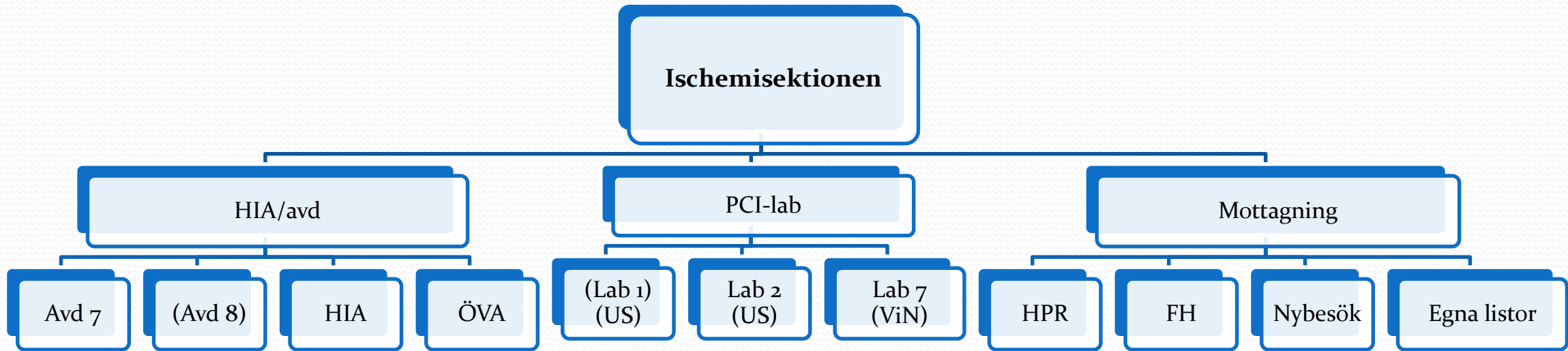


Ischemisektionen

Administrativa mötet SÖSR 2024-03-20

Sofia Sederholm Lawesson
Ischemisektionsansvarig överläkare, Kard klin, US

Ischemisektionen



Ansvarig HIA: Mats Pettersson

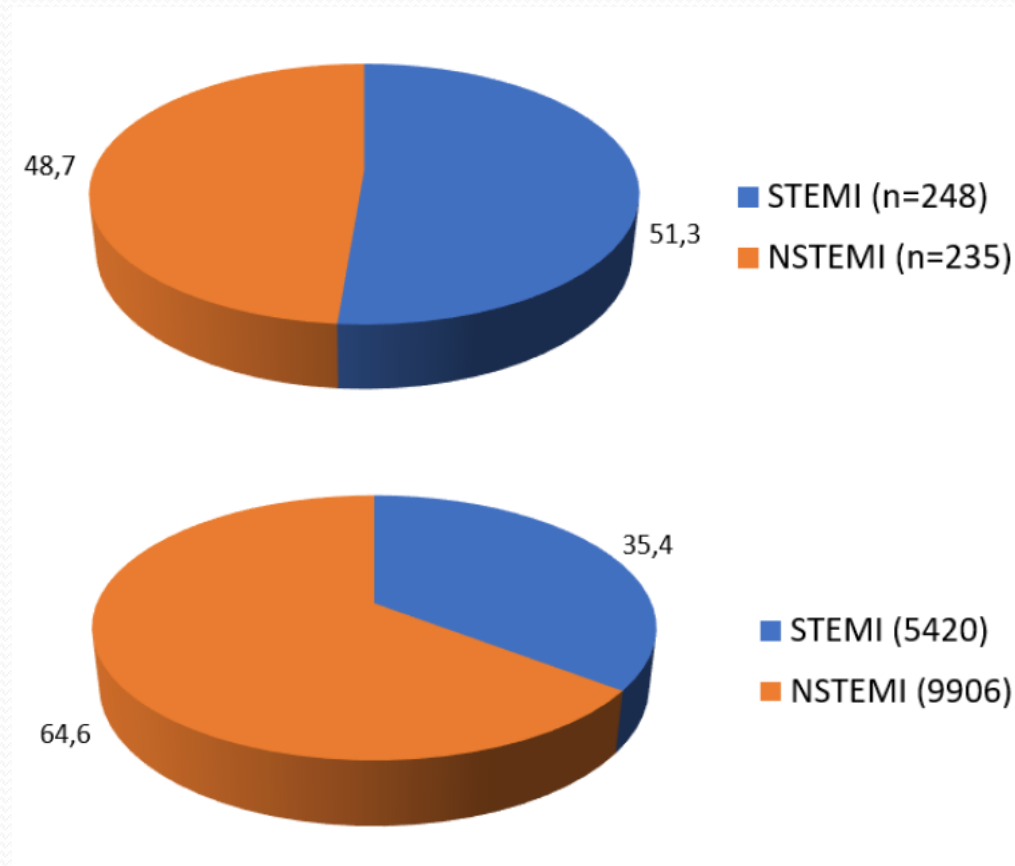
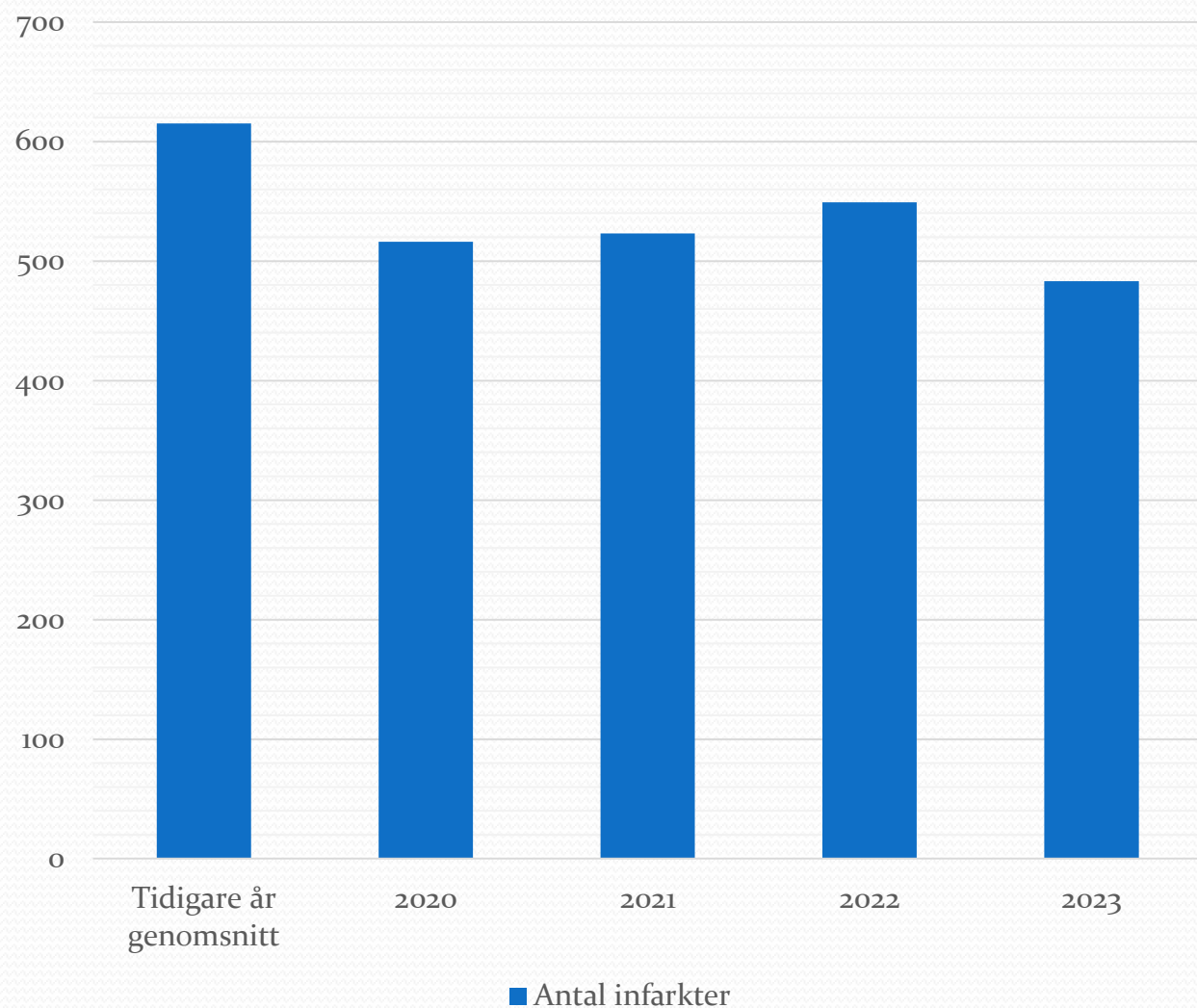
Ansvarig PCI-lab: Sammy Zwackman

Ansvarig FH: Thomas Muhr

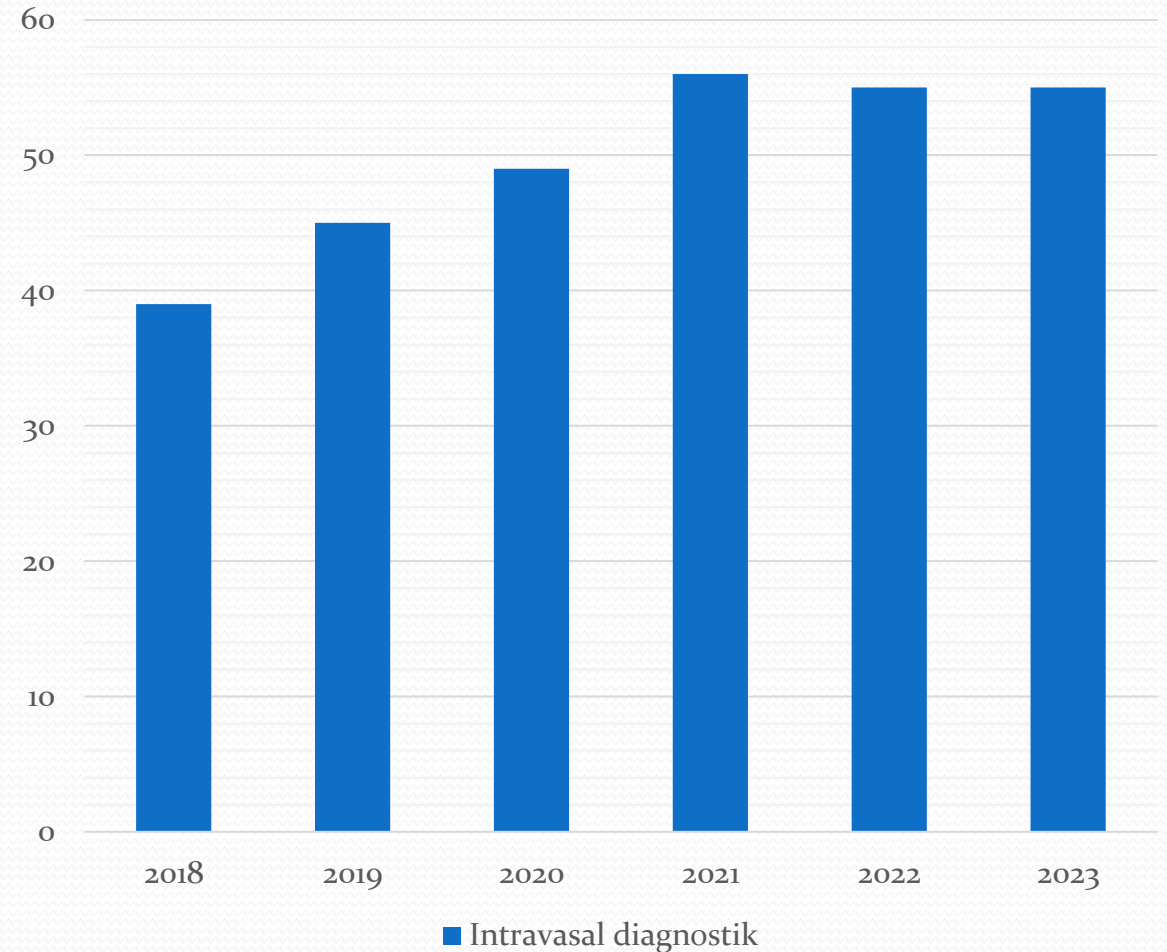
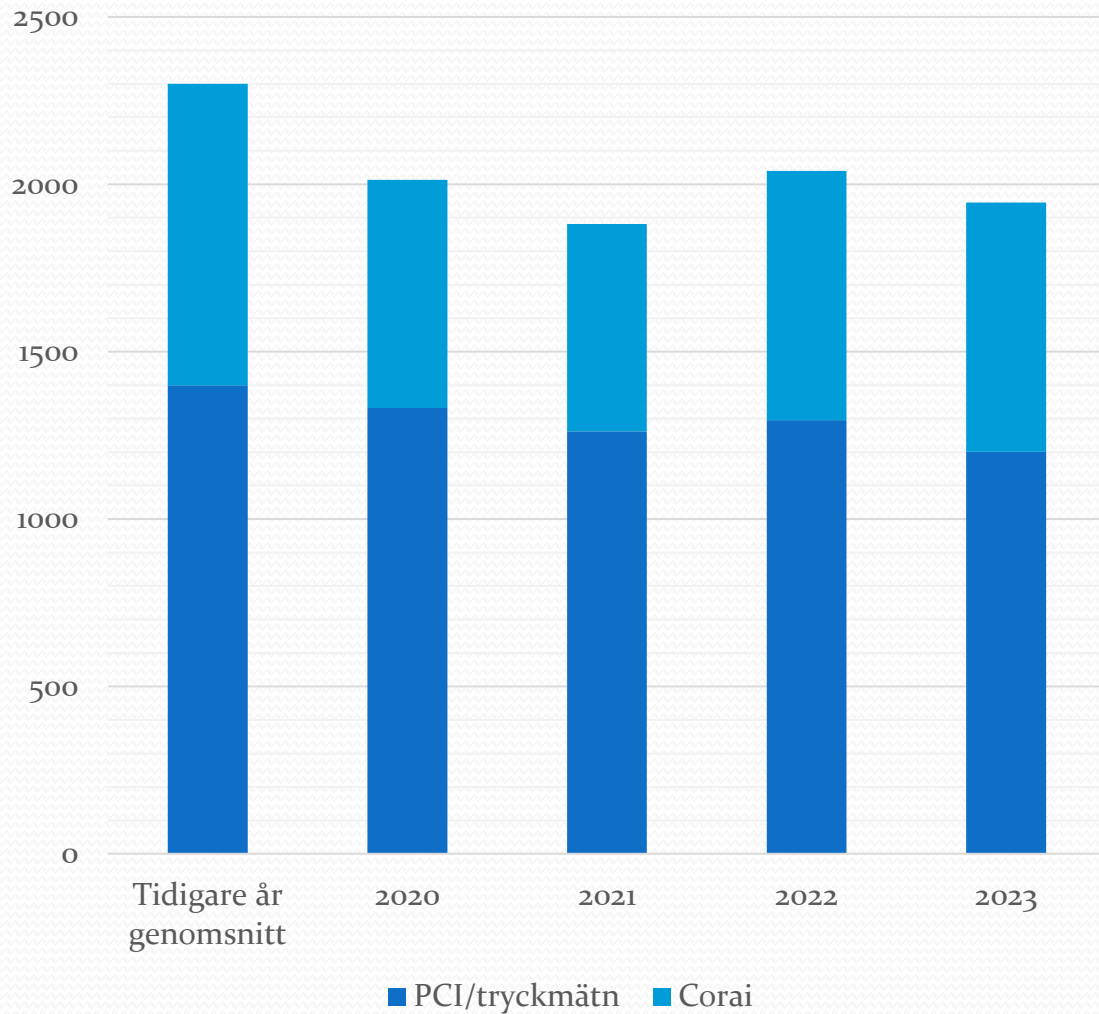
Ansvarig HPR/mott: Ted Cabreira

Ansvarig ÖVA: Marcus Gjerde

Nedgång i antal infarkter efter pandemin håller i sig

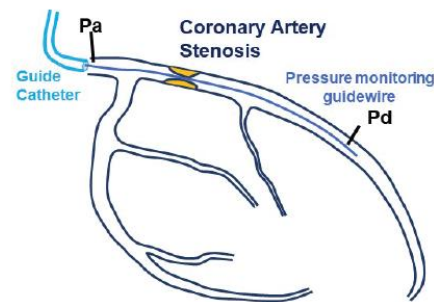


Viss nedgång i corai/PCI, ökning i diagnostik



Corari, PCI och diagnostik

		Linköping PCI Antal	Linköping PCI Procent av utförda	Riket Antal	Riket Procent av utförda
Någon diagnostik vid PCI	Ja	654	54.5%	10542	43.4%
	Nej	546	45.5%	13728	56.5%
Tryck	Ja	422	35.1%	7357	30.3%
	Nej	778	64.8%	16913	69.6%
Doppler	Ja	16	1.3%	378	1.6%
	Nej	1184	98.6%	23892	98.3%
IVUS	Ja	210	17.5%	2461	10.1%
	Nej	990	82.4%	21809	89.7%
OCT	Ja	59	4.9%	1265	5.2%
	Nej	1141	95.0%	23005	94.6%
Annan	Ja	14	1.2%	643	2.6%
	Nej	1186	98.8%	23627	97.2%

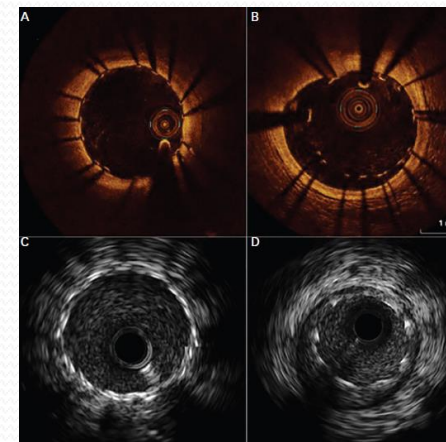
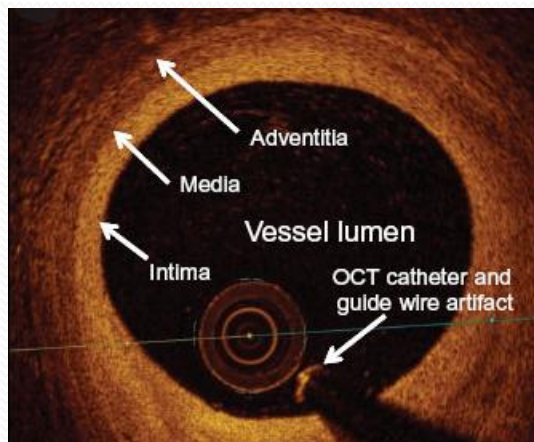
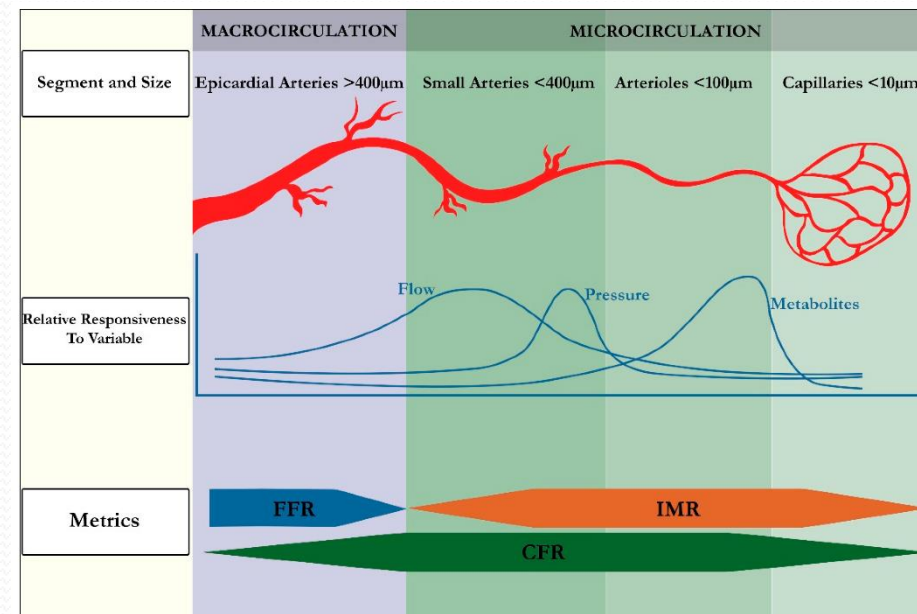


$$FFR = \frac{\text{Maximum Myocardial Flow (stenosis)}}{\text{Maximum Myocardial Flow (hypothetical no stenosis)}}$$

$$\approx \frac{(Pd - Pv) / \text{Resistance}}{(Pa - Pv) / \text{Resistance}} \text{ at hyperemia}$$

Assuming that Pv is close to zero

$$\approx \frac{Pd}{Pa} \text{ at hyperemia}$$

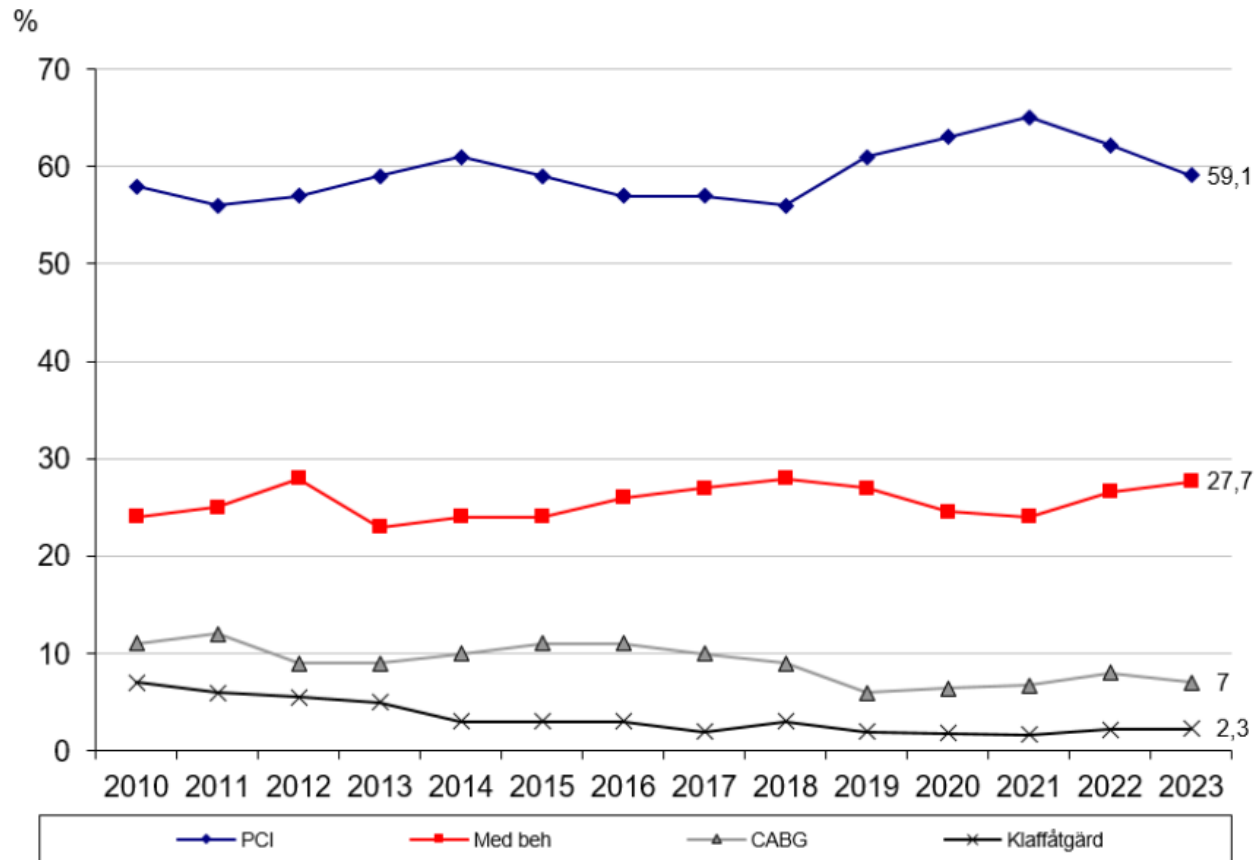


När kan vi komma ifråga för remiss från er?

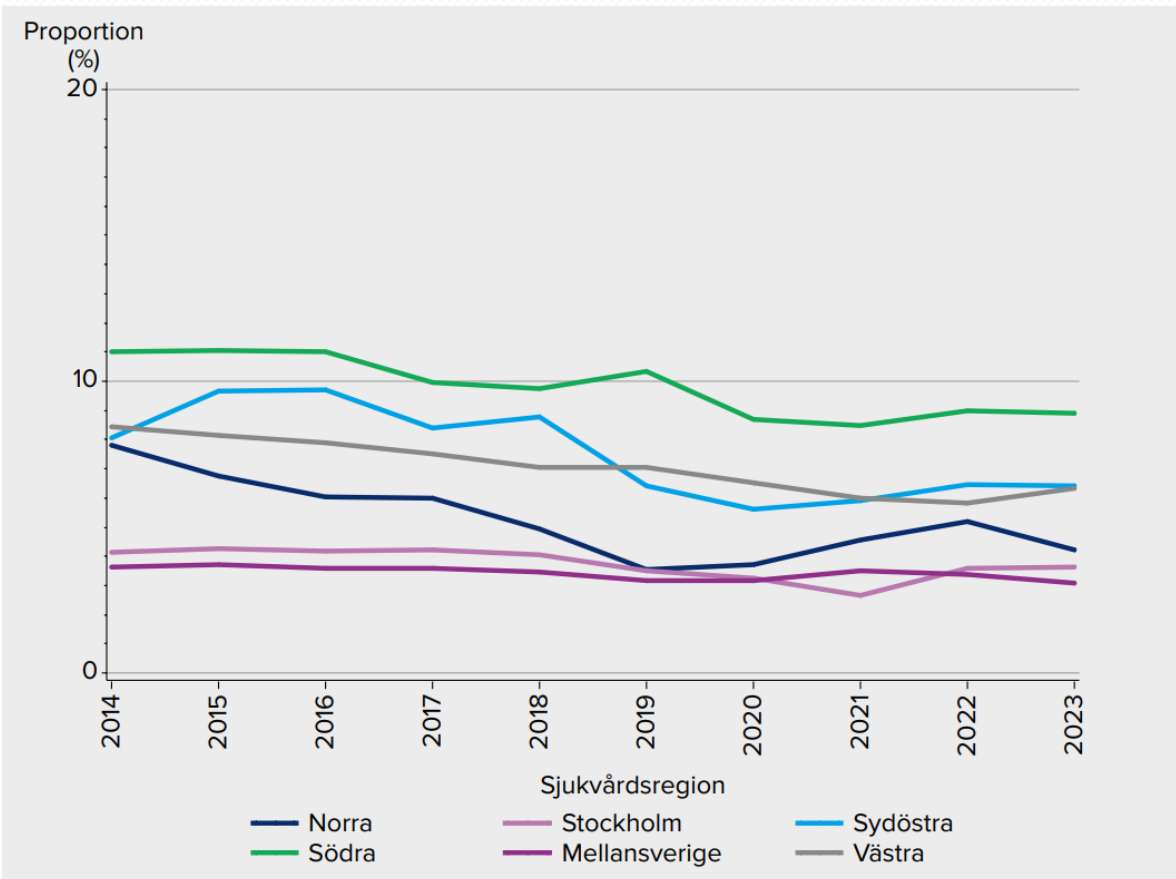
- STEMI – RÖ
- Komplicerad anatomi och instabil patient – SÖSR
 - Behov av Kangrexal- eller Aggrastatinfusion?
 - Höggradigt instabil och inväntar CABG
 - Behov av pump-stöd (vård på THIVA)
- Refraktär angina
- CABG!

Beslut efter corai

Primärbeslut efter koronarangiografi



Variabler ur SCAAR: PCI; ad hoc eller elektivt, CABG; med eller utan samtidig klafföpp, Med beh; ingen åtgärd allt fortsatt medicinsk behandling

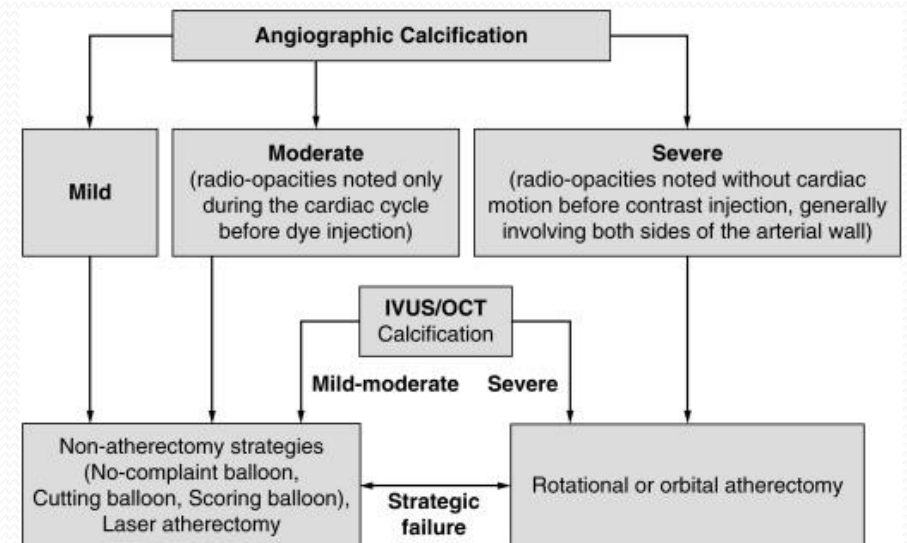


Rotablator, orbital aterektomi och shock-wave

Typ-patient: den äldre patienten med komplexa lesioner med mycket kalk

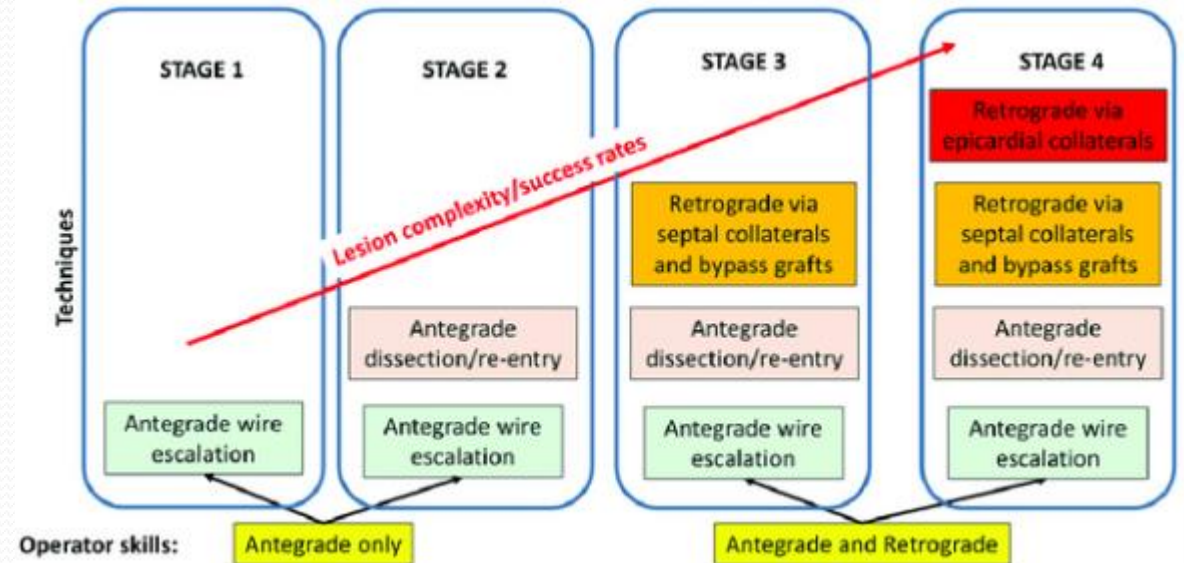
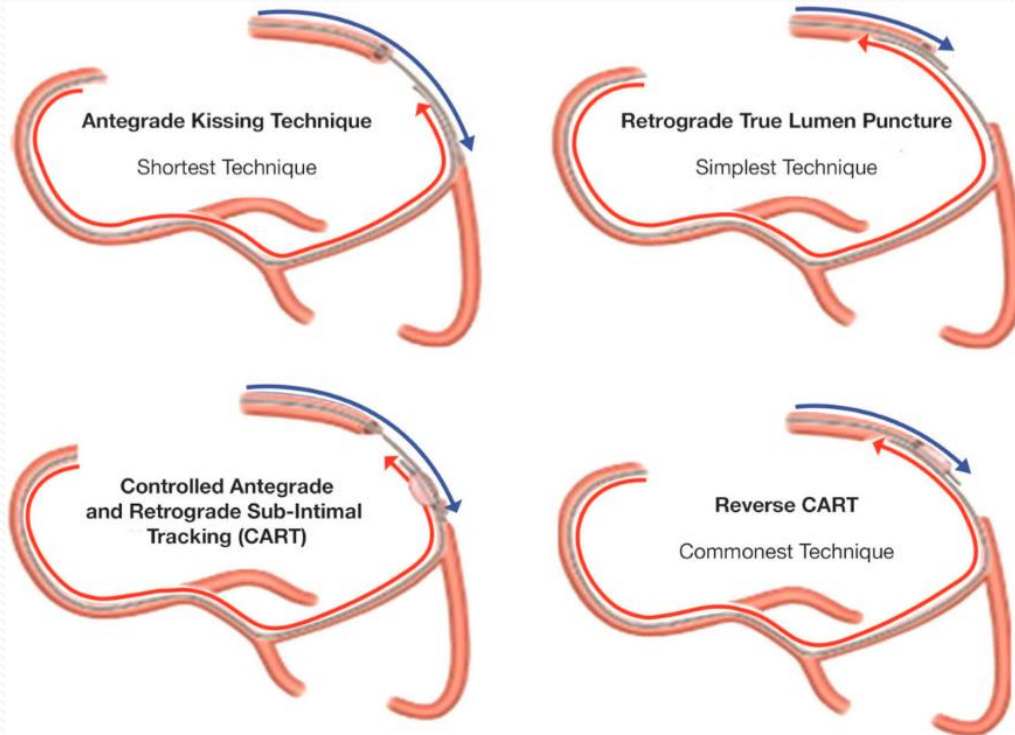
- Rotablator-PCI: 9 (tidigare 13 2022, ca 30/år innan dess)
- Shock-wave: 11 (10 st 2022)
- Orbital aterektomi: 17 (15 2022)

Optimal patient: mycket kalk, excentriskt och djupt sittande.



CTO-PCI

- År 2023 25 ingrepp på 23 pat, lyckat för 17 st (74%).
- År 2022 28 ingrepp på 28 pat, varav lyckat för 25 (89%).
- År 2021 27 ingrepp på 26 pat, varav lyckat för 23 (88%).
- Remittera komplicerade fall så dras patienter på dedikerad koronarrond



Hur tar vi beslut om revask-metod?

PCI

CABG

FAVOURS PCI	FAVOURS CABG
<p>Clinical characteristics</p> <ul style="list-style-type: none"> Presence of severe co-morbidity (not adequately reflected by scores) Advanced age/frailty/reduced life expectancy Restricted mobility and conditions that affect the rehabilitation process 	<p>Clinical characteristics</p> <ul style="list-style-type: none"> Diabetes Reduced LV function (EF \leq35%) Contraindication to DAPT Recurrent diffuse in-stent restenosis
<p>Anatomical and technical aspects</p> <ul style="list-style-type: none"> MVD with SYNTAX score 0-22 Anatomy likely resulting in incomplete revascularization with CABG due to poor quality or missing conduits Severe chest deformation or scoliosis Sequelae of chest radiation Porcelain aorta^a 	<p>Anatomical and technical aspects</p> <ul style="list-style-type: none"> MVD with SYNTAX score \geq23 Anatomy likely resulting in incomplete revascularization with PCI Severely calcified coronary artery lesions limiting lesion expansion
	<p>Need for concomitant interventions</p> <ul style="list-style-type: none"> Ascending aortic pathology with indication for surgery Concomitant cardiac surgery

The Heart Team—comprising clinical or non-invasive cardiologists, cardiac surgeons, and interventional cardiologists, as well as anaesthetists and other specialists if deemed necessary—should provide a balanced, multidisciplinary decision-making process.

Assessment of surgical risk ^c		
It is recommended that the STS score is calculated to assess in-hospital or 30 day mortality, and in-hospital morbidity after CABG. ^{112,114,138}	I	B
Calculation of the EuroSCORE II score may be considered to assess in-hospital mortality after CABG. ¹¹²	IIb	B
Assessment of CAD complexity		
In patients with LM or multivessel disease, it is recommended that the SYNTAX score is calculated to assess the anatomical complexity of CAD and the long-term risk of mortality and morbidity after PCI. ¹¹⁷⁻¹²⁴	I	B

Vilka väcker diskussion?

Recommendations according to extent of CAD	CABG		PCI	
	Class ^a	Level ^b	Class ^a	Level ^b
One-vessel CAD				
Without proximal LAD stenosis.	IIb	C	I	C
With proximal LAD stenosis. ^{68,101,139-144}	I	A	I	A
Two-vessel CAD				
Without proximal LAD stenosis.	IIb	C	I	C
With proximal LAD stenosis. ^{68,70,73}	I	B	I	C
Left main CAD				
Left main disease with low SYNTAX score (0 - 22). ^{69,121,122,124,145-148}	I	A	I	A
Left main disease with intermediate SYNTAX score (23 - 32). ^{69,121,122,124,145-148}	I	A	IIa	A
Left main disease with high SYNTAX score (≥ 33). ^{c 69,121,122,124,146-148}	I	A	III	B
Three-vessel CAD without diabetes mellitus				
Three-vessel disease with low SYNTAX score (0 - 22). ^{102,105,121,123,124,135,149}	I	A	I	A
Three-vessel disease with intermediate or high SYNTAX score (>22). ^{c 102,105,121,123,124,135,149}	I	A	III	A
Three-vessel CAD with diabetes mellitus				
Three-vessel disease with low SYNTAX score 0-22. ^{102,105,121,123,124,135,150-157}	I	A	IIb	A
Three-vessel disease with intermediate or high SYNTAX score (>22). ^{c 102,105,121,123,124,135,150-157}	I	A	III	A

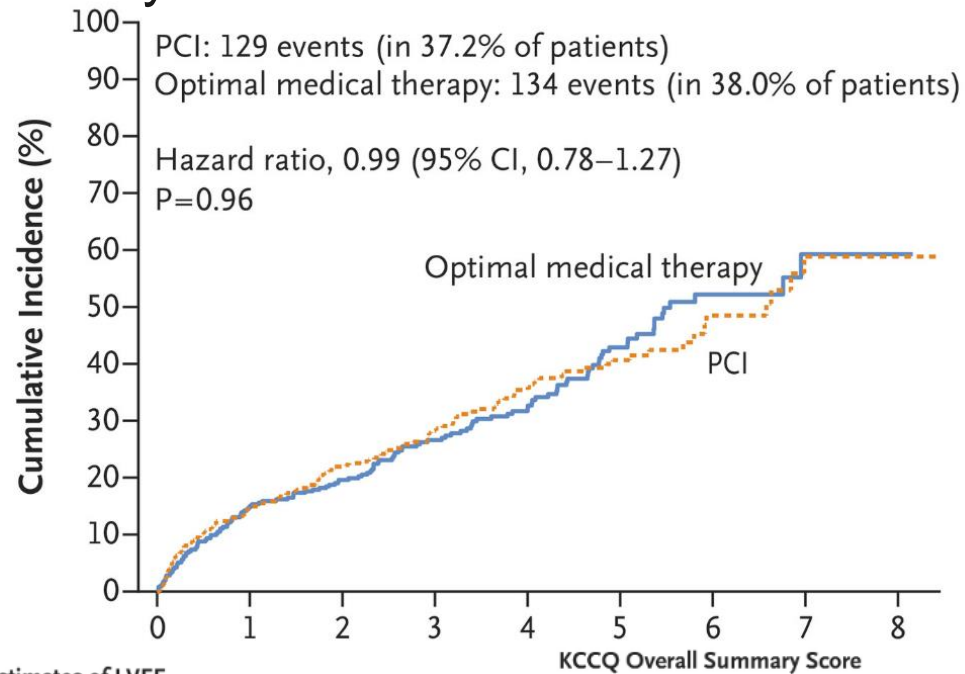
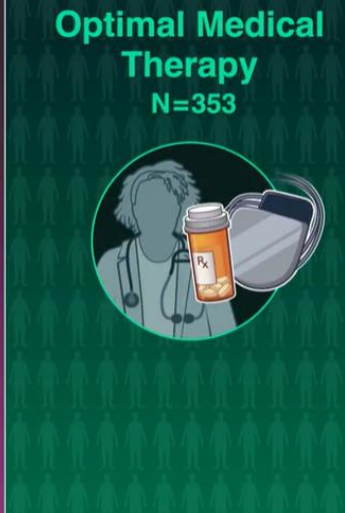
Recommendations on revascularizations in patients with chronic heart failure and systolic left ventricular dysfunction (ejection fraction $\leq 35\%$)

Recommendations	Class ^a	Level ^b
In patients with severe LV systolic dysfunction and coronary artery disease suitable for intervention, myocardial revascularization is recommended. ^{81,250}	I	B
CABG is recommended as the first revascularization strategy choice in patients with multivessel disease and acceptable surgical risk. ^{68,81,248,255}	I	B

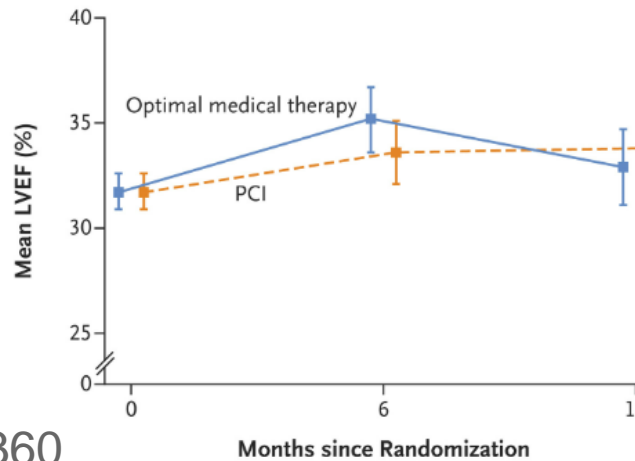
REVIVED-studien: Percutaneous Revascularization for Ischemic Left Ventricular Dysfunction

700 Patients

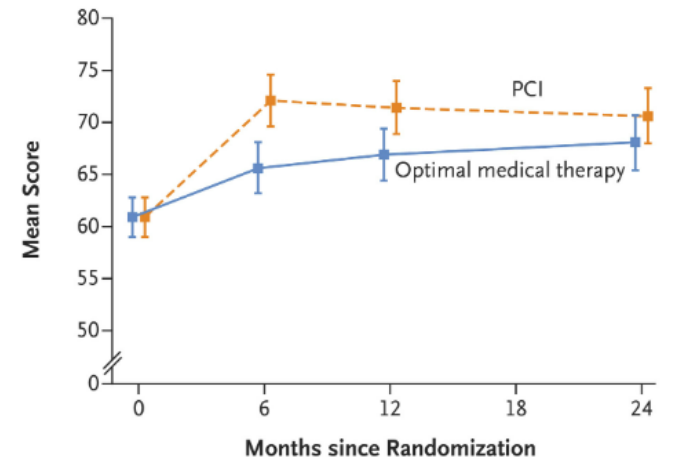
- Left ventricular ejection fraction of $\leq 35\%$
- Extensive coronary artery disease
- Viability in ≥ 4 dysfunctional myocardial segments



A Echocardiographic Estimates of LVEF



KCCQ Overall Summary Score





STICH SWEDEHEART

CABG or PCI in Patients with Ischemic Cardiomyopathy –

A randomized registry clinical trial

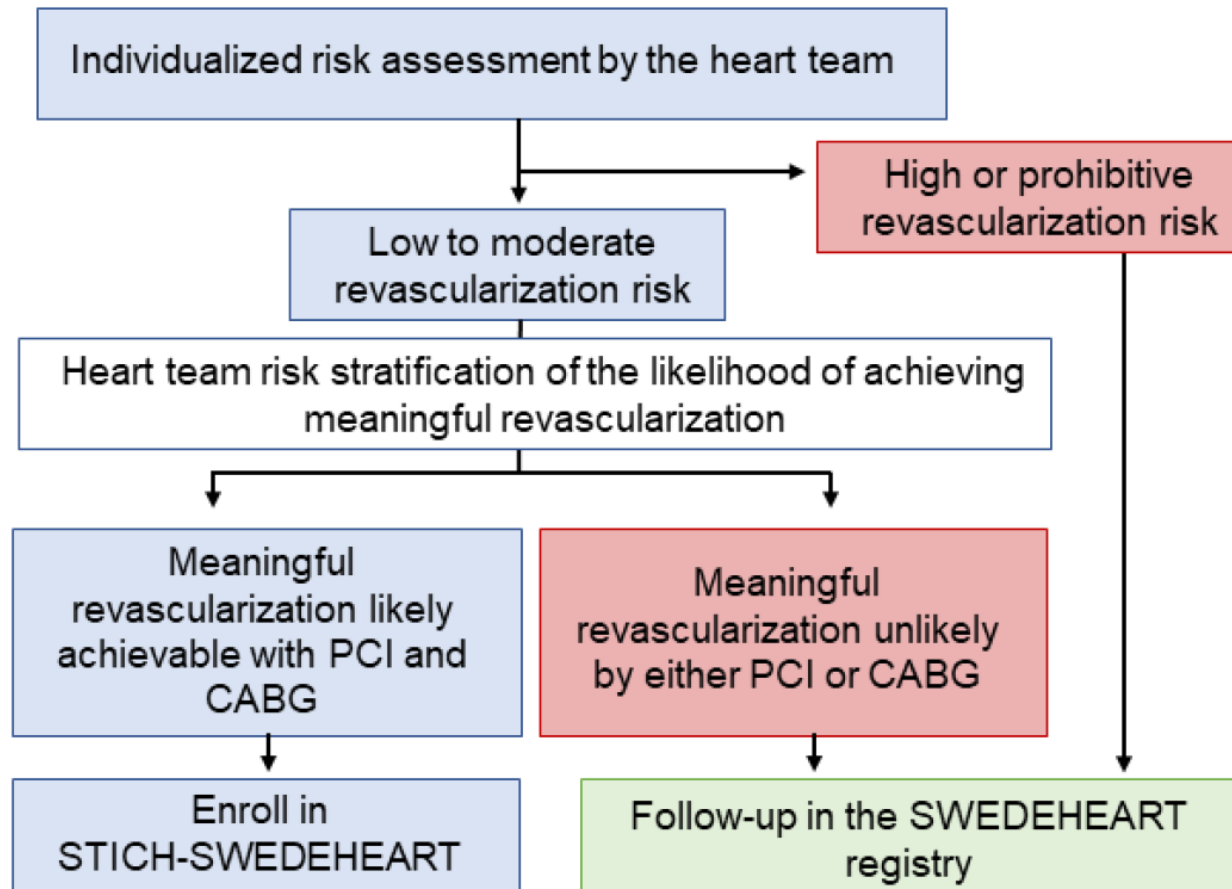
Short title: STICH-SWEDEHEART

An open-label, multicentre randomized registry trial

The aim is to compare PCI vs CABG for revascularization of patients with heart failure and LVEF $\leq 40\%$ and multi-vessel CAD.



STICH SWEDEHEART



En annan patientgrupp där vi gärna tar ett samtal



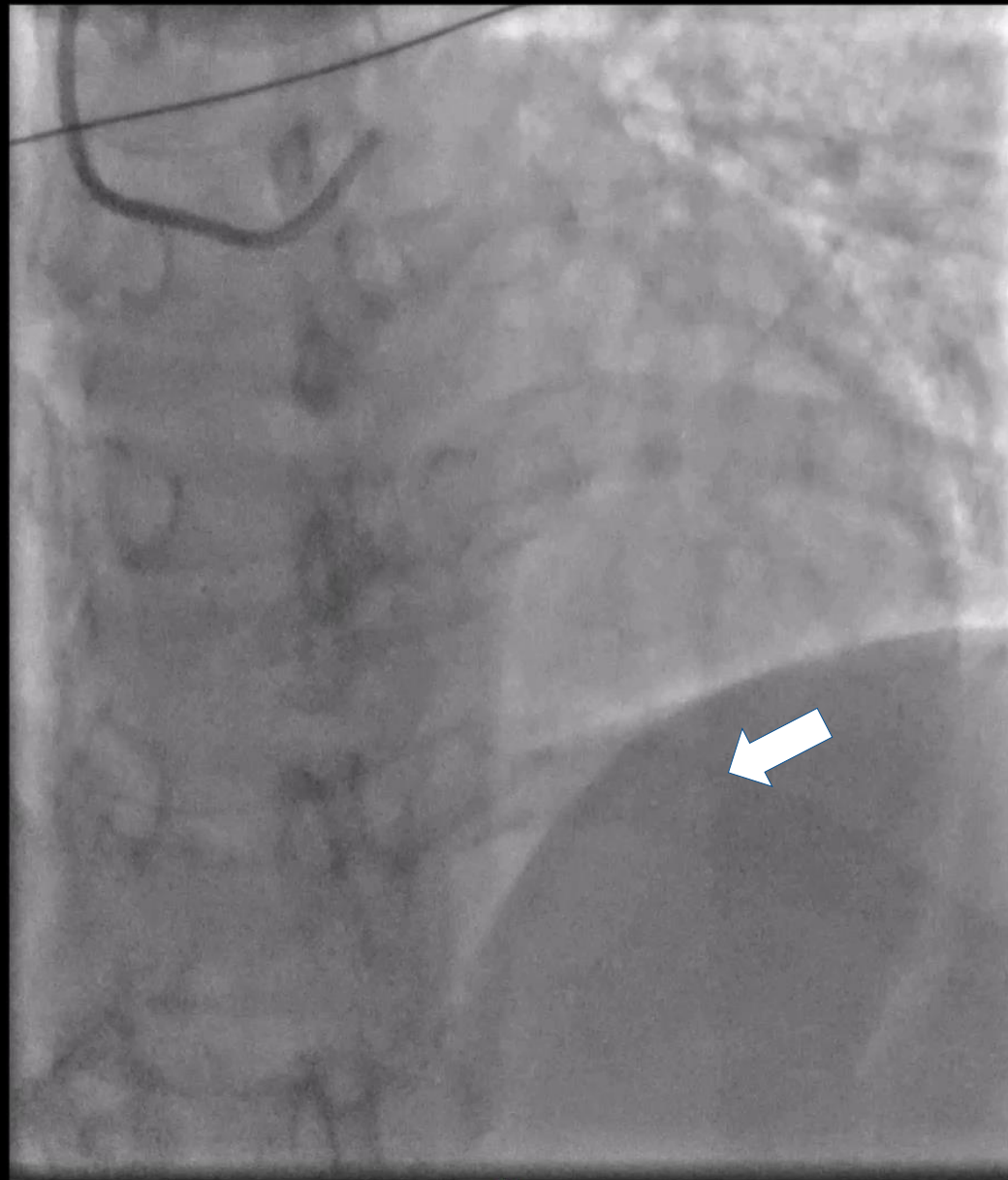
48-årig kvinna med smärta i bröstet

Dx/Sin: 16,2

Kran/Kaud: 37,1

1. ANGIOGRAFI CORONAR ▾

C: 128,0, W: 256,0



LPF

Utf Mod: MX119111

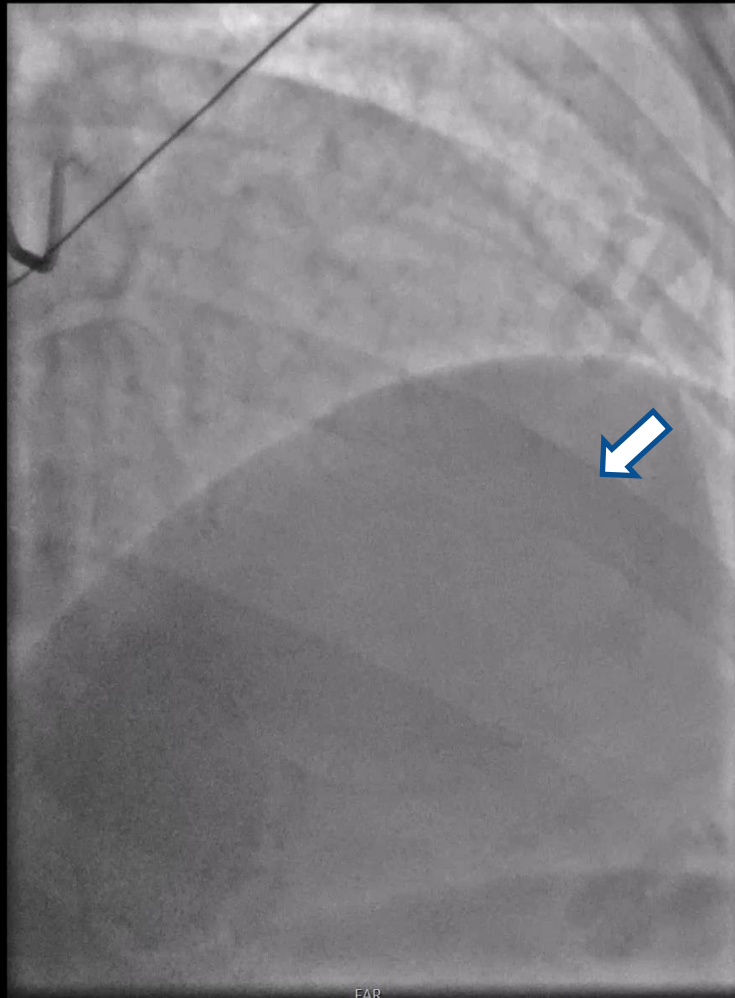
Bild-Datum/Tid: 2022-05-02, 14:40:22

2022-05-02, 14:40:46 ▾

FAL

48-årig kvinna med smärta i bröstet

Dx/Sin: -24,1
Kran/Kaud: 27
1. ANGIOGRAFI CORONAR



Utf Mod: MX119111
Bild-Datum/Tid: 2022-05-02, 14:40:22
2022-05-02, 14:41:17

FAR

1. ▾

C: 127,5, W: 255,0



Så här ser det ut när man tittar in i kärlet

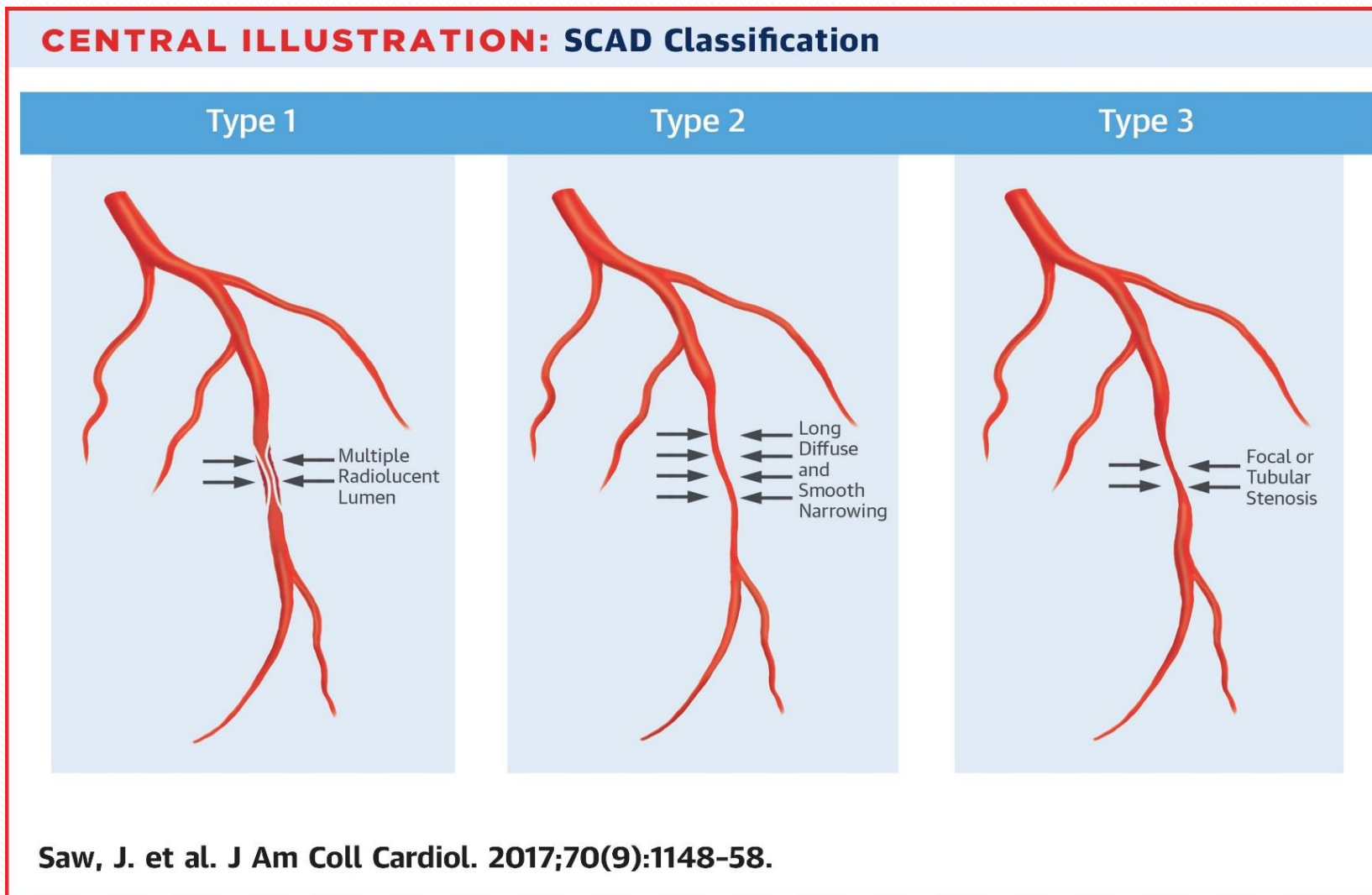


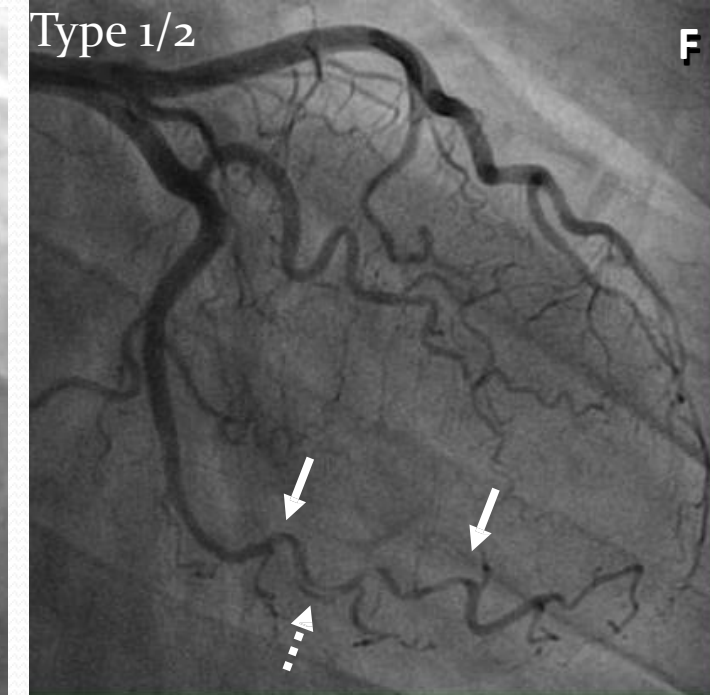
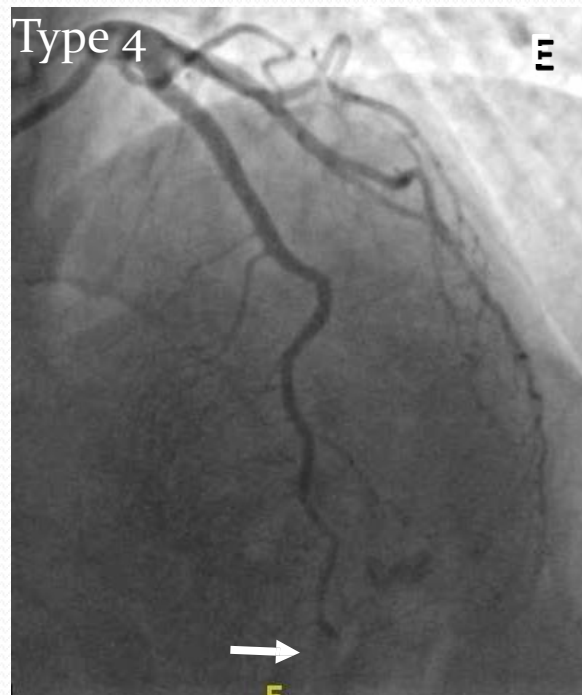
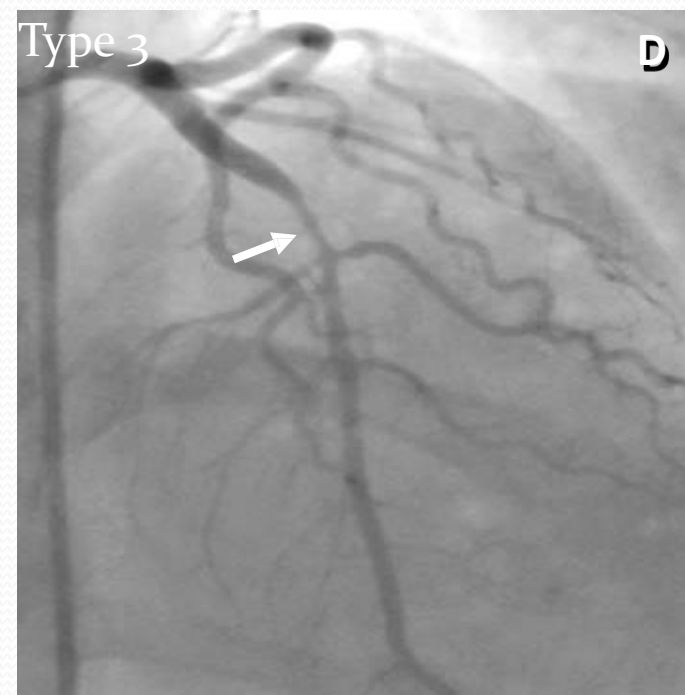
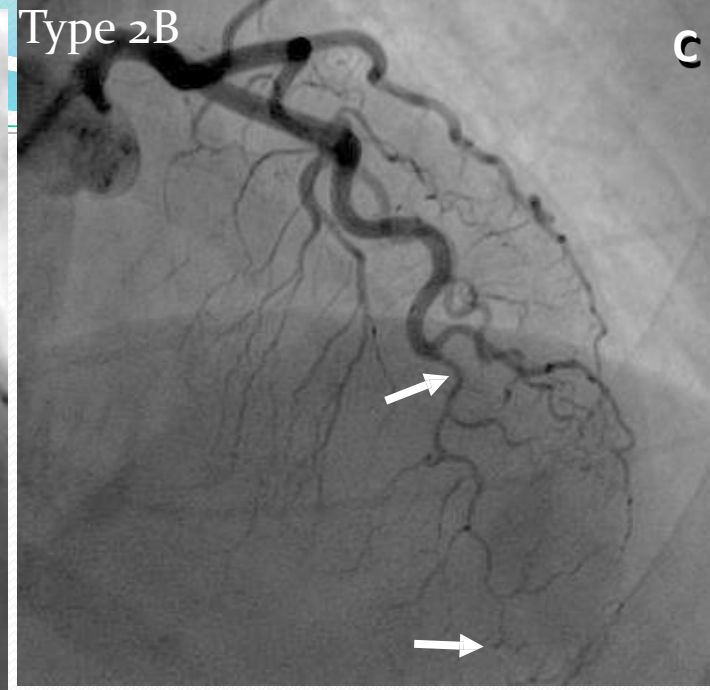
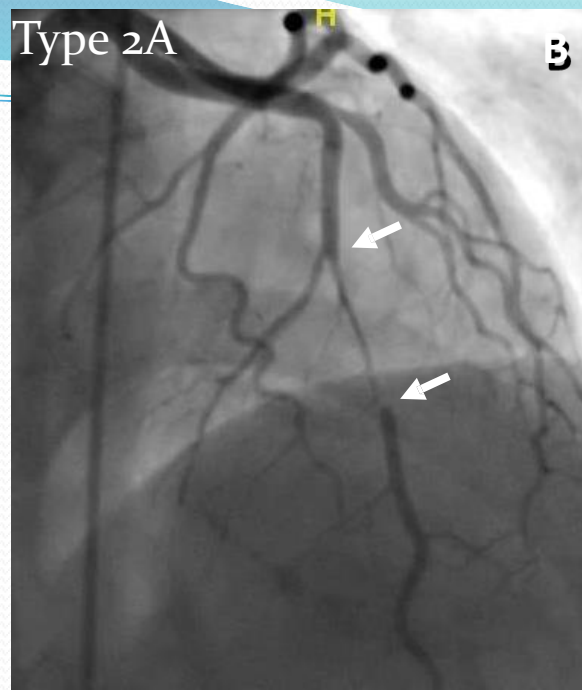
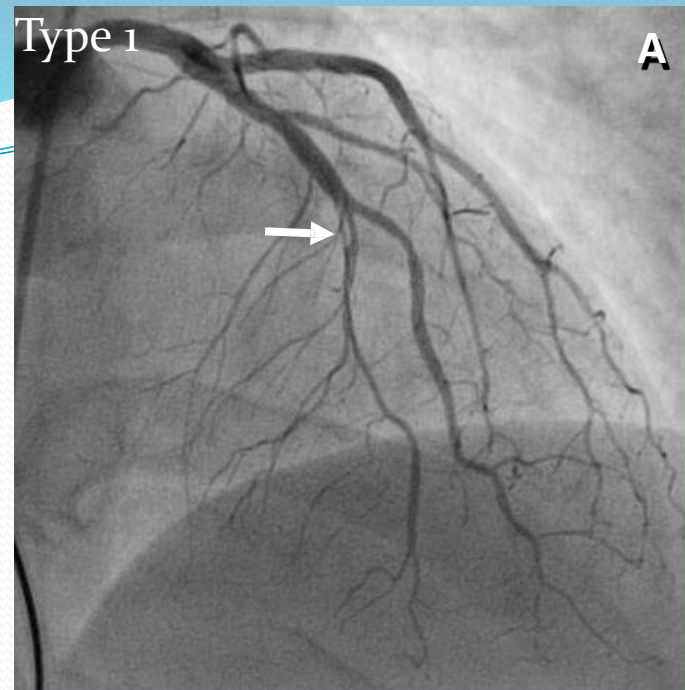
Utf Mod:
2022-05-02, 15:29:34 ▾



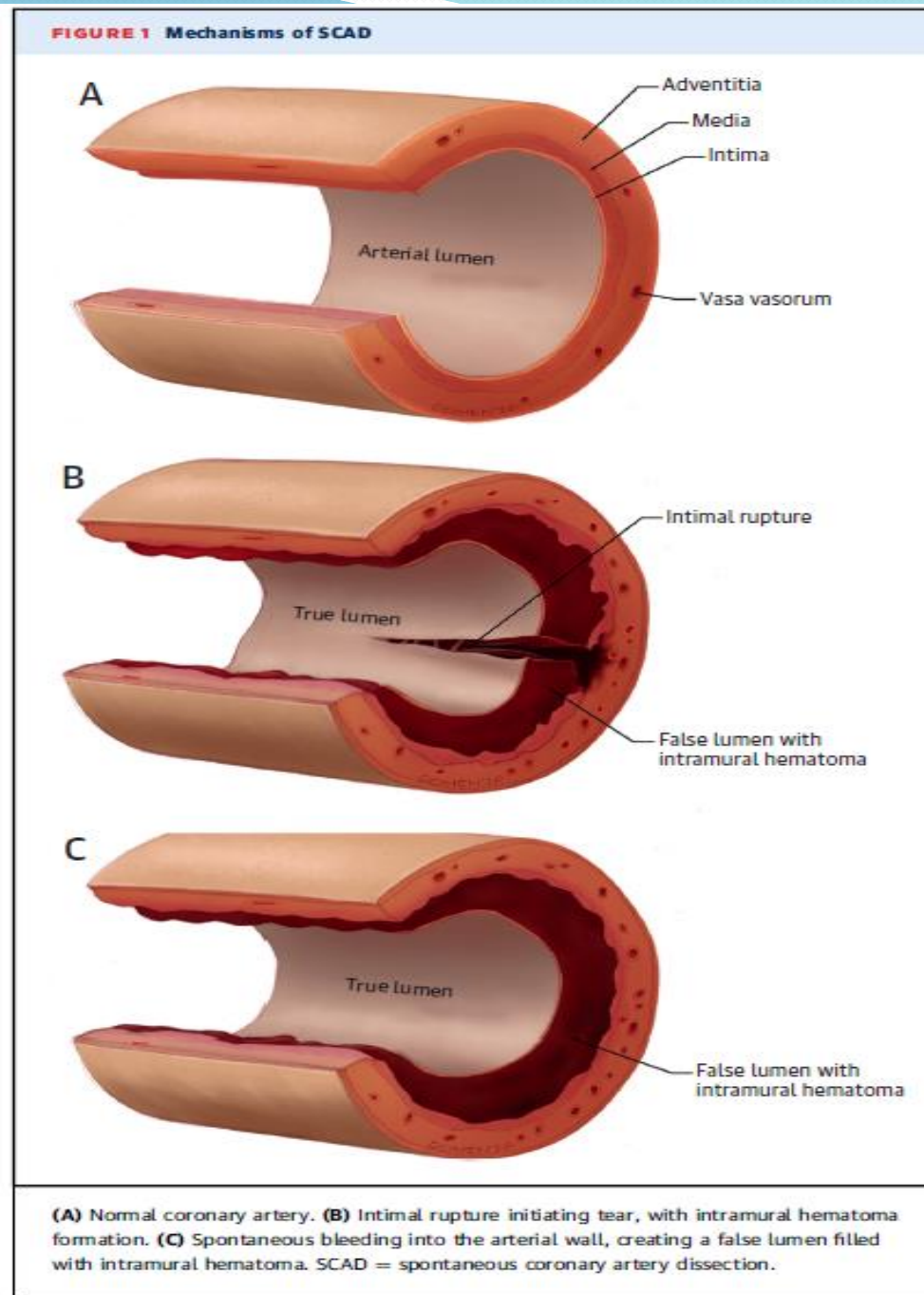
1 mm

SCAD, Saw-klassifikation





Två mekanismer bakom SCAD



Klinisk presentation av SCAD - hjärtinfarkt

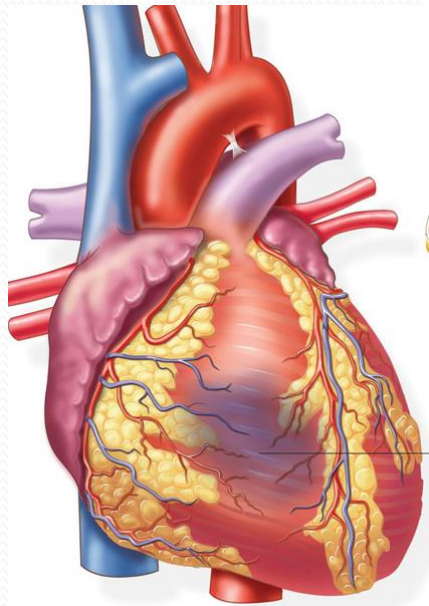
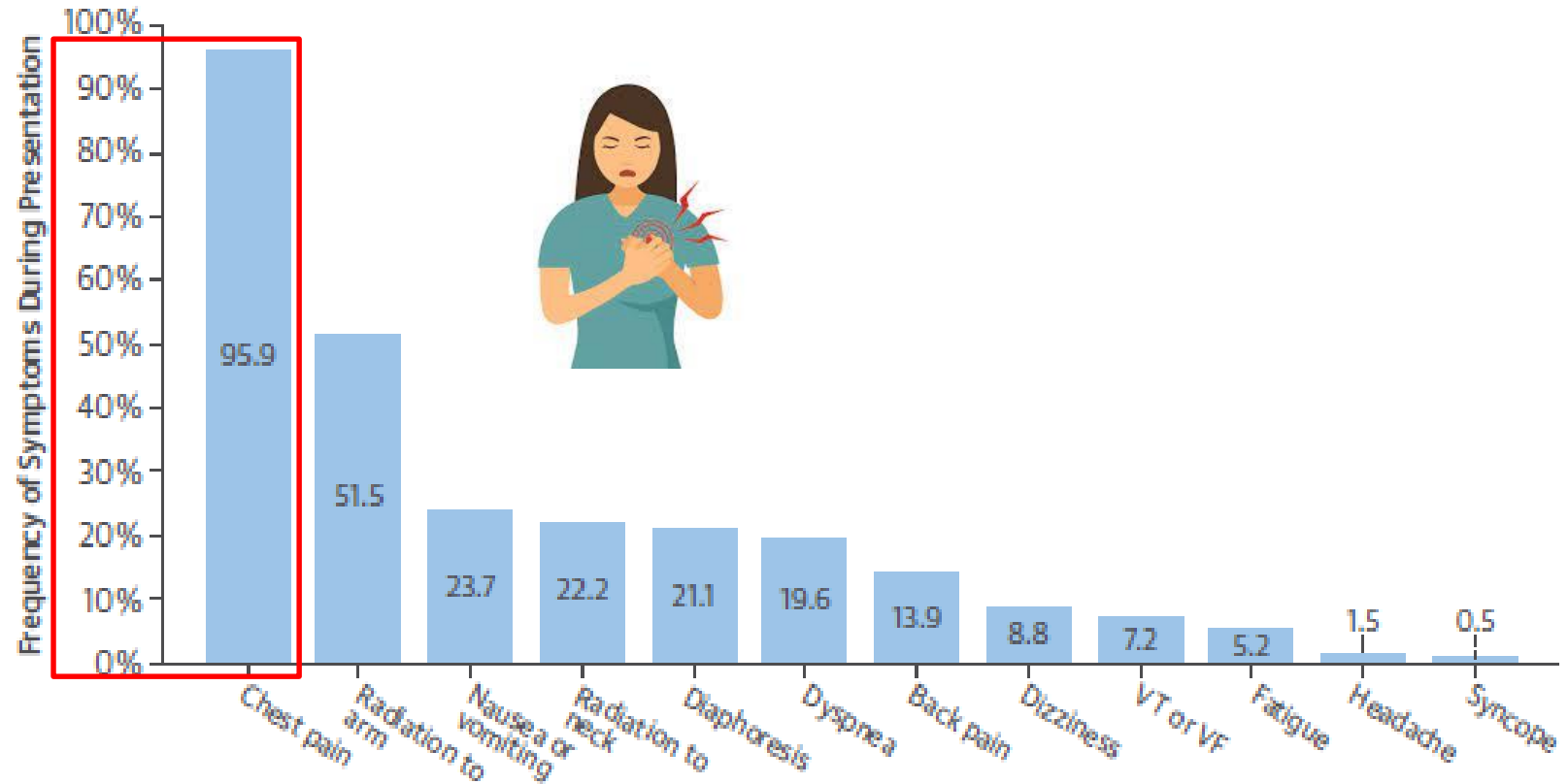


FIGURE 2 Frequency of Symptom Presentation of SCAD



Chest pain is the most commonly reported symptom with SCAD presentation (51). SCAD = spontaneous coronary artery dissection; VF = ventricular fibrillation; VT = ventricular tachycardia.

SCAD - ÅLDERSFÖRDELNING

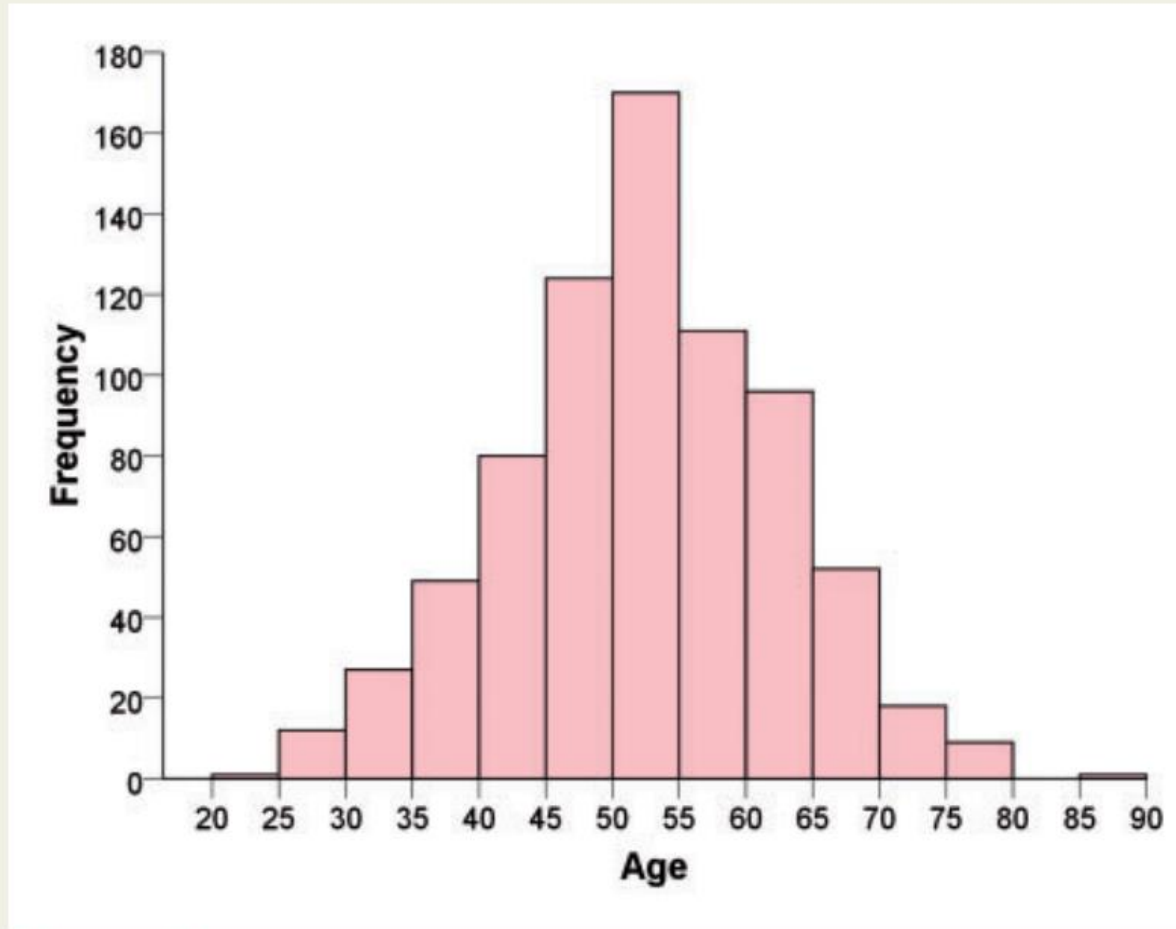
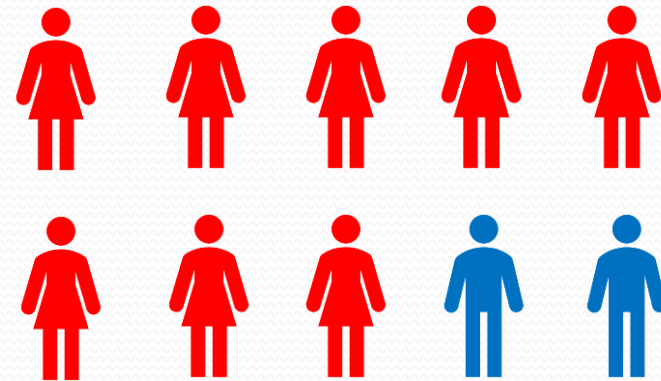


Figure 2 Histogram of age distribution.

Snittålder på drygt 50 år och den stora majoriteten är yngre än 65 år.



SCAD - UTLÖSANDE MOMENT

Table 4 Precipitating stressors and potential predisposing conditions

N (%)	N = 750
Precipitating stressors	
Emotional stress (rated high or severe)	377 (50.3)
Perceived stress scale ≥ 20	288 (41.2)
Unusually intense physical stress	216 (28.9)
Isometric stress >50 lb	74 (9.8)
Cocaine/amphetamine use	2 (0.3)
Valsalva-type stress	90 (12.0)
No precipitating factor	252 (33.6)
Predisposing conditions	
Fibromuscular dysplasia	233 (31.1)
Systemic inflammatory disease	35 (4.7)
Connective tissue disorder	27 (3.6)
Active hormonal therapy	75 (10.0)
Peripartum	34 (4.5)
Grand multigravida (≥ 5 pregnancies)	67 (8.9)
Multiparous (≥ 4 births)	64 (8.5)
Grand multiparity (≥ 5 births)	17 (2.3)
Idiopathic (none of the above)	376 (50.1)



SCAD – ANNAN SAMTIDIG SJUKLIGHET

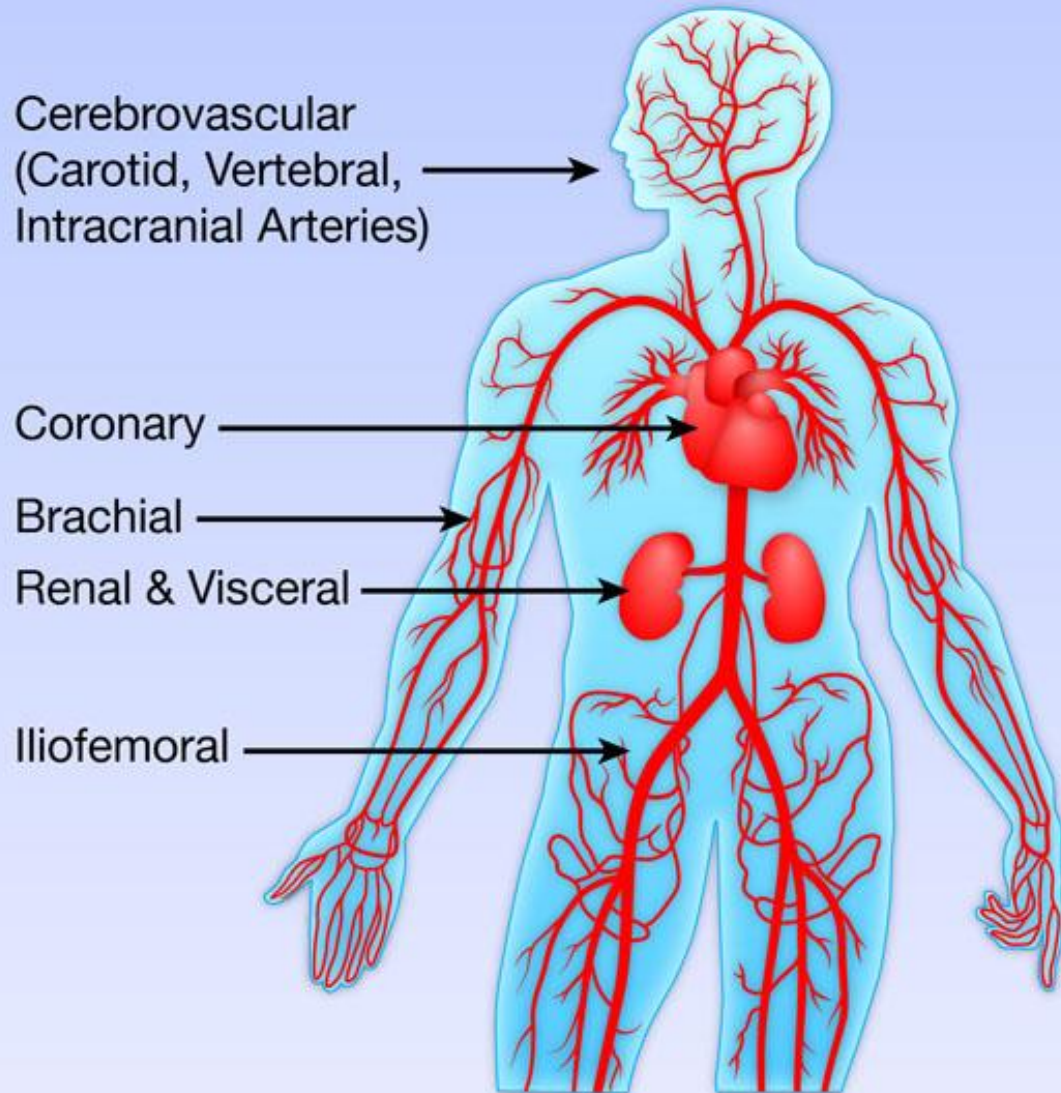
Table I Baseline demographics

Mean \pm SD, median (Q1–Q3), or n (%)	N = 750
Age (years)	51.8 \pm 10.2
Sex (female)	664 (88.5)
Medical history	
Diabetes mellitus	34 (4.5)
Diabetes mellitus on medication	16 (2.1)
Hypertension	241 (32.1)
Dyslipidaemia	152 (20.3)
Current smoker	87 (11.6)
Family history of premature CAD	285 (38.0)
Relevant clinical history	
Tinnitus	100 (13.3)
History of migraines	244 (32.5)
History of depression	146 (19.5)
On medication for depression	111 (14.8)
History of anxiety	148 (19.7)
On medication for anxiety	88 (11.7)
Thyroid dysfunction	97 (12.9)
Hypothyroid	85 (11.3)

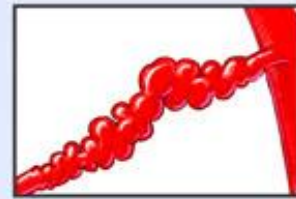


FIBROMUSKULÄR DYSPLASI (FMD) – EN SYSTEMISK KÄRLSJKDOM

Main Arterial Beds Involved



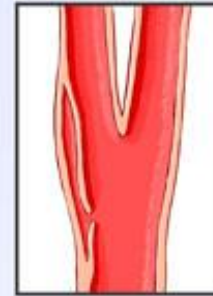
Main Arterial Manifestations



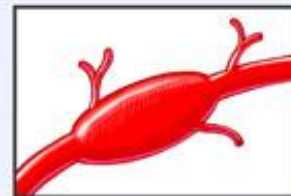
String-of-Beads*



Focal Stenosis*



Dissection



Aneurysm



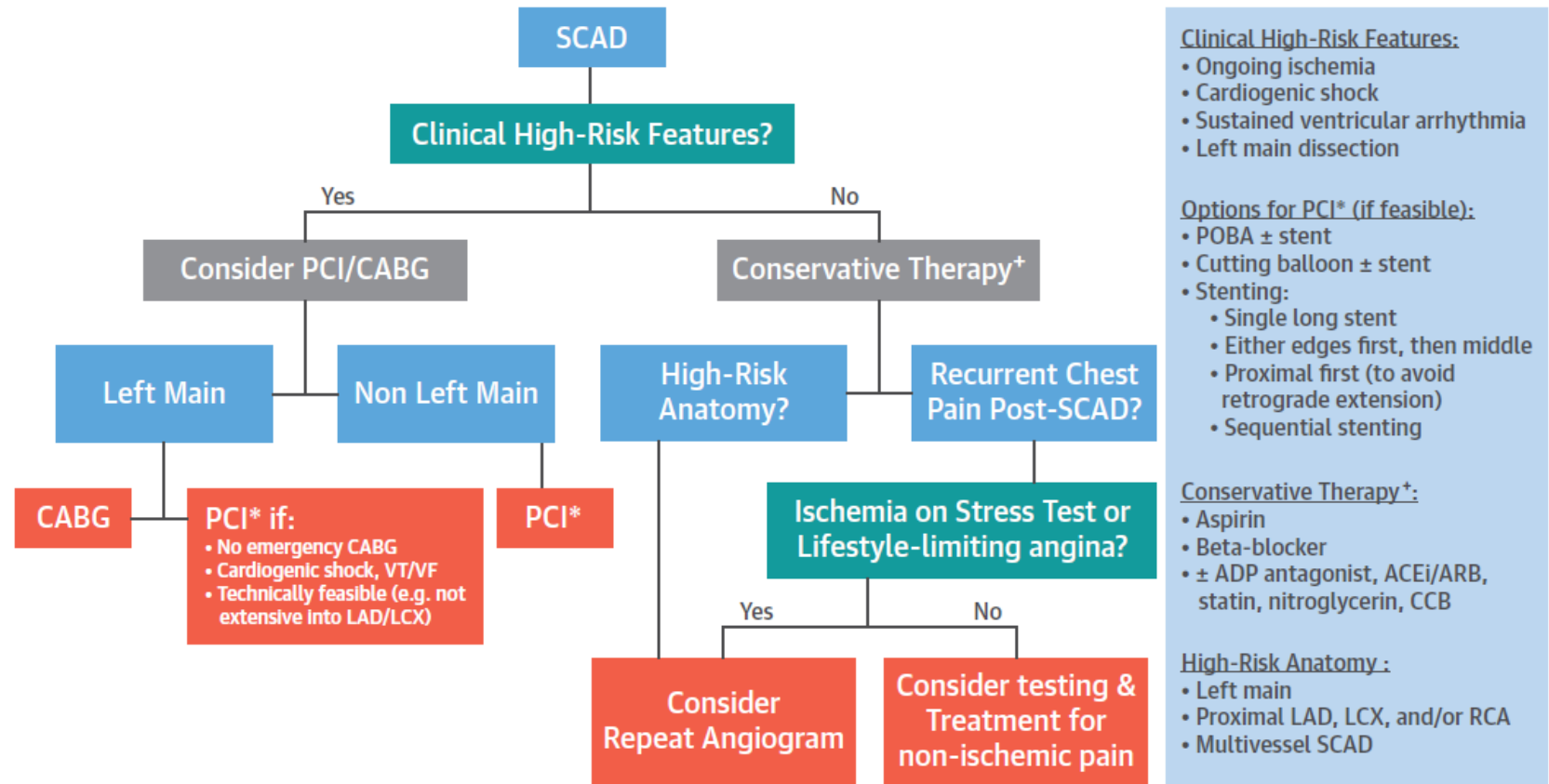
Tortuosity

HUR SKA SCAD
BEHANDLAS?



PCI?
BARA OM
MAN
ABSOLUT
MÅSTE!

CENTRAL ILLUSTRATION Suggested Algorithm for Management and Repeat Angiography

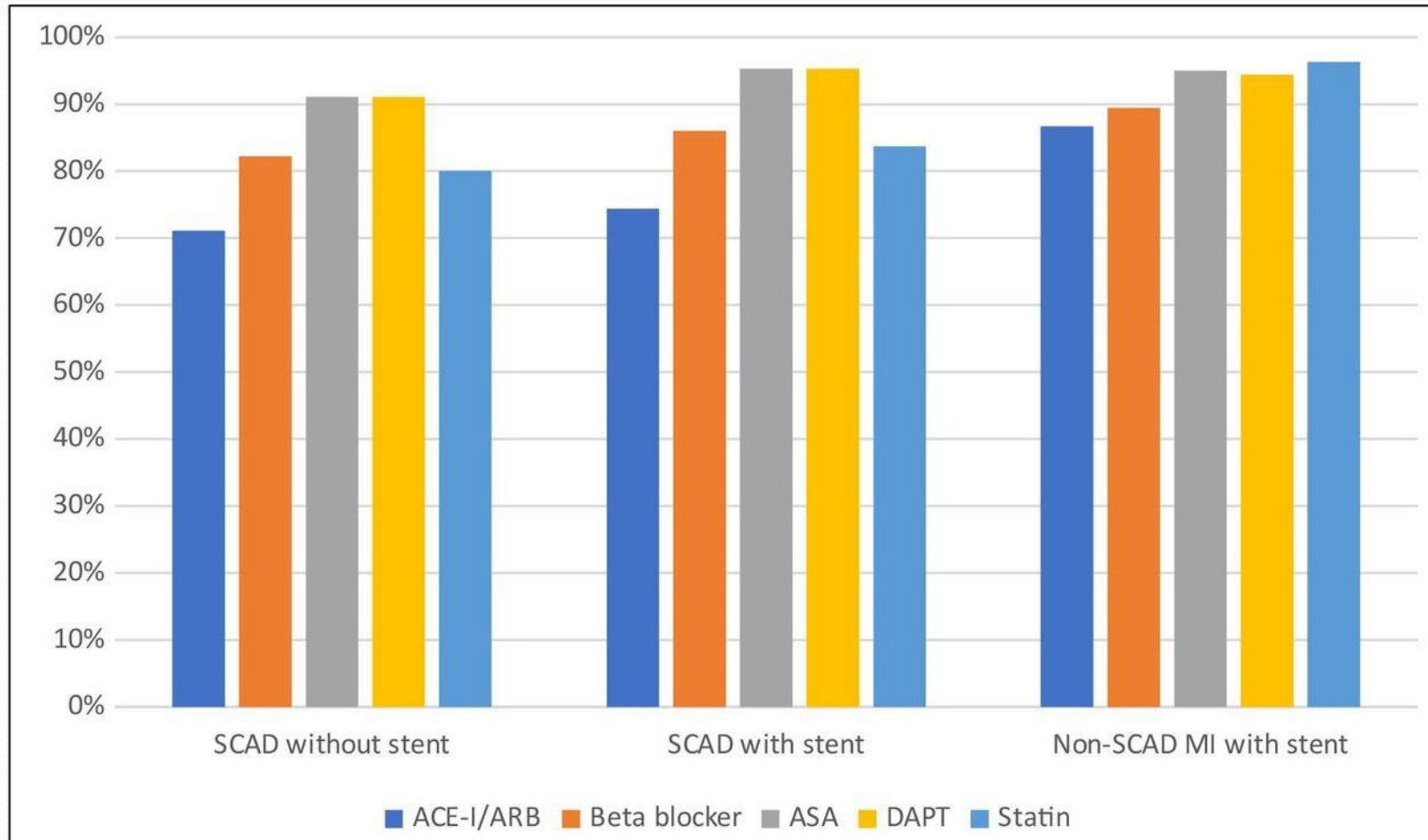


- Clinical High-Risk Features:**
- Ongoing ischemia
 - Cardiogenic shock
 - Sustained ventricular arrhythmia
 - Left main dissection
- Options for PCI* (if feasible):**
- POBA ± stent
 - Cutting balloon ± stent
 - Stenting:
 - Single long stent
 - Either edges first, then middle
 - Proximal first (to avoid retrograde extension)
 - Sequential stenting
- Conservative Therapy*:**
- Aspirin
 - Beta-blocker
 - ± ADP antagonist, ACEi/ARB, statin, nitroglycerin, CCB
- High-Risk Anatomy:**
- Left main
 - Proximal LAD, LCX, and/or RCA
 - Multivessel SCAD

Hassan, S. et al. J Am Coll Cardiol Interv. 2019;12(6):518-27.

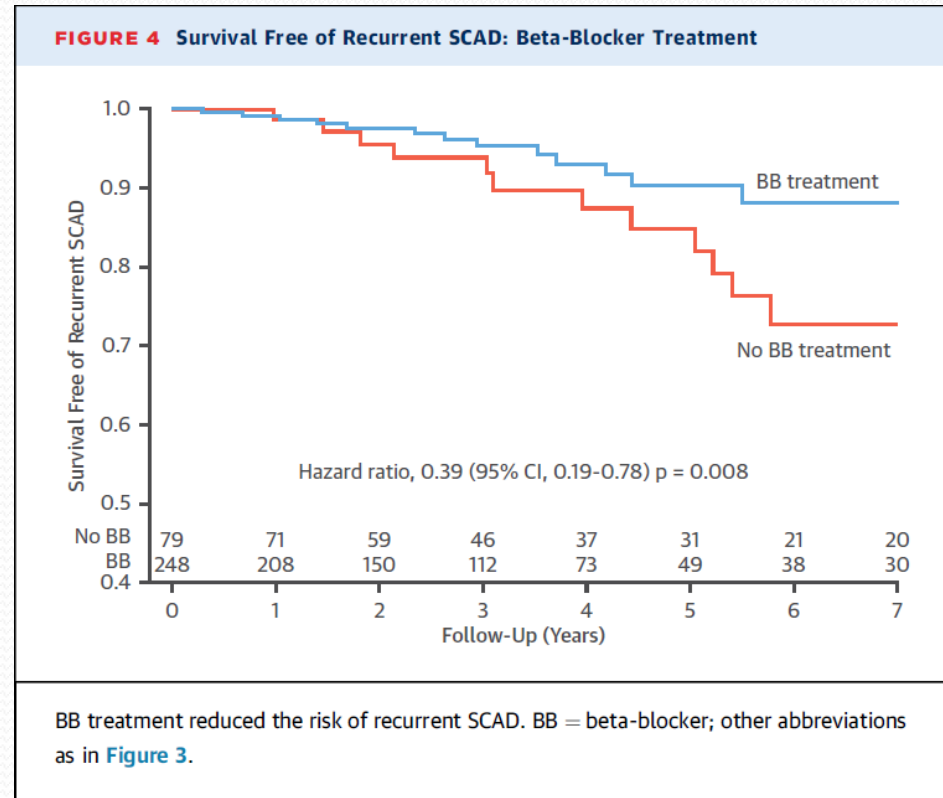
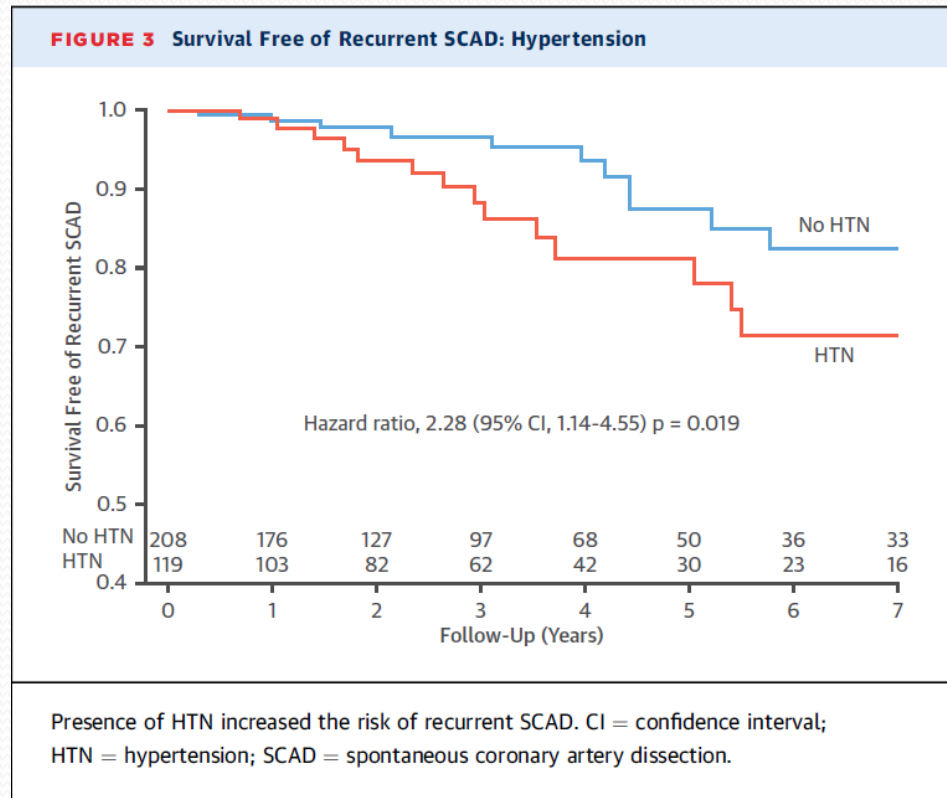
ACEi = angiotensin-converting enzyme inhibitor; ADP = adenosine diphosphate receptor; CABG = coronary artery bypass graft; CCB = calcium-channel blocker; LCX = left circumflex artery; LAD = left anterior descending coronary artery; POBA = plain old balloon angioplasty; RCA = right coronary artery; VF = ventricular fibrillation; VT = ventricular tachycardia.

Hur ser behandlingen ut av SCAD i Sverige?



Henrik Wilander et al. *BMJ Open* 2022;12:e060949

Behandla högt blodtryck – och gärna med betablockad



SweSCAD: Kardiologer på universitetsklinikerna för nationell expertis och forskning på SCAD lett av Linköping.

Tacksam för remiss på dessa patienter i lugnt skede och lyft gärna på luren när de ligger inlagda!



Tack för att ni lyssnat!



The original STICH study

- In the Surgical Treatment in Ischemic Heart Failure (STICH) trial from 2011 CABG+OMT was compared with OMT alone. Although the primary outcome of all-cause mortality at the end of the initial 5-year follow-up period did not differ between the groups, a 16% lower risk of death was observed at the extended 10-year follow-up in the CABG+OMT group.
- The mean age was 60 and 59 years in the CABG and OMT groups, respectively. The patients were symptomatic with 86% in the CABG arm and 85% in the OMT arm reporting NYHA class II or III, and 43% of both arms reporting CCS class II symptoms.
- At the time STICH took place (2002 to 2007) the class I recommended medical therapies for HFrEF were angiotensin converting enzyme inhibitors (ACE-I), beta blockers, and digitalis.

Study design



STICH SWEDEHEART

A Swedish multicentre, randomized, open label clinical trial.

All outcomes will be analysed using the **intention-to-treat** principle.

Eligible subjects will be randomized after providing informed consent. Eligible subjects will be randomized using permuted block **randomization with 1:1 ratio**. Randomization will be stratified by site, sex and acute coronary syndrome.

With the exception of the revascularization procedure itself, the study procedures are independent of what randomized group the patient is belonging to. In the intervention arm, patients will be revascularized by PCI, and patients in the control arm will be revascularized by CABG. All patients will receive **medical treatment according to guidelines**.

Study-specific follow-up by **telephone** will be performed **at years 1, 2 and 3**, as well as at the **end of the study**. Yearly follow-up by telephone may continue for a maximum of **25 years**.

Inclusion criteria



STICH SWEDEHEART

- **Age \geq 18 years**
- **Symptomatic HF** (NYHA HF class II-IV within 1 month of enrolment)
- **LVEF \leq 40%** (by either echocardiography or gated SPECT ventriculography, or MRI or any other recognized assessment of LV)
- **Meaningful amount of myocardium at risk because of multi-vessel or left main CAD** (BCIS myocardial jeopardy score \geq 6 on a recent (<6 months) coronary angiogram).
- **Heart team believes that complete revascularization can be achieved by both PCI or CABG** (complete revascularization defined as residual ischemia in <10% of the left ventricle)
- Heart team agrees that **guideline directed medical therapy** has been initiated for \geq 1 month in prevalent and newly diagnosed cases. In patients hospitalized with newly diagnosed iLVSD (with or without ACS) requiring revascularization before discharge, GDMT needs to be initiated, when possible, in-hospital before randomization, with the expectation that it will be titrated to maximally tolerated doses after revascularization
- **Written informed consent**

Exclusion criteria



STICH SWEDEHEART

- **Previous randomization** in the study
- **Decompensated heart failure** requiring inotropic/adrenergic support, invasive or non-invasive ventilation or intra-aortic balloon pump/ ventricular assist device therapy less than 48 hours prior to randomization
- **Recent STEMI** (<1 month)
- **Recent PCI** (<3 months)
- Valvular heart disease or other **cardiac conditions requiring surgical repair/replacement** (e.g. LV aneurysm)
- Prohibitive bleeding risk or **clinical scenario mandating avoidance of long-term DAPT**
- Expected **survival less than 3 years** due to non-cardiac illness
- Circumstances likely to lead to **poor treatment compliance**
- Individuals for whom **record in public health databases is not accessible** (non-eligibility to public health system, parallel healthcare systems)
- **Pregnancy** or woman of **childbearing potential** who is not sterilized or using a medically accepted form of contraception

Study endpoints



STICH SWEDEHEART

Primary endpoint

- The occurrence of the composite of death, stroke, non-procedural myocardial infarction or heart failure hospitalization at 3 years

Key secondary endpoint

- Key secondary endpoint: The hierarchical occurrence (in descending order of importance) at 3-year follow-up of time to death, time to stroke, time to non-procedural myocardial infarction, number of heart failure hospitalizations and 1-year Kansas City Cardiomyopathy Questionnaire (KCCQ) score; evaluated using the win ratio approach.