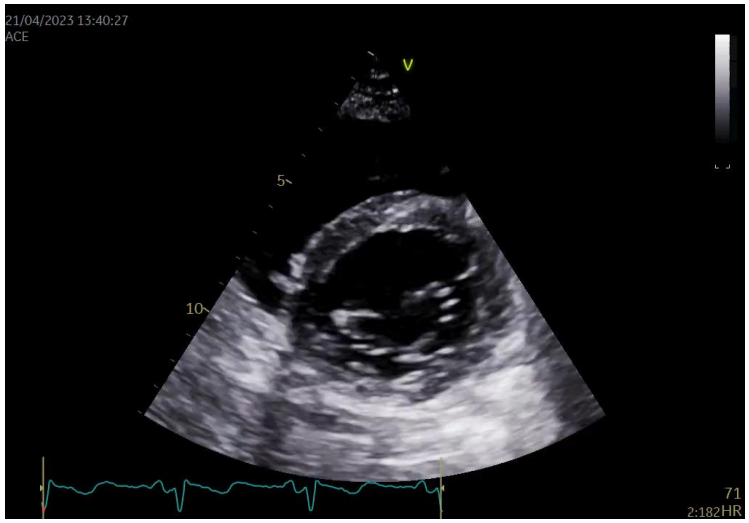
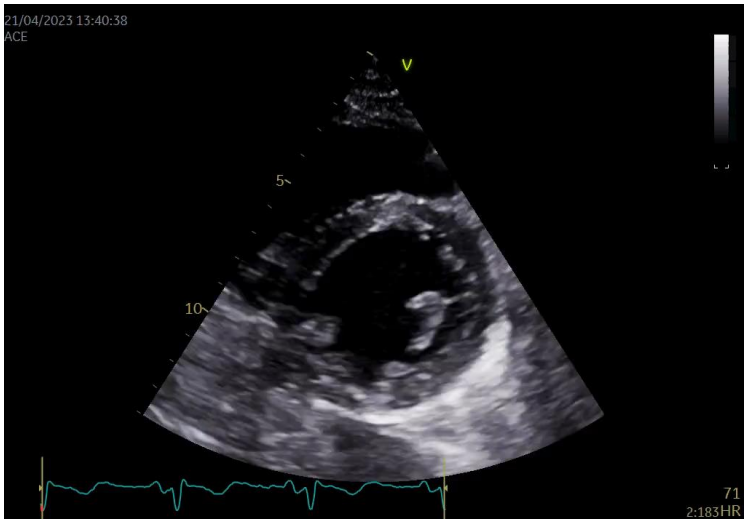


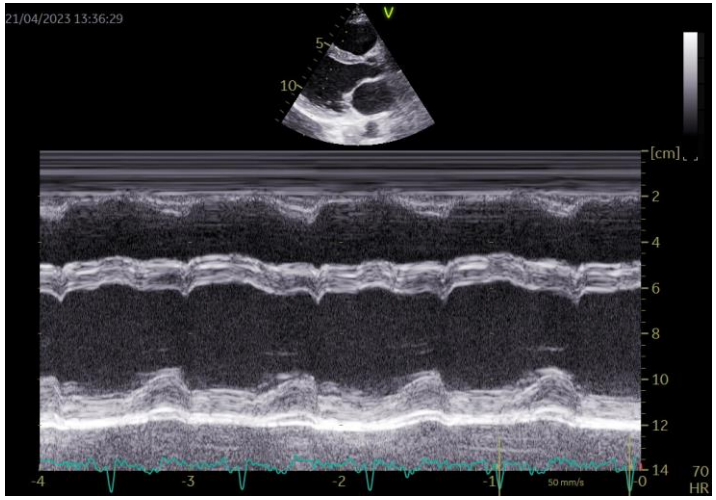


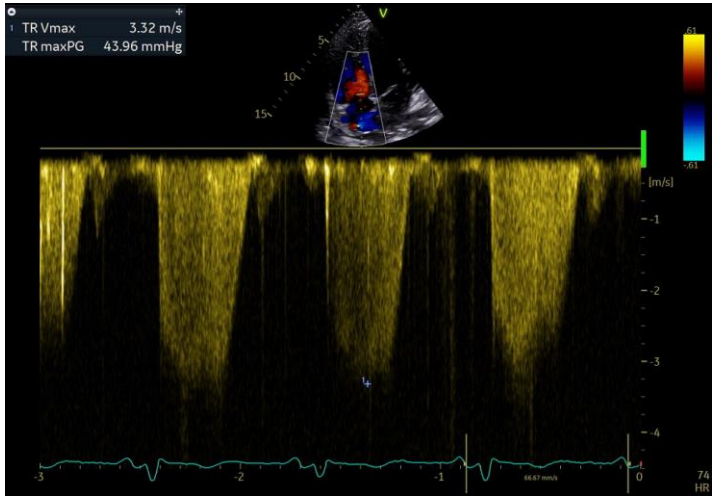




- LV: hypokinetic mid segments, EF: 45%
- MR: 3+/4+

ECHO





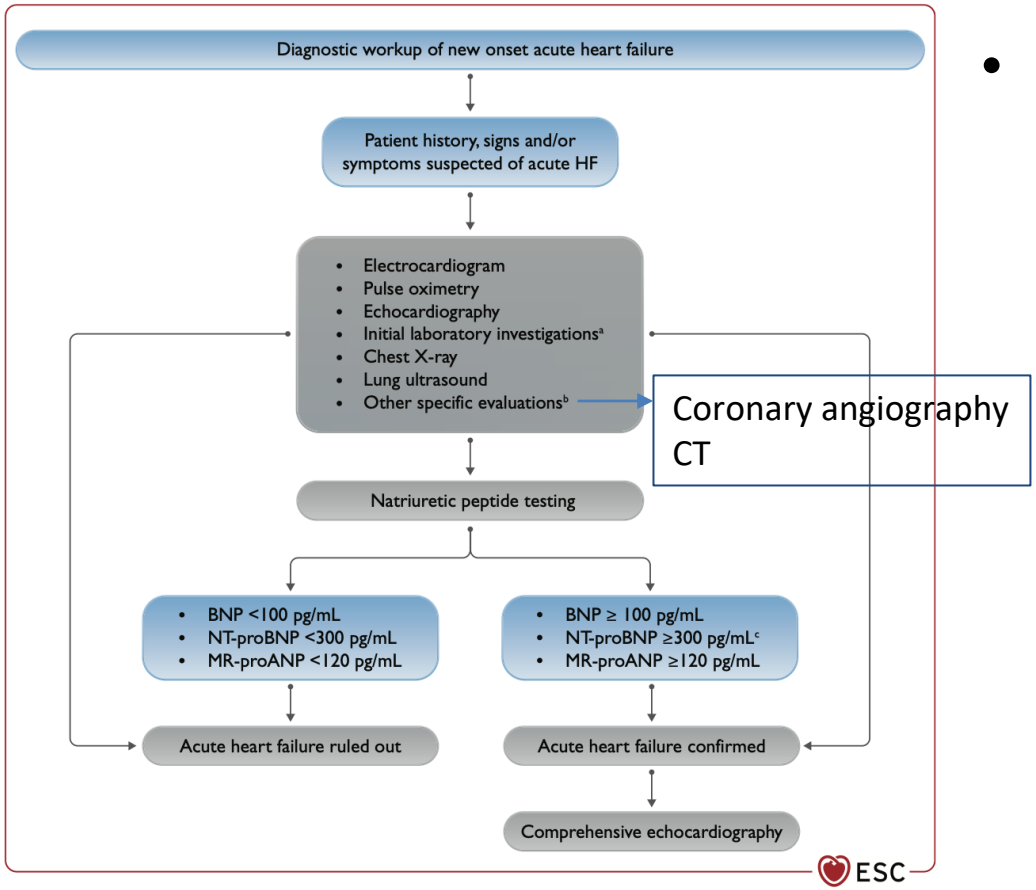
- LV: hypokinetic mid segments, EF: 45%
- MR: 3+/4+
- PH

Blood tests

Hb: 9g/dl
WBC: 10.200 K/μL
PLT: 118.000 K/μL

INR: 0.95
APTT: 25.5 sec
d-dimers: 27921 μg/l

Glu: 105 mg/dl
Ur: 36 mg/dl
Cr: 0.8 mg/dl
K: 3.5 mmol/L
Na: 142 mmol/L
SGOT: 16 U/L
SGPT: 14 U/L
CPK: 149 U/L
LDH: 303 U/L
CRP: 73 mg/L
TnI-hs : 157.1 pg/ml → peak 24h : 895 pg/ml
BNP: 1151 pg/ml
CHOL: 169 mg/dl
χολερυθρίνη: 0.4 mg/dl
λευκώματα: 5.3 g/dl
αλβουμίνη: 3.4 g/dl
ουρικό οξύ: 7.2 mg/dl
TSH: 3.3 ml U/L



2021 ESC HF Guidelines

- New onset acute HF ?

✓ **Clinical confirmation**

✓ **Cause ??**

ACS

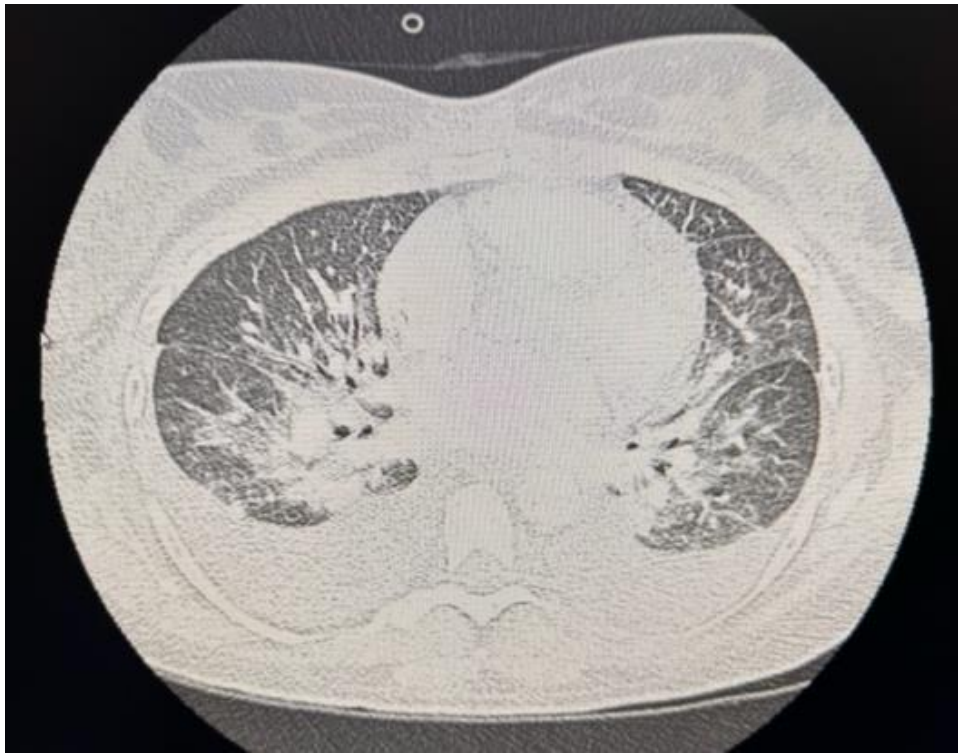
- ischemic obstructive CAD
- SCAD
- coronary artery spasm

PE

Takotsubo Syndrome

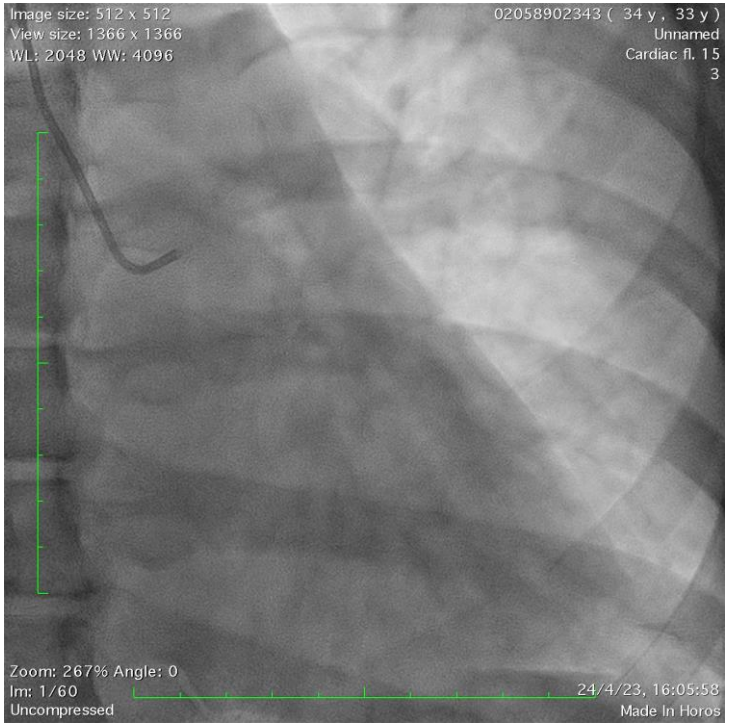
Peripartum Cardiomyopathy

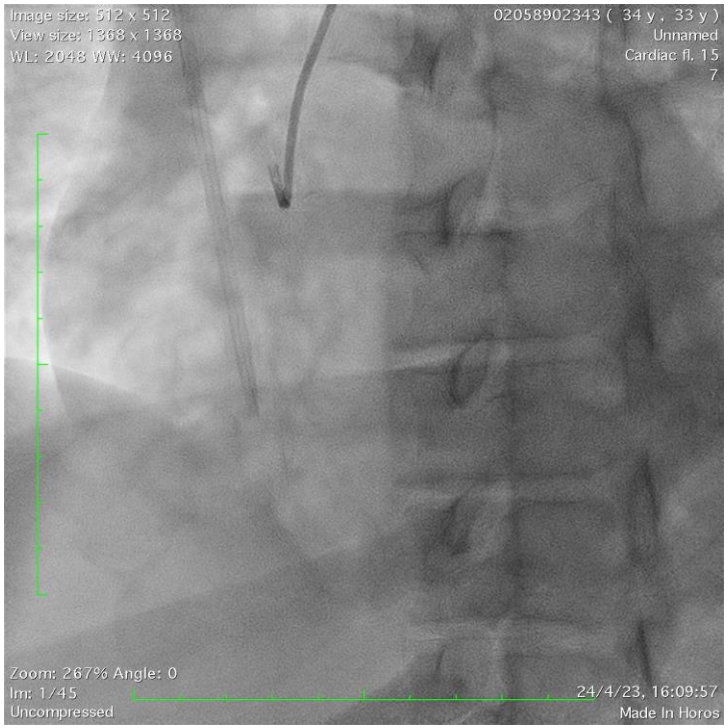
MDCT - CTPA



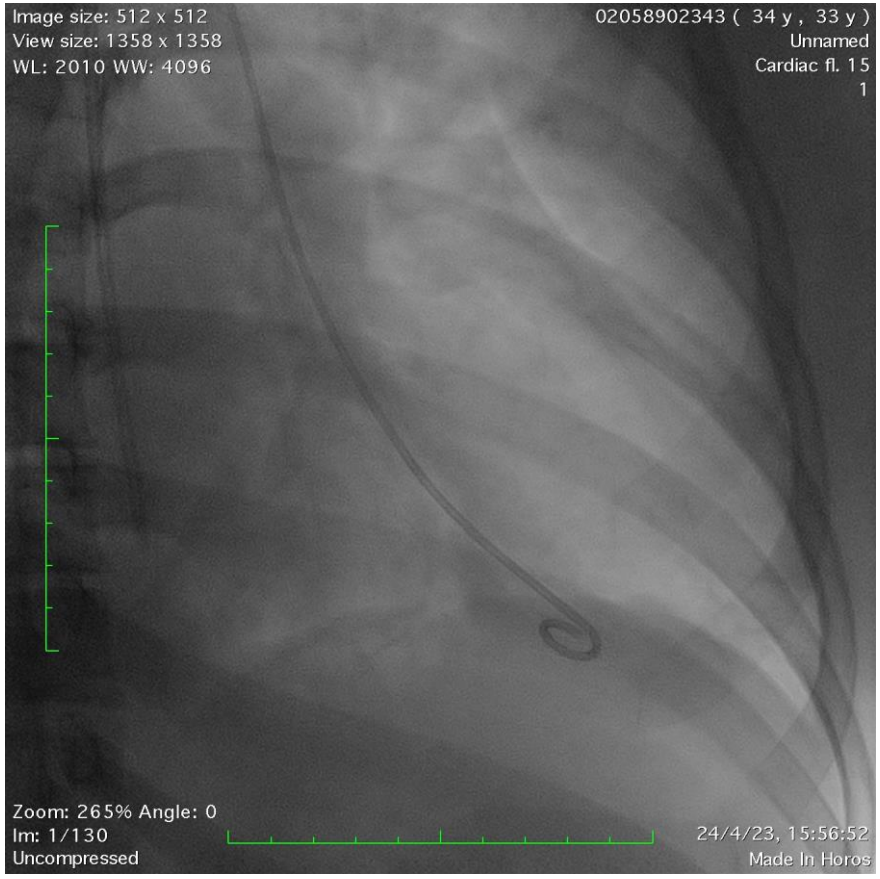
No PE findings
Bilateral pleural effusion
Alveoral and perihilar infiltrations
Linear atelectases in lung parenchyma

Coronary Angiography





Ventriculography



Diagnosis

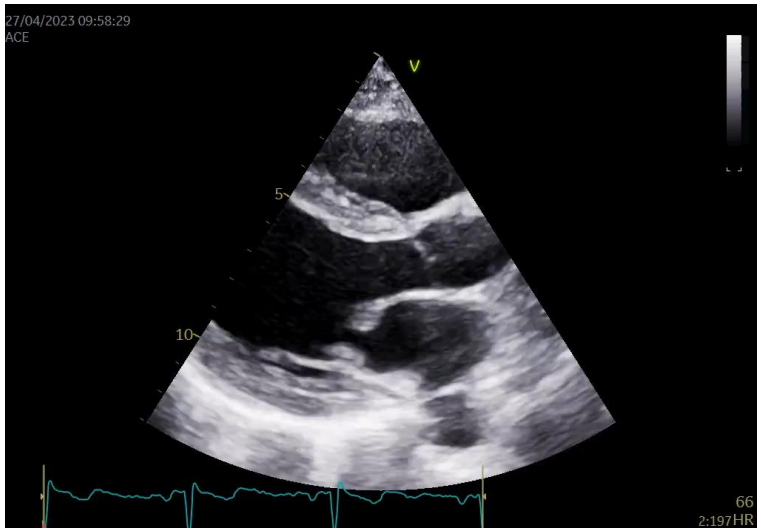
- **Takotsubo cardiomyopathy**

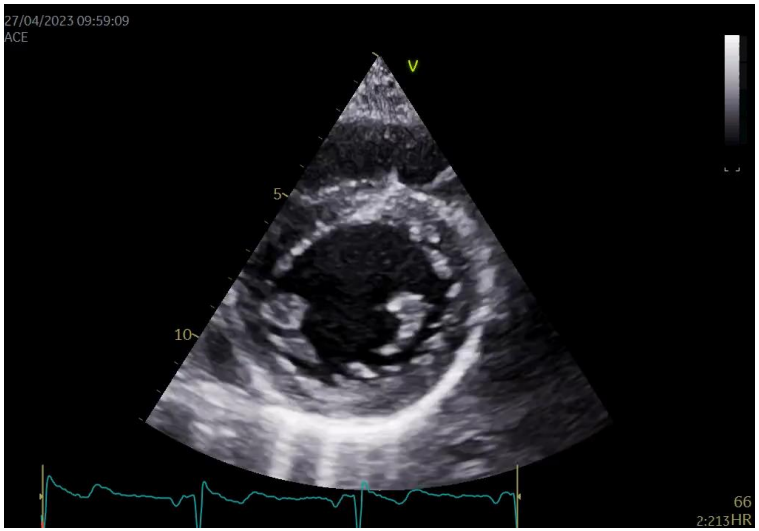
Management

- **O2**
- iv. **furosemide** 40mg x3
- tab. **bisoprolol** 2.5mg
- tab. **ramipril** 2.5mg
- **tinzaparin** 0.45 subc
- iv. norprolac (quinagolide) 75mg
- iv. piperacillin
- iv. metronidazole

In the following days…

- Pt. stabilized
- LVEF improved





Discharged after 8 days

- Furosemide 20mg OD
- Bisoprolol 2.5mg OD
- Ramipril 2.5mg OD
- Norprolac 75mg OD

CMR

2 w. FU

Takotsubo Cardiomyopathy

stress-induced cardiomyopathy

Takotsubo Syndrome

transient apical ballooning

broken heart syndrome

- 1 - 2% of all 'troponin-positive' suspected ACS presentations
- Presentation: chest pain, ECG changes, cTn elevation, LV dysfunction

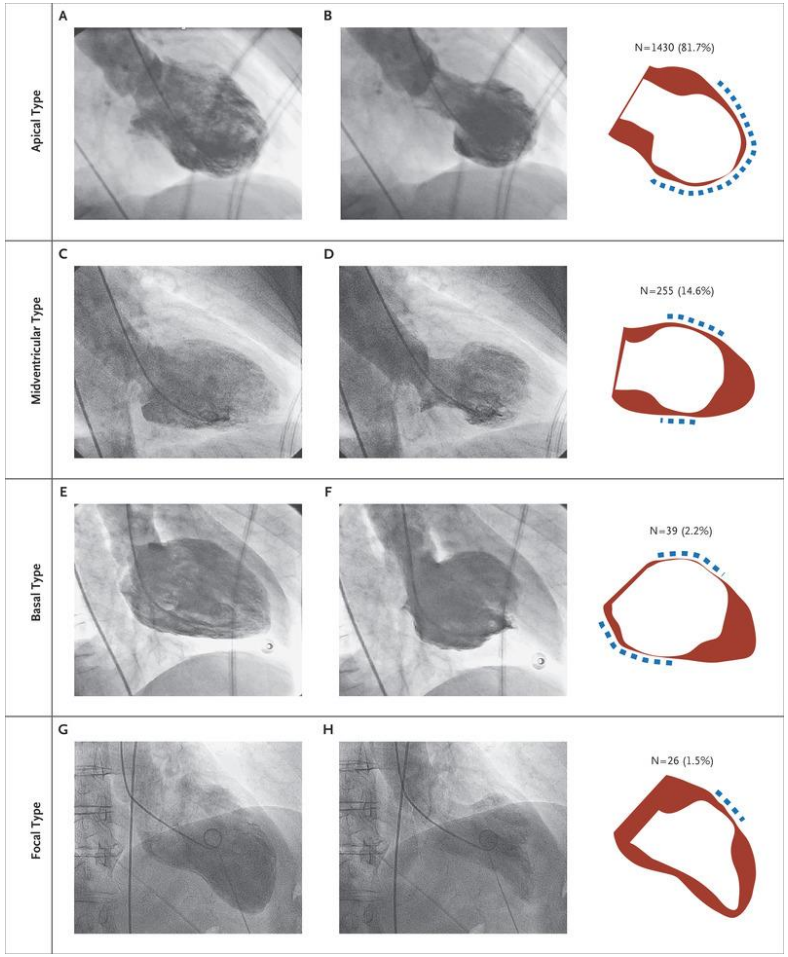
Mechanism

SNS activation → catecholamine excess → direct and indirect myocardial damage → transient regional LV systolic dysfunction

generally triggered by emotional or physical stress

coronary vasospasm
microvascular dysfunction
acute myocardial dysfunction
inflammation

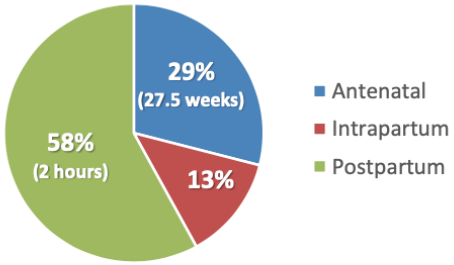
Takotsubo cardiomyopathy



Pattern of TCM	Prevalence in International Takotsubo Registry	Prevalence in obstetric cases studied
Apical	82%	54%
Basal*	2.2%	**42%**
Mid-ventricle	14.6%	4%
Focal	1.5%	0%
* Also known as inverted TCM		

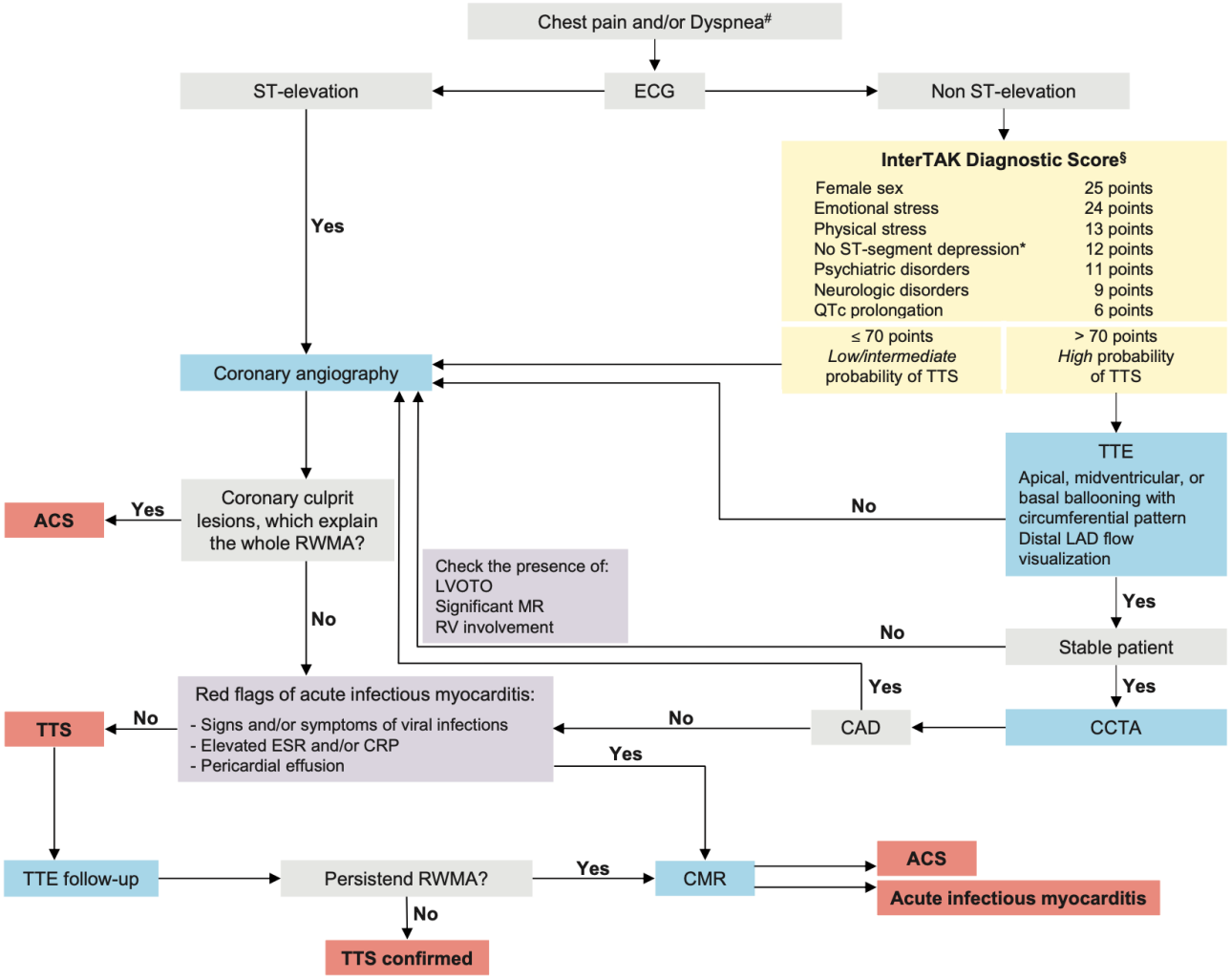
Clinical features:

- *Onset* (median):



- *Precipitating factor*, identified in 56% of patients, involved either exposure to extrinsic catecholamine (31%) (tocolytic agent) or events associated with high intrinsic catecholamine levels. The later included complications such as post-partum haemorrhage (PPH) (16%) and abruption, or endocrine disorder (16%).

Diagnostic algorithm of takotsubo syndrome



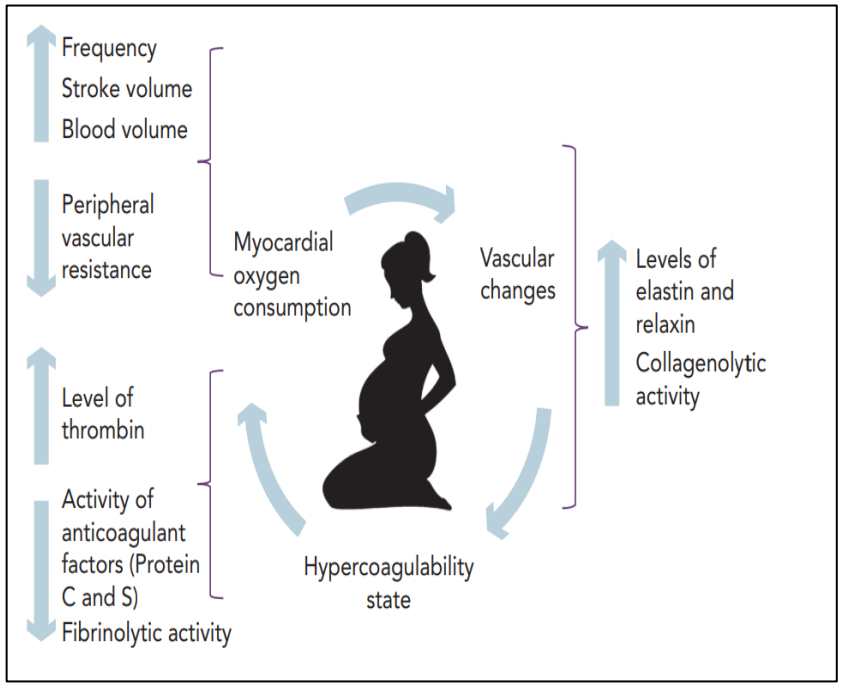
International Expert Consensus Document on Takotsubo Syndrome, EHJ, 2018

Pregnancy, a physiologic challenge…

Significant changes:

- ✓ hormonal
- ✓ metabolic
- ✓ hemodynamic

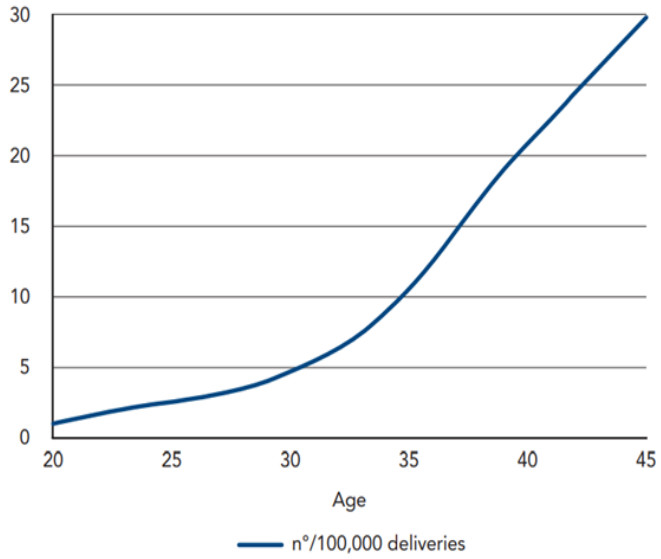
- Volume changes
- Sympathetic activation
- Pro-coagulative state
- Changes in connective tissue



Acute myocardial infarction during pregnancy

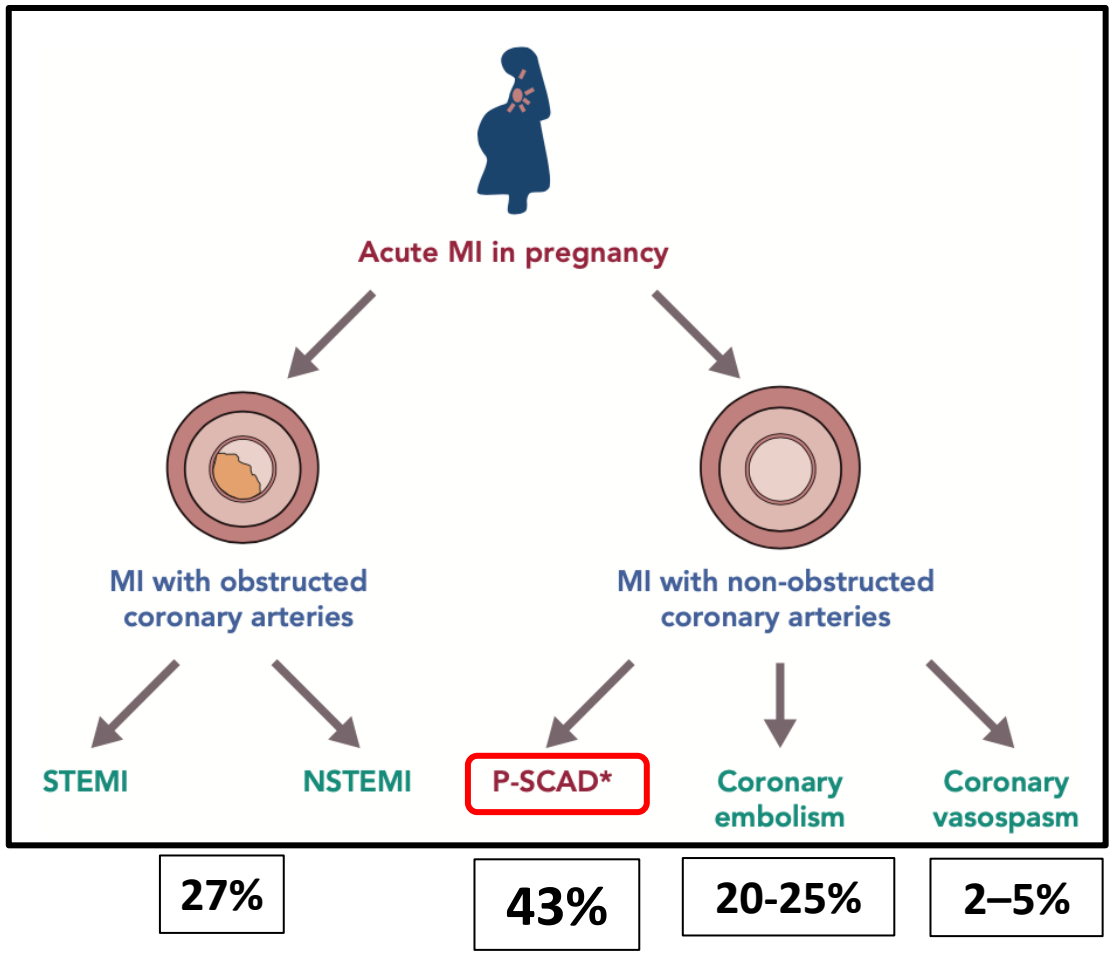
- rare (3-10 / 100,000 pregnancies), but serious condition
- Pregnancy ↑3-4x risk of AMI.
- Peak incidence between the last month of gestation and the first 2 weeks post-partum

- strongest risk factor: maternal age



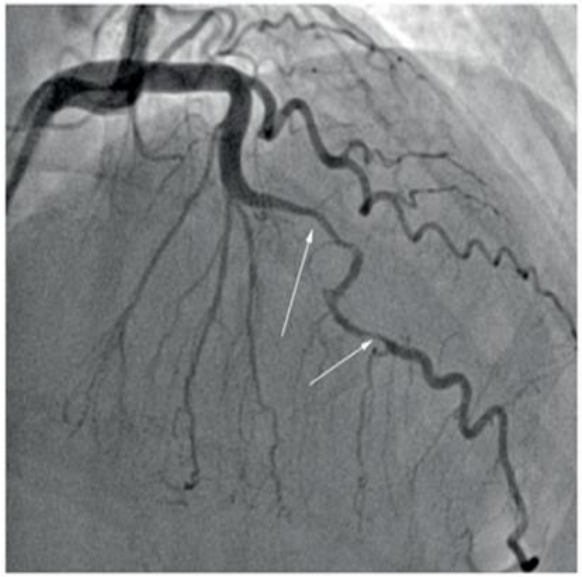
- Diagnosis: similar to non-pregnant pts.

Acute MI in pregnancy



Normal Coronary Arteries (11–29%)

SCAD



O'Kelly, A.C. J. Cardiovasc. Dev. Dis. 2022, 9, 198

Management

- No clear indication on the treatment of ACS in pregnancy is reported in current guidelines
- Treatment should be tailored on a patient-to-patient basis

→To facilitate management, patients should be classified in pre- and post- partum groups

- **Post-partum ACS group:** treatment according to the general ACS guidelines
  - only mother's health at risk
  - consider newborn lactation!
- **Pre-partum ACS group:** hampered by the presence of the foetus!! (risk for spontaneous abortion, bleeding and teratogenic effect)

Two major issues should be considered:

1. the interventional aspect

2. the pharmacological aspect

Both may have restrictions in different periods of pregnancy

Invasive management

- **Coronary angiography** is the diagnostic and therapeutic gold standard, in pregnancy-associated ACS
- In patients who present with STEMI or hemodynamically unstable NSTEMI, coronary angiography should be offered regardless of pregnancy status.

- However, **fetal radiation risk** should be considered:
  - inversely related to gestational age

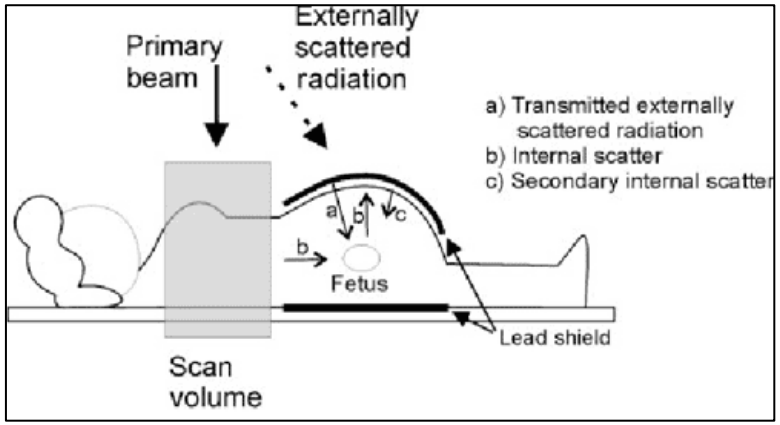
    (highest risk of fetal injury in <20 weeks gestational age)
  - inversely related to radiation dose

    (no evidence of fetal injury or loss in <50 mGy)

Fetal exposure:
- ✓ Chest radiograph →0.01 mGy
- ✓ CT Chest → 0.3 mGy
- ✓ Coronary CT → 1 to 3 mGy
- ✓ Diagnostic coronary angiogram → 1.5 mGy
- ✓ Percutaneous coronary intervention → 3 mGy

Minimizing radiation dose in pregnancy

- Radial access
- Prefer AP projections
- Minimize fluoroscopy time
- Use of low-dose fluoroscopy



- Place source as distant as possible / receiver as close as possible
- Avoid direct radiation of the abdomen
- Focus to the area of interest
- Use IVUS/ OCT
- Abdominal shielding (limited benefit)

Ideally the mean radiation dose to the abdomen should be no more than 1.5 mGy

Medical management

Table 7 **Drugs and safety data**

Drugs	Classification (Vaughan Williams for antiarrhythmic drugs)	Former FDA category	Placenta permeable	Transfer to breast milk (foetal dose)	Pre-clinical/clinical safety data
Abciximab	Monoclonal antibody with antiplatelet effects	C	Unknown	Unknown	Inadequate human studies • use only if potential benefit outweighs potential risk Animal data: • no animal reproduction studies
ACE inhibitors[a]	ACE inhibitor	D	Yes	Yes[b] (maximum of 1.6%)	Contraindicated • renal or tubular dysplasia, oligohydramnios, growth retardation, ossification disorders of skull, lung hypoplasia, contractures, large joints, anaemia, intrauterine foetal death
Acenocoumarol	Vitamin K antagonist	D	Yes	Yes (no adverse effects reported)	Embryopathy (mainly first trimester), bleeding (see discussion in section 5)
Acetylsalicylic acid (low dose)	Antiplatelet drug	B	Yes	Well tolerated	No teratogenic effects • there is insufficient clinical experience regarding the use of doses between 100–500 mg/day
Adenosine[c]	Antiarrhythmic	C	No	No	No foetal adverse effects reported (limited human data)
Alirocumab	Lipid-lowering drug (monoclonal antibody)	-	Yes	Unknown	No human data: not recommended Animal data: • no adverse effects on foetal growth or development in rats and monkeys • maternal toxicity in rats • weaker secondary response to antigen challenge in the offspring of monkeys
Aliskiren	Renin inhibitor	D	Unknown	Yes (secreted in rat milk)	No use in first trimester; contraindicated in second and third trimesters • see other RAAS blockers Animal data: • no evidence of embryofoetal toxicity or teratogenicity at doses ≤600 mg/kg/day in rats or 100 mg/kg/day in rabbits • fertility, pre-natal development, and post-natal development were unaffected in rats at doses ≤250 mg/kg/day. The doses in rats and rabbits provided systemic exposures of 1–4× and 5× MRHD

Continued

2018 ESC Guidelines for the management of CVD during pregnancy

- **Thrombolysis**
  - Relative contraindication
  - Carries numerous risks (fetal and maternal hemorrhage, fetal death, preterm birth)
  - Should only be offered if coronary angiography is both indicated and unavailable
  - The risk of significant maternal bleeding after thrombolysis is especially associated with delivery
- **Aspirin**
  - ✓ Full-dose can be used up to 32 weeks gestational age
  - ✓ Low-dose can be safely used throughout pregnancy

- If **DAPT** is required, **clopidogrel** is the preferred P2Y12 inhibitor.
- **UFH and LMWH** are the preferred anticoagulants.
- **Nitrates:** can be used, but maternal hypotension should be avoided (risk of placental hypoperfusion)
- **Beta blockers:** generally safe during pregnancy, metoprolol is preferred
- **ACEi & ARB:** contraindicated
- **Statins:** contraindicated

O'Kelly AC. J. Cardiovasc. Dev. Dis. 2022