



Management of Chronic Coronary Syndrome CCS: Targeting Patients' Personalized Approach

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Case 1: Case Summary

- UKMN, 58 yr old
- Medical check up for occasional exertional chest discomfort x 6 months
- **CVRF :**
 - Smoker
 - Hypertension
 - Type 2 DM – Diet control due to hypoglycaemic episodes with OHA
 - Hypercholesterolemia
 - OSA – not on CPAP

Physical examination

- Fully conscious and orientated
- Currently not in pain
- BP 130/80 mmHg
- HR 80/min
- No S/- of heart failure
- No focal neurological deficit

Blood tests

Hb	14.8
WBC	8.94
Platelet	277
Creatinine	0.7 mg/dl
Na	140
K	4.5
Cl	108
HCO ₃	22
CRP	1.4
ALT	11.3

HbA1C	7.1
Total cholesterol	3.6
LDL	2.35
TG	1.7
HDL	1.07
Uric acid	524
Trop I	0.02
TSH	2.35
Urine RE	No proteinuria
Serology screening	Non reactive

58 Years

Male

23-Mar-23 13:49:24

Rate 63 . Sinus rhythm.....normal P axis, V-rate 50-99
 PR 171 . Probable left atrial enlargement.....P >50ms, <-0.10mv V1
 QRS 104 . Anteroseptal infarct, old.....Q >40ms, V1-V2
 QT 335 . Borderline repolarization abnormality.....ST dep & abnormal T
 QTc 394

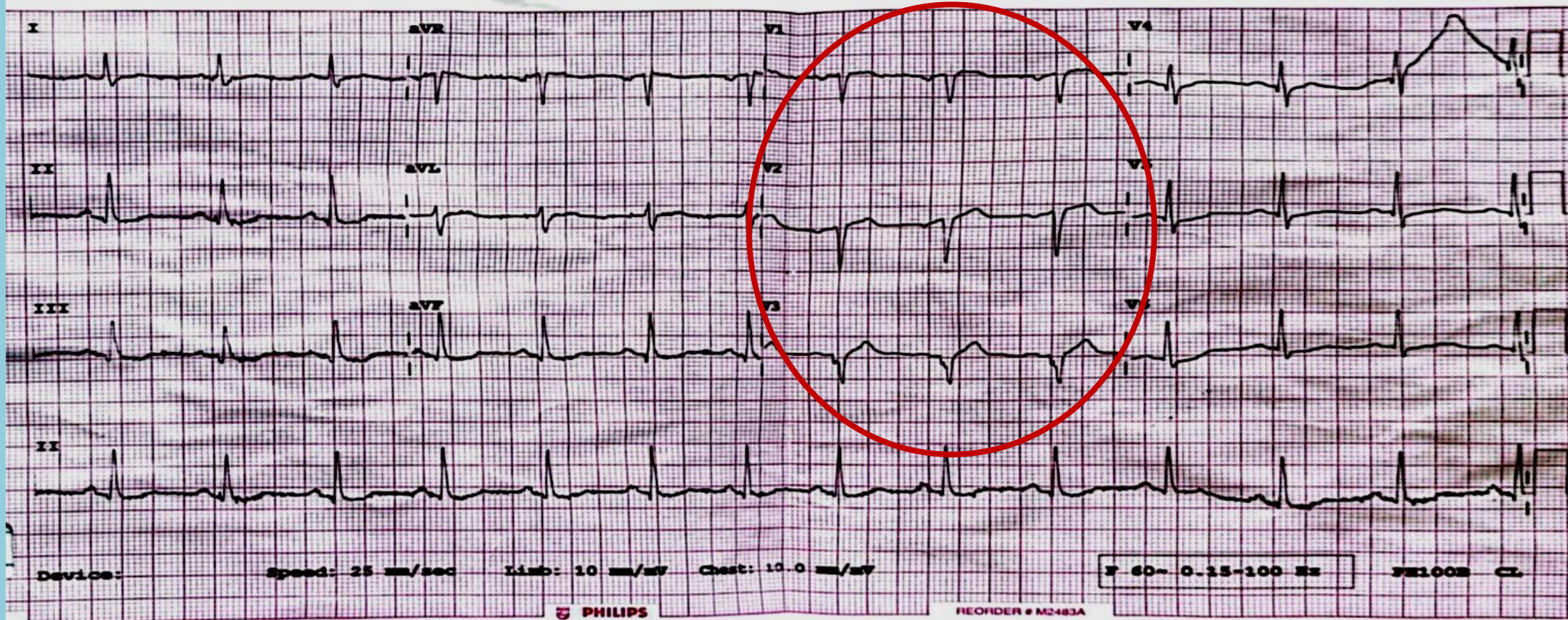
--AXIS--

P 63
 QRS 77
 T -33

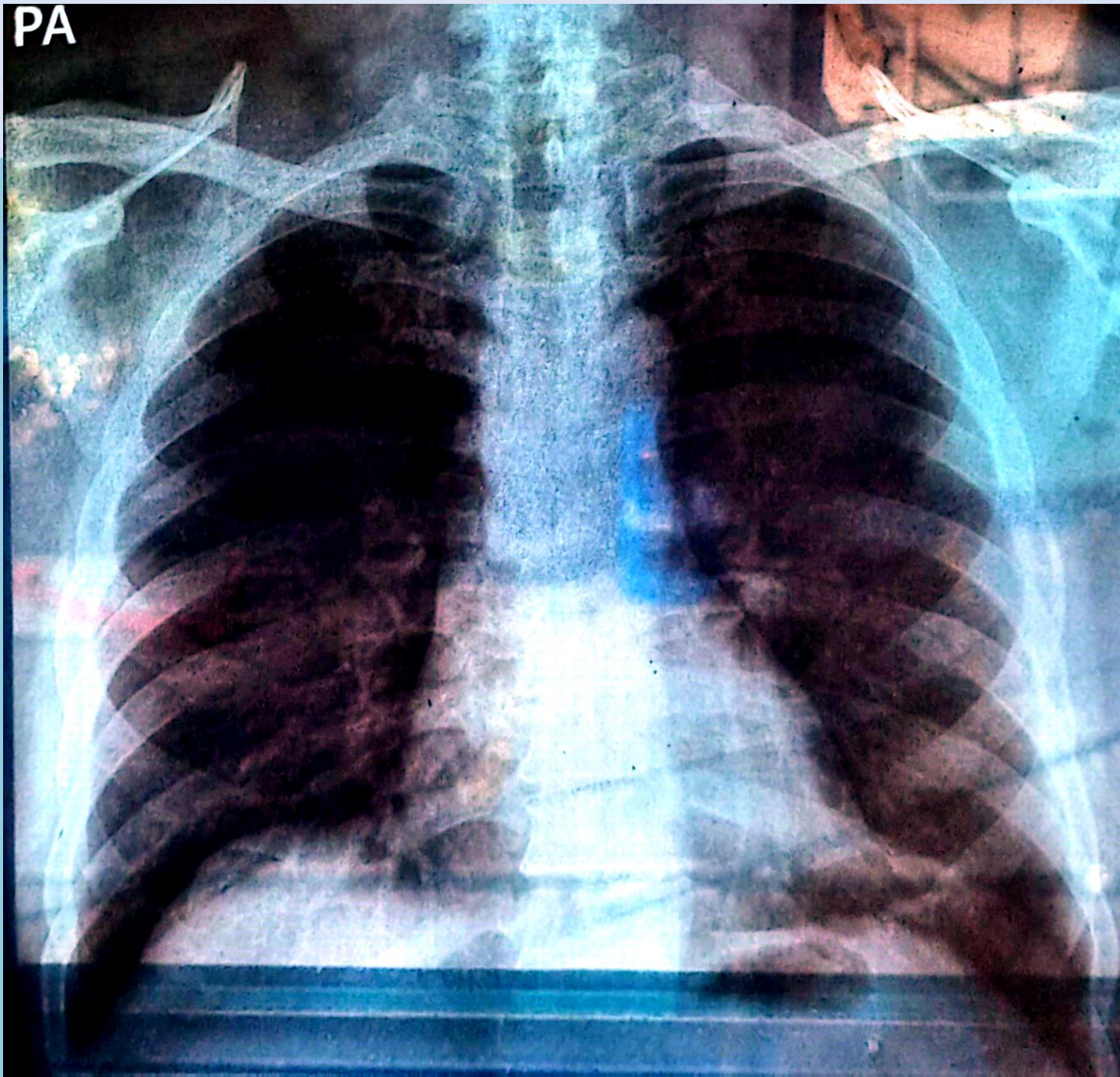
- ABNORMAL ECG -

12 Lead; Standard Placement

Unconfirmed Diagnosis



PA



**YANGON GENERAL HOSPITAL
CARDIOLOGY DEPARTMENT**

ECHOCARDIOGRAM REPORT

Patient Demographics

Patient ID: 37511320230323		Study Date: 23/03/2023	
Age: 58y	Gender: M	Ht:	Wt:
Referring Physician:		Performed By:	

Adult Echo: Measurements and Calculations

2D

MPA Diam	1.7 cm
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MMode

IVSd (MM)	1.03 cm	LVIDs (MM)	4.00 cm	AoR Diam (MM)	2.5 cm
LVIDd (MM)	5.00 cm	LVPWs (MM)	1.56 cm	AV Cusp Sep	1.8 cm
LVPWd (MM)	1.18 cm	EF (MM-Teich)	40.7 %	LA/Ao (MM)	1.12
IVSs (MM)	1.11 cm	LA Dimen (MM)	2.8 cm		

Left Ventricle

EDV (MM-Teich)	118 ml	A2Cs	44.2 ml	EF (BF)	46.9 %
ESV (MM-Teich)	70.0 ml	EDV (A2C)	86.8 ml	LV Mass (Cubed)	208 g
SV (MM-Teich)	48.0 ml	EDV (A4C)	84.6 ml	SV (A4C)	36.3 ml
FS (MM-Teich)	20.0 %	ESV (A2C)	44.2 ml	EF (A4C)	42.9 %
EF (MM-Teich)	40.7 %	ESV (A4C)	48.3 ml	SV (A2C)	42.6 ml
A4Cd	84.6 ml	EDV (BP)	86.0 ml	EF (A2C)	49.1 %
A4Cs	48.3 ml	ESV (BP)	45.7 ml		
A2Cd	86.8 ml	SV (BP)	40.3 ml		

Left Atrium

LA Dimen (MM)	2.8 cm
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AV Vmax	
Max PG	6 mmHg
Vmax	1.21 m/s

Mitral Valve

MV Peak E Vel	0.616 m/s	MV E/A	0.6
MV Peak A Vel	1.02 m/s	MR Vmax	2.61 m/s

Tricuspid Valve

TR Vmax		RVSP	18 mmHg
Max PG	8 mmHg		
Vmax	1.40 m/s		

Pulmonic Valve and Vessels

MPA Diam		PV Vmax		PV Accel Time	
Dist	1.7 cm	Max PG	5 mmHg	Slope	1276 cm/s ²
		Vmax	1.07 m/s	Time	102 ms
				P½t	31.8 ms

Other Measurements

<u>Dimensions: Diameters</u>	
RVIDd 2D	2.0 cm
Ao/LA(MM)	0.893
<u>Dimensions: Diameters</u>	
RWT	0.472

Comments

NORMAL CHAMBERS DIMENSION
REDUCED LVEF 46%
APICAL, APICOSEPTAL AND ANTEROSEPTAL WALL HYPOKINESIA
IMPAIRED LV RELAXATION (GRADE 1 DIASTOLIC DYSFUNCTION)
MILD MR
NO PULMONARY HYPERTENSION
NO THROMBUS
NO PERICARDIAL EFFUSION

Diagnosis

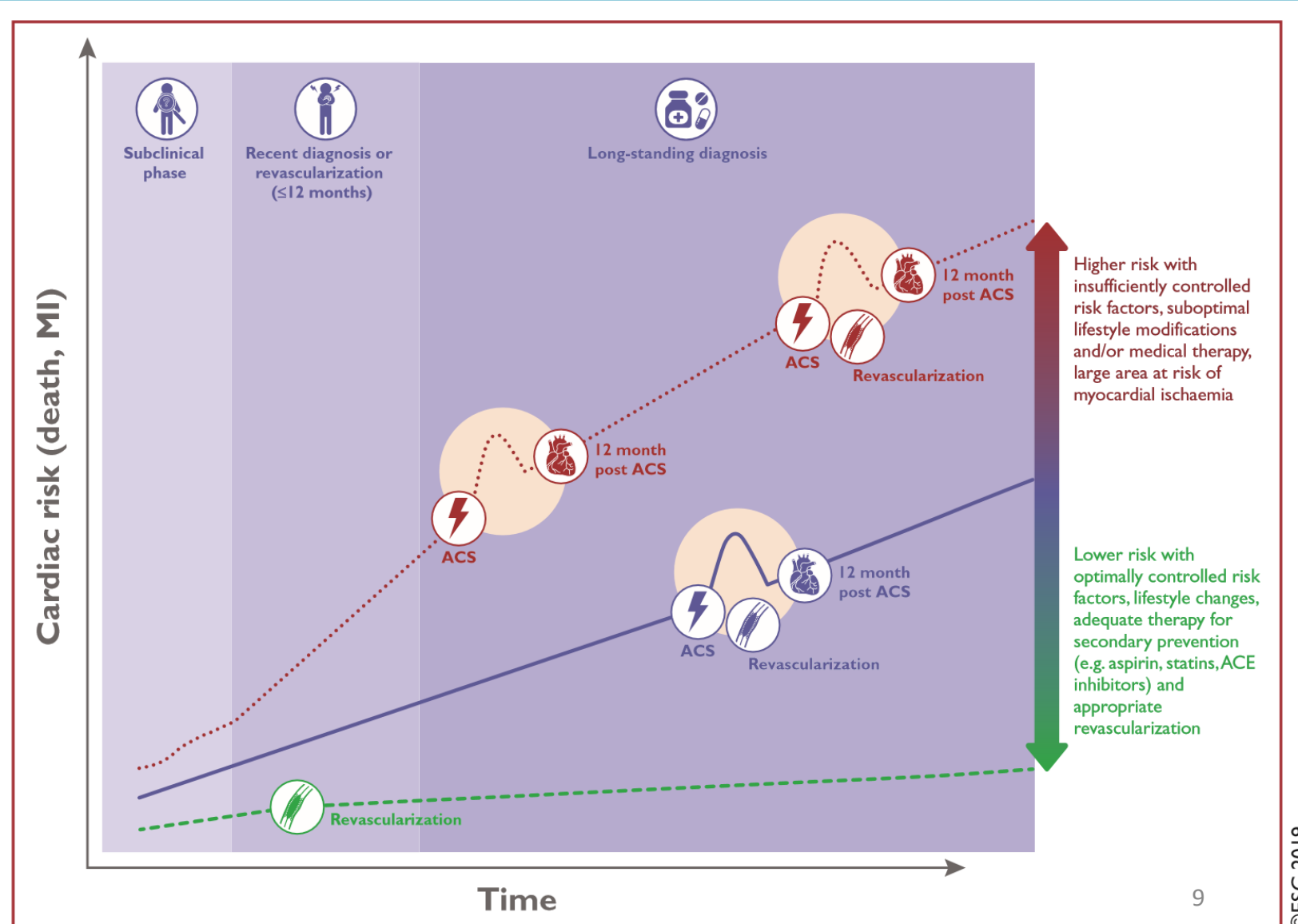
**Chronic coronary syndrome (Months-old anteroseptal MI)
(Silent Infarct in uncontrolled DM)**

CAD: ACS and CCS “Dynamic Nature”

Coronary artery disease (CAD) is a pathological process characterized by atherosclerotic plaque accumulation in the epicardial arteries.

Clinical presentation of CAD can be categorized as either acute coronary syndromes (ACS) or chronic coronary syndromes (CCS).

“dynamic process” of atherosclerosis and altered arterial function ”



Chronic Coronary Syndromes

6 Common Scenarios



Patients with suspected CAD and 'stable' anginal symptoms, and/or dyspnoea



Patients with new onset of HF or LV dysfunction and suspected CAD



Patients with stabilised symptoms < 1 year after an ACS or patients with recent revascularisation

Chronic Coronary Syndromes

6 Common Scenarios



**Patients
> 1 year after initial
diagnosis or
revascularisation**



**Patients with
angina and
suspected
vasopastic or
microvascular
disease**

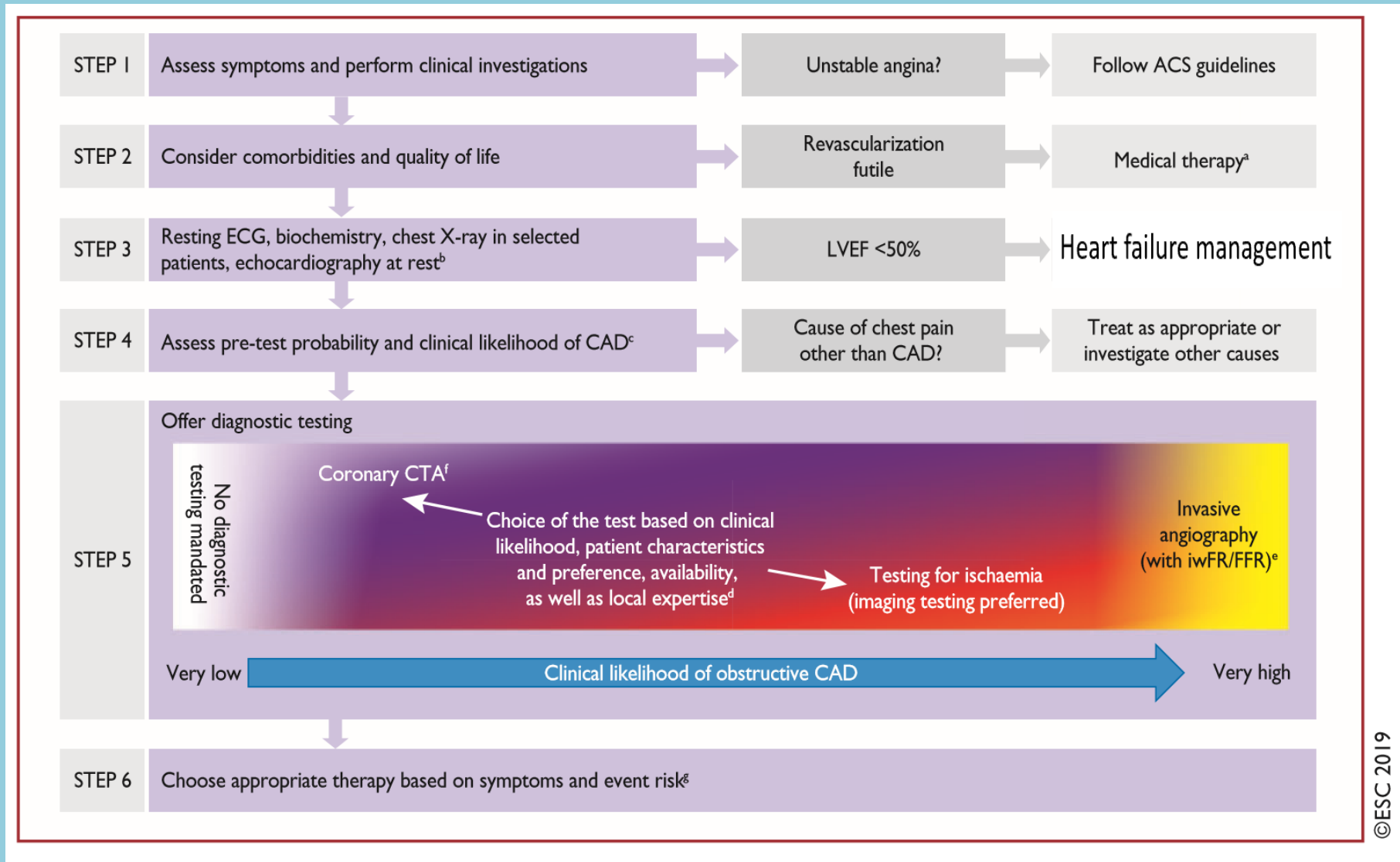


**Asymptomatic
subjects in
whom CAD is
detected at
screening**

Management Plan???

1. Exercise treadmill test
2. CT calcium score and CT coronary angiogram
3. Stress Echo
4. Invasive coronary angiogram
5. No further investigation and medical treatment for CCS

Approach for the initial diagnostic management of patients with angina/Dyspnoea and suspected coronary artery disease



STEP I Assess symptoms and perform clinical investigations

Unstable angina?

Follow ACS guidelines

Grade	Description of angina severity
I	Angina only with strenuous exertion
II	Angina with moderate exertion
III	Angina with mild exertion
IV	Angina at rest

Unstable angina may present in one of three ways:

- (i) as **rest angina**, i.e. pain of characteristic nature and location occurring at rest and for prolonged periods (**>20 min**)
- (ii) new-onset angina, i.e. recent (2 months) onset of **moderate-to-severe angina** (CCS grade II or III) or
- (iii) **crescendo angina**, i.e. previous angina, which progressively increases in severity and intensity, and at a lower threshold, over a short period of time.

STEP 2

Consider comorbidities and quality of life

Revascularization
futile

Medical therapy^a

- **Assess the patient's general health, comorbidities, and quality of life**

- **Clinically indicated minimum further testing**
- **Appropriate medical therapy**
- **Guideline-based risk-factor modification**

STEP 3

Resting ECG, biochemistry, chest X-ray in selected patients, echocardiography at rest^b

LVEF <50%

Heart failure management

History

- HF symptoms
- Past CAD events
- major cardiovascular comorbidity (AF, hypertension, or valvular dysfunction)
- non-cardiovascular comorbidity (CKD, diabetes, anaemia, or cancer)
- Current medical therapy, adherence, and tolerance

Physical exam

- HF signs

ECG - heart rate and rhythm, extrasystole, signs of ischaemia, pathological Q waves, hypertrophy, conduction abnormalities, and bundle branch block

Imaging

Echocardiography - systolic dysfunction, diastolic dysfunction, hypertrophy, chamber volumes, valvular function, and evidence of pulmonary hypertension.

Chest X-ray - pulmonary congestion, interstitial oedema, infiltration, or pleural effusion

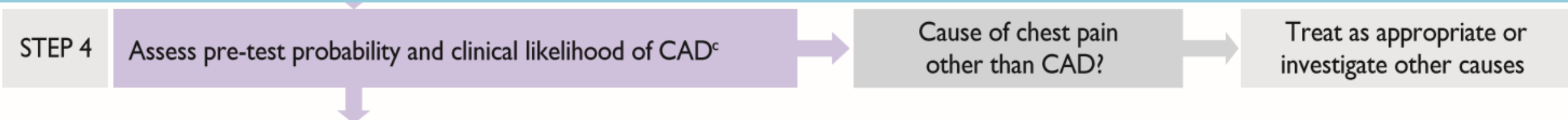
coronary angiography (or coronary CTA) - presence and extent of CAD

Lab investigations

Natriuretic peptide

Renal function, serum electrolytes

Liver function



Age	Typical		Atypical		Non-anginal		Dyspnoea ^a	
	Men	Women	Men	Women	Men	Women	Men	Women
30–39	3%	5%	4%	3%	1%	1%	0%	3%
40–49	22%	10%	10%	6%	3%	2%	12%	3%
50–59	32%	13%	17%	6%	11%	3%	20%	9%
60–69	44%	16%	26%	11%	22%	6%	27%	14%
70+	52%	27%	34%	19%	24%	10%	32%	12%

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Dark green (PTP >15%) - Non-invasive testing - **beneficial**

Light green (PTP 5-15%) - Non-invasive testing - **may be considered** after assessing the overall **clinical likelihood** based on the **modifiers of PTPs**

Grey (PTP <5%) - **No** diagnostic testing (only for compelling reasons)

PTP based on sex, age and nature of symptoms (Table 5)

Decreases likelihood

- Normal exercise ECG^a
- No coronary calcium by CT (Agatston score = 0)^a

Increases likelihood

- Risk factors for CVD (dyslipidaemia, diabetes, hypertension, smoking, family history of CVD)
- Resting ECG changes (Q-wave or ST-segment/T-wave changes)
- LV dysfunction suggestive of CAD
- Abnormal exercise ECG^a
- Coronary calcium by CT^a

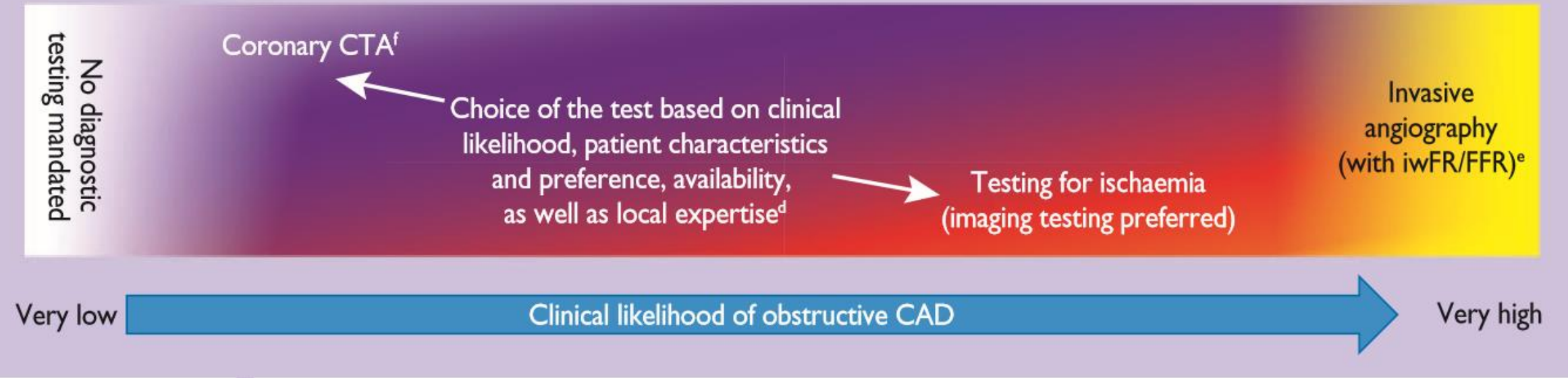
Clinical likelihood of CAD

Modifiers of PTPs

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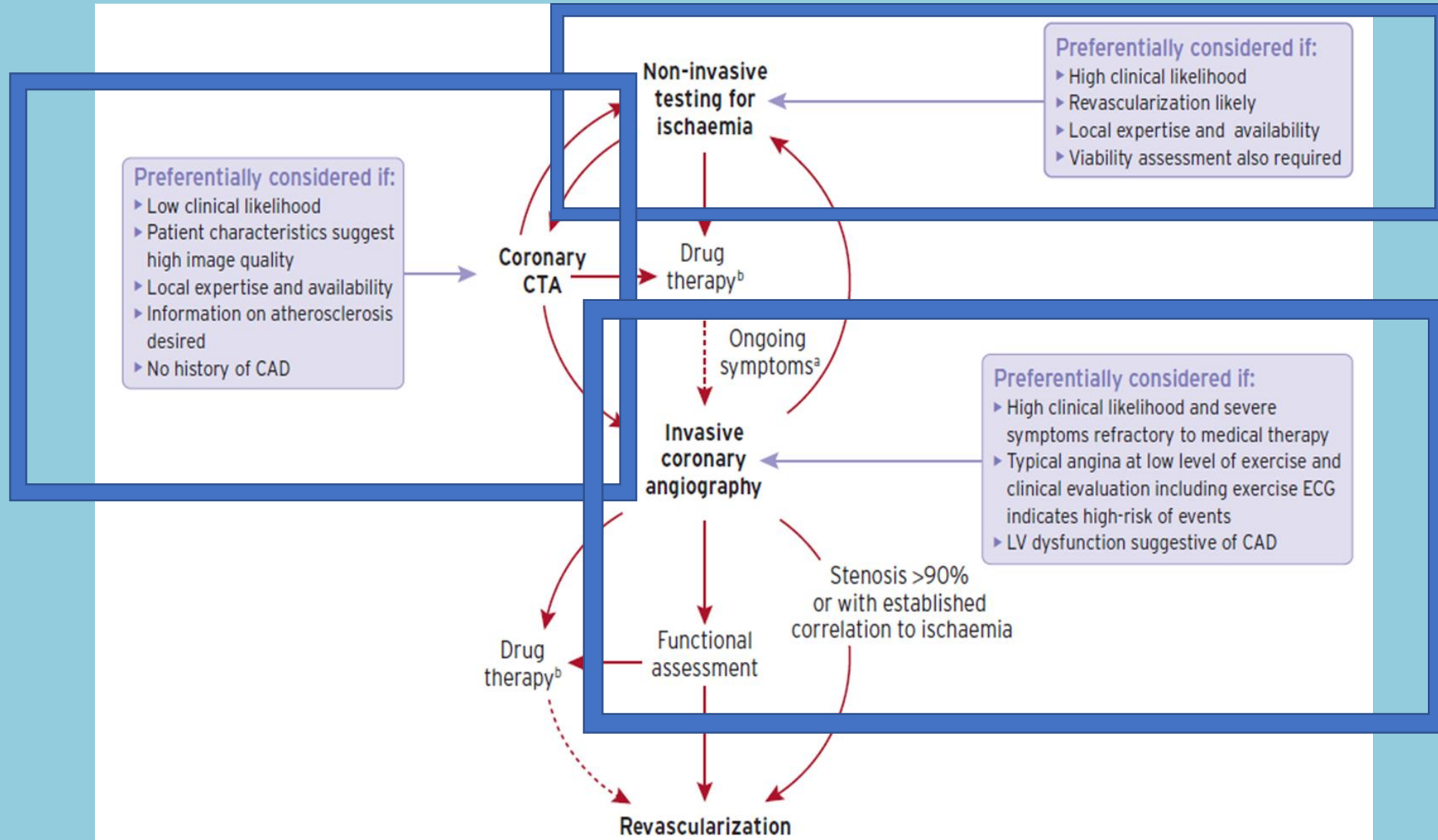
Offer diagnostic testing

STEP 5



- **Functional** non invasive test - stress CMR or stress echocardiography, SPECT, PET, myocardial contrast echocardiography, or contrast CMR.
- **Anatomical** non invasive test - coronary CTA
- **Exercise ECG**

Main diagnostic pathways in symptomatic patients with suspected obstructive coronary artery disease

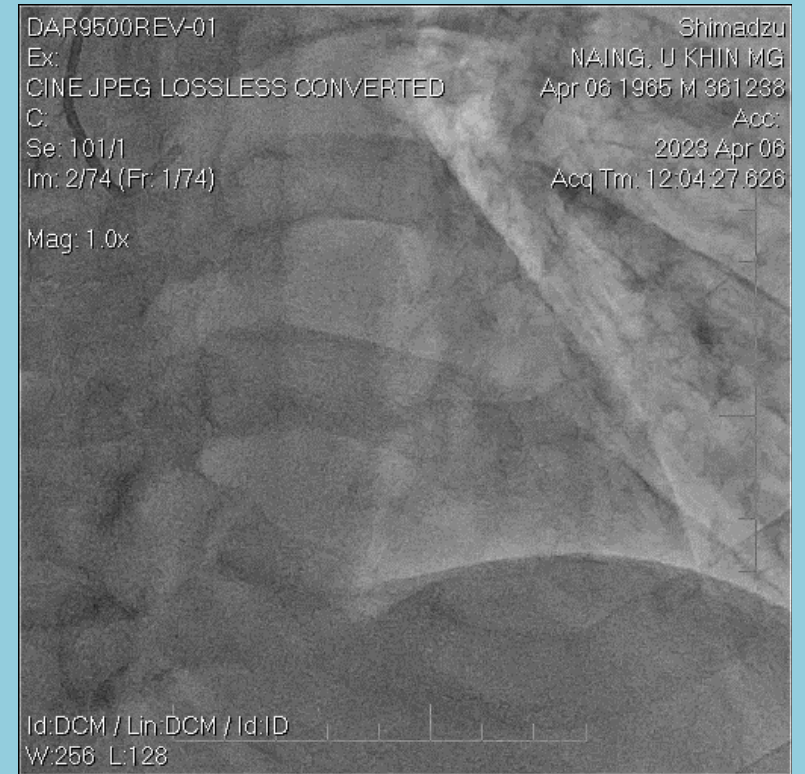


Invasive Coronary Angiogram

LAD



LAD

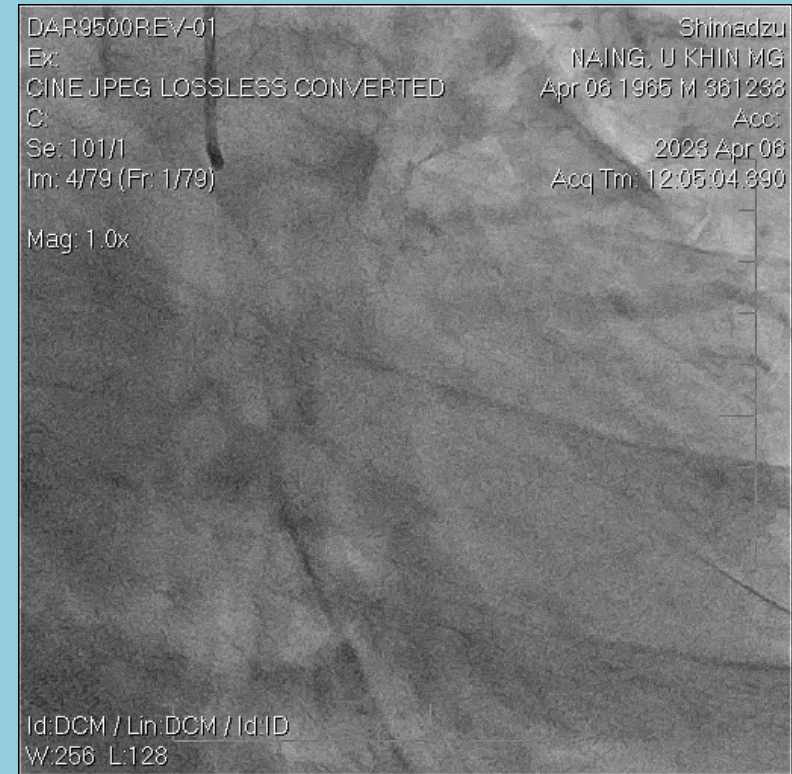


Invasive Coronary Angiogram

LAD

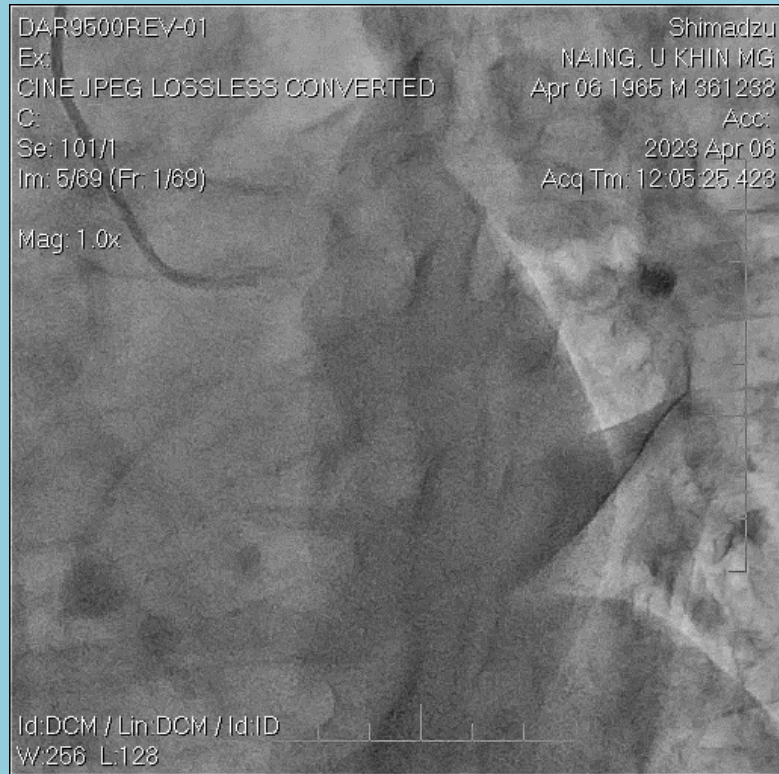


LCX

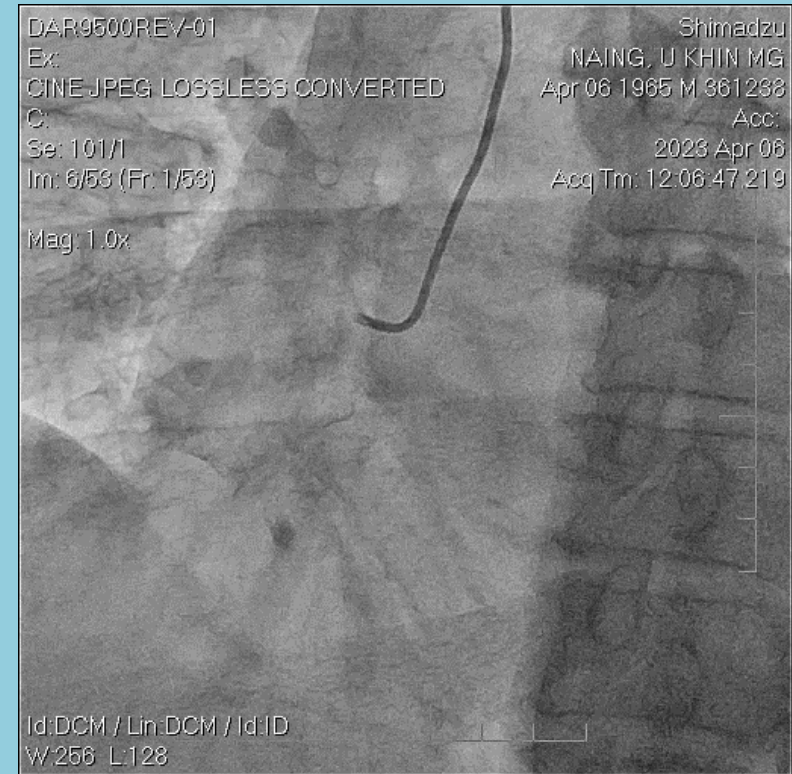


Invasive Coronary Angiogram

LM/LCX

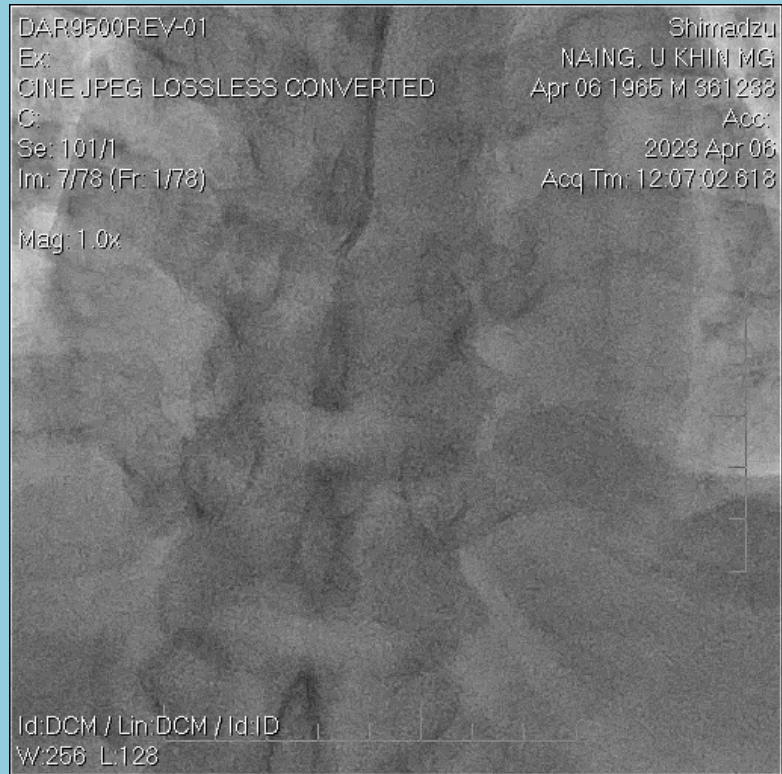


RCA



Invasive Coronary Angiogram

RCA



RCA



Diagnosis

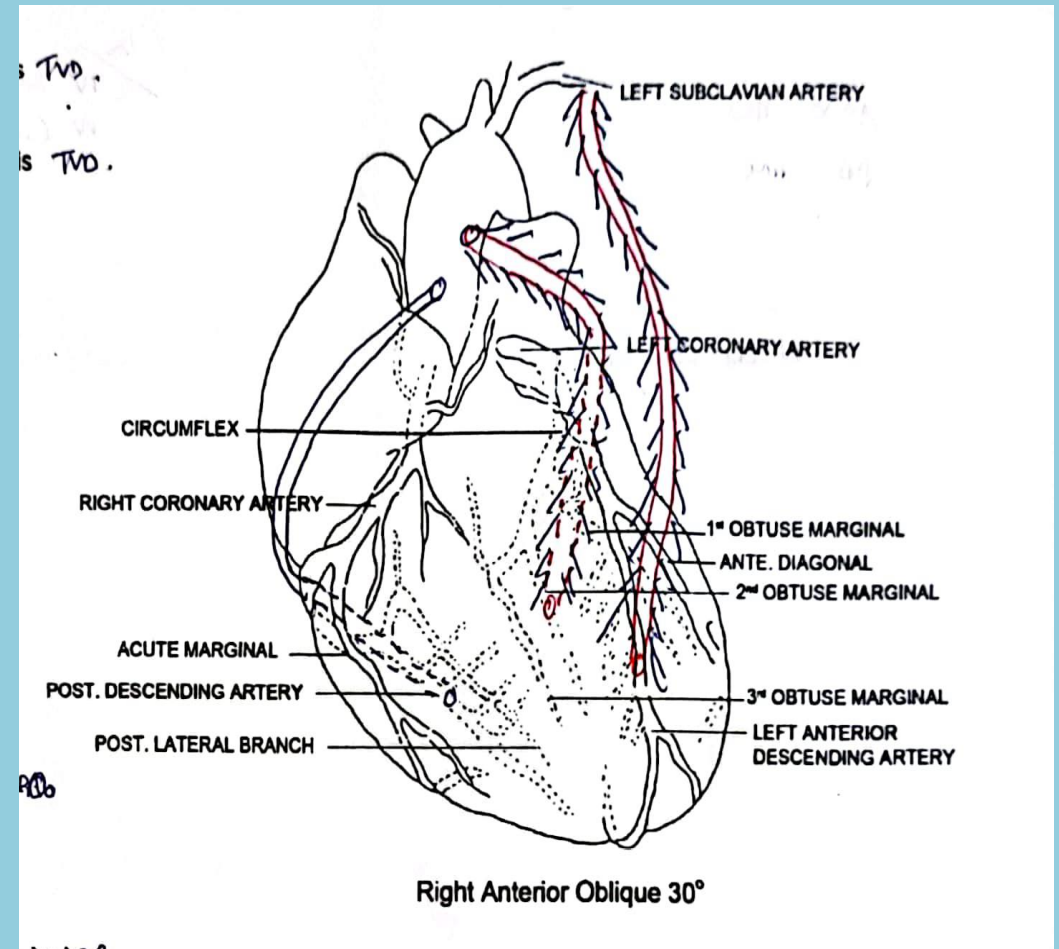
- **Chronic coronary syndrome (Months-old anteroseptal MI)
(Silent Infarct in uncontrolled DM)**
- **Triple Vessels CAD**

Underwent CABG – 3 Grafts

LIMA to LAD

Left Radial art to OM2

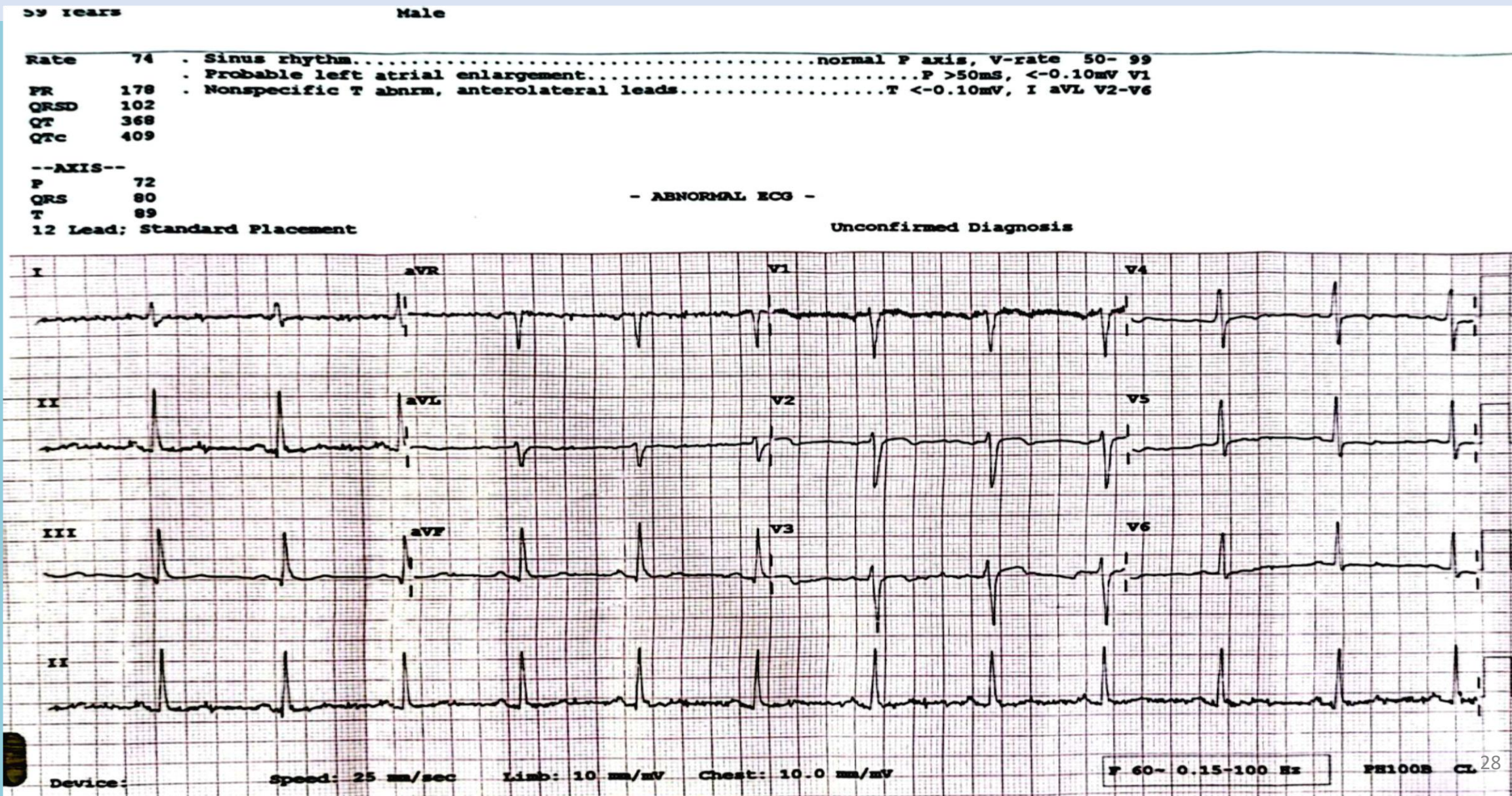
SVG to PDA



Medications

- Aspirin 81 mg OD
 - Clopidogrel 75 mg OD
 - Atorvastatin 40 mg HS
 - Bisoprolol 2.5 mg OD
 - Coversyl 5 mg HS
 - Metformin 500 mg BD
 - Sitagliptin 50 mg OD
 - Vasteral 80 mg OD
 - Diltiazem 30mg TDS for 3 months
 - Pantoprazole 40 mg OD
- Cosyrel 1 tab HS
(Bisoprolol 5 mg + Perindopril 5 mg)

3 month follow up



YANGON GENERAL HOSPITAL

CARDIOLOGY DEPARTMENT

ECHOCARDIOGRAM REPORT

Patient Demographics

Patient ID: OPD/ 18.9.23	Study Date: 18/09/2023
Age: [REDACTED]	Gender: M
Ht: [REDACTED]	Wt: [REDACTED]
BSA: [REDACTED]	Perform: [REDACTED]

Adult Echo: Measurements and Calculations

2D

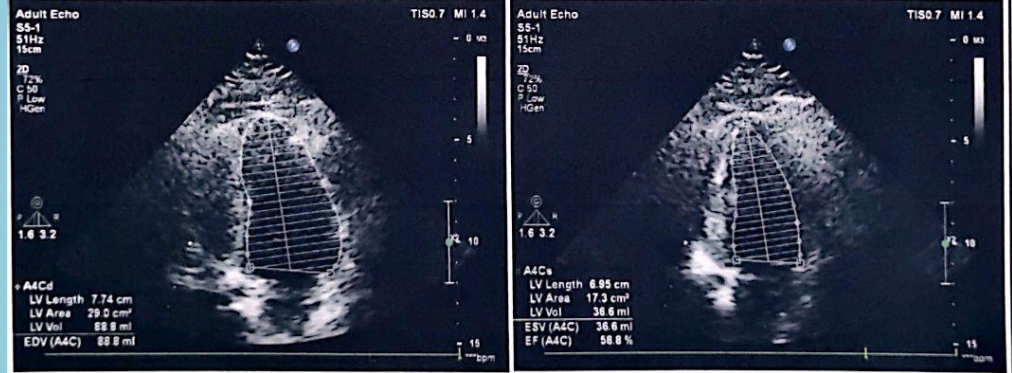
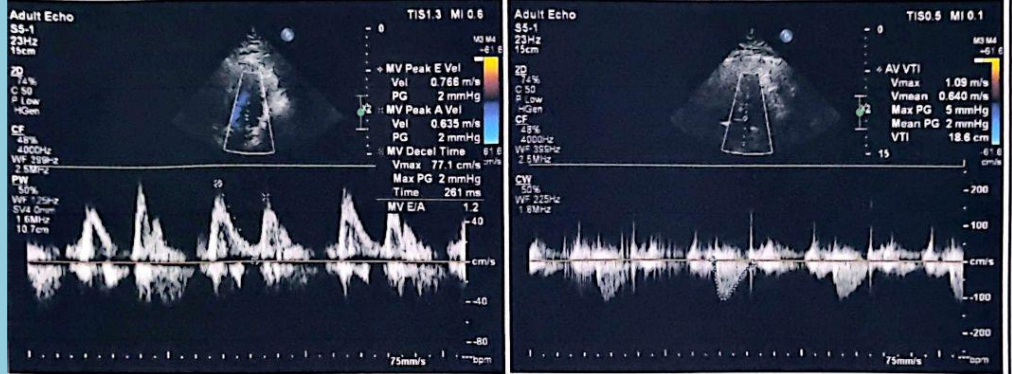
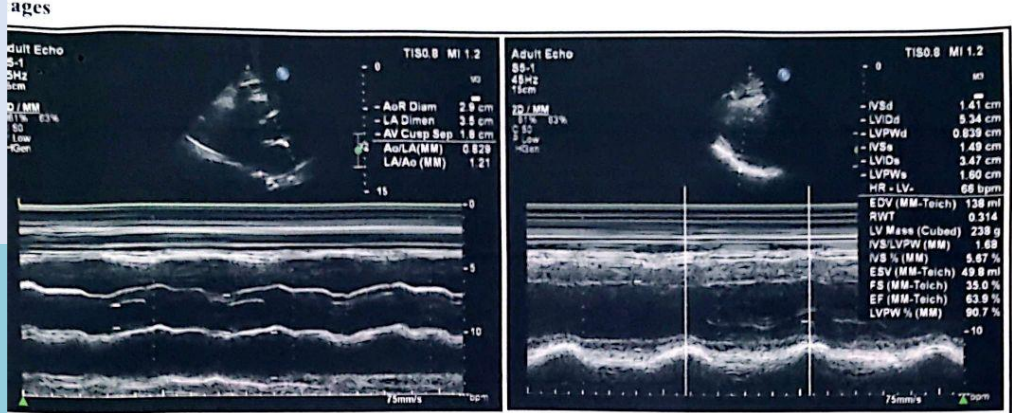
MPA Diam	2.4 cm
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MMode

IVSd (MM)	1.41 cm	LVIDs (MM)	3.47 cm	AoR Diam (MM)	2.9 cm
LVIDd (MM)	5.34 cm	LVPWs (MM)	1.60 cm	AV Cusp Sep (MM)	1.8 cm
LVPWd (MM)	0.839 cm	EF (MM-Teich)	63.9 %	LA/Ao (MM)	1.21
IVSs (MM)	1.49 cm	LA Diam (MM)	3.5 cm		

Left Ventricle

IVSd (MM)	1.41 cm	EF (MM-Teich)	63.9 %	LVLs (A4C)	7.0 cm
LVIDd (MM)	5.34 cm	IVS/LVPW (MM)	1.68	EDV (MM-Cubed)	152 ml
LVPWd (MM)	0.839 cm	FS (MM-Cubed)	35.0 %	ESV (MM-Cubed)	41.8 ml
IVSs (MM)	1.49 cm	A4Cd		SV (MM-Cubed)	110 ml
		LVVol	88.8 ml		
		LV Length	7.74 cm		
		LV Area	29.0 cm ²		
LVIDs (MM)	3.47 cm	A4Cs		EF (MM-Cubed)	72.5 %
		LVVol	36.6 ml		
		LV Length	6.95 cm		
		LV Area	17.3 cm ²		
LVPWs (MM)	1.60 cm	EDV (A4C)	88.8 ml	LV Mass (Cubed)	238 g
EDV (MM-Teich)	138 ml	ESV (A4C)	36.6 ml	IVS % (MM)	5.67 %



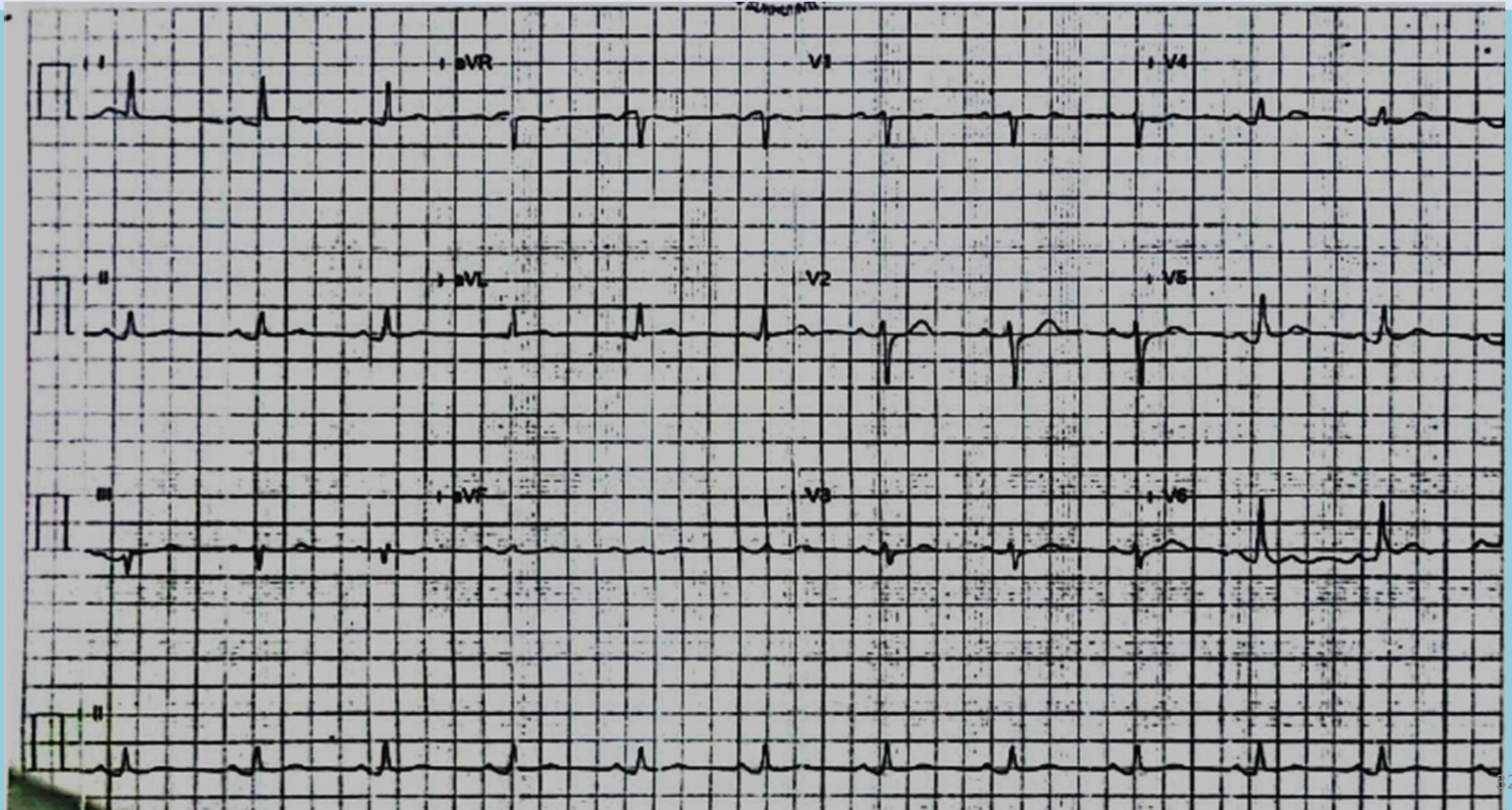
Case 2: Case Summary

- 56 yr old gentleman, non smoker, recently recovered from severe Covid 19 infection, received both antiviral Rem and Tocilizumab for cytokine storm
- CVRF : Hypertension, Dyslipidaemia, Mild nephropathy
- Presenting with dyspnea on minimal exertion and tightness of chest

Physical examination

- Fully conscious and orientated
- Not in pain and not dyspnoeic
- BP 125/70 mmHg
- HR 70/min
- Lungs – few crepts
- No pedal odema
- No S/- of DVT
- SaO₂- 95% on Air

Baseline ECG



Blood tests

Hb	14.1
WBC	6.86
Platelet	225
Creatinine	169 umol/l
Na	140
K	4.2
Cl	104
HCO3	23
CRP	0.4
ALT	18

HbA1C	5.6
Total cholesterol	6.6
LDL	3.6
TG	2.9
HDL	0.9
Uric acid	5.2
Trop I	0.04
D dimer	0.25
Urine RE	No proteinuria
Serology screening	Non reactive

YANGON GENERAL HOSPITAL
CARDIOLOGY DEPARTMENT

ECHOCARDIOGRAM REPORT

Patient Demographics

Study Date: 17/05/2023					
Patient ID: 361685	Age:	Gender: M	Ht:	Wt:	BSA:
Referring Physician:	Performed By: [REDACTED]				

Adult Echo: Measurements and Calculations

2D	MPA Diam	2.3 cm
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MMode					
IVSd (MM)	0.877 cm	LVIDs (MM)	2.82 cm	AoR Diam (MM)	2.6 cm
LVIDd (MM)	4.50 cm	LVPWs (MM)	1.60 cm	AV Cusp Sep (MM)	1.8 cm
LVPWd (MM)	1.11 cm	EF (MM-Teich)	67.4 %	LA/Ao (MM)	1.31
IVSs (MM)	1.22 cm	LA Dimen (MM)	3.4 cm		

Left Ventricle					
EDV (MM-Teich)	92.4 ml	EF (MM-Teich)	67.4 %	ESV (A4C)	15.4 ml
ESV (MM-Teich)	30.1 ml	A4Cd	47.4 ml	LV Mass (Cubed)	152 g
SV (MM-Teich)	62.3 ml	A4Cs	15.4 ml	SV (A4C)	32.8 ml
FS (MM-Teich)	37.3 %	EDV (A4C)	47.4 ml	EF (A4C)	67.5 %

Left Atrium	
LA Dimen (MM)	3.4 cm

Aortic Valve					
AV Vmax	AI Vmax	AI P½t			
Max PG	Max PG	P½t	1464 ms		
Vmax	Vmax				
4 mmHg	28 mmHg				
1.06 m/s	2.65 m/s				

Mean PG	3 mmHg	AI Dec Slope	53.0 cm/s²
VTI	20.7 cm	Slope	
Vmean	0.777 m/s		

Mitral Valve					
MV Peak E Vel	0.635 m/s	MVA (P½t)	3.01 cm²	IVRT	74 ms
MV Peak A Vel	0.543 m/s	MV P½t	73 ms		
MV E/A	1.2	MR Vmax	1.90 m/s		

Tricuspid Valve					
TAPSE	TR Vmax	RVSP	27 mmHg		
Dist	Max PG		17 mmHg		
	Vmax		2.05 m/s		

Pulmonic Valve and Vessels					
MPA Diam	PV VTI				
Dist	Mean PG	2 mmHg			
	VTI	17.1 cm			
	Vmean	0.587 m/s			
PV Vmax	PI End Dias Vel				
Max PG	Vd	1.52 m/s			
Vmax	PG	9 mmHg			

Other Measurements	
Dimensions: Diameters	
RVIDd 2D	29 cm
Ao/LA(MM)	0.765
Dimensions: Diameters	
HR - LV-	58 bpm
RWT	0.493
Pulmonic Valve: Velocities & Time	
PADP	19.0 mmHg

Comments

NORMAL DIMENSION CARDIAC CHAMBERS
 NO SIGNIFICANT REGIONAL WALL MOVEMENT ABNORMALITY
 NORMAL LV SYSTOLIC FUNCTION
 EF IS AROUND 67%
 NORMAL LV RELAXATION FUNCTION
 TRIVIAL MR, TR, AR, TRIVIAL TO MILD PR
 NO PULMONARY HYPERTENSION
 NORMAL RV FUNCTION
 NO CLOT, NO VEGETATION, NO PERICARDIAL EFFUSION, NO INTRACARDIAC SHUNT

What should we do?

- **Exercise treadmill test**
- **CT Coronary Angiogram**
- **CT Pulmonary angiogram**
- **Invasive Coronary Angiogram**

Exercise treadmill test

PROTOCOL: BRUCE

Reason for Exercise Test: Screening for CAD

Exercise Test Summary

Phase Name	Stage Name	Time in Stage	Speed (mph)	Grade (%)	HR (bpm)	BP (mmHg)	Comment
PRETEST	SUPINE	01:07	0.00	0.00	73	121/80	
	STANDING	04:31	1.20	0.00	85	108/68	
EXERCISE	STAGE 1	02:31	1.70	10.00	113	115/60	
	STAGE 2	03:00	2.50	12.00	136	133/70	
	STAGE 3	00:18	3.40	14.00	139		
RECOVERY	RECOVERY	00:30	0.00	0.00	136		
		00:30	0.00	0.00	129		
		00:30	0.00	0.00	117	161/84	
		00:30	0.00	0.00	109		
		01:00	0.00	0.00	105	152/69	
		01:00	0.00	0.00	97	165/78	
		01:00	0.00	0.00	93	146/80	
02:39	0.00	0.00	93	147/89			

The patient exercised according to the BRUCE for 5:47 min:s, achieving a work level of Max. METS: 7.40. The resting heart rate of 68 bpm rose to a maximal heart rate of 141 bpm. This value represents 86 % of the maximal, age-predicted heart rate. The resting blood pressure of 121/80 mmHg, rose to a maximum blood pressure of 165/78 mmHg. The exercise test was stopped due to Dyspnea.

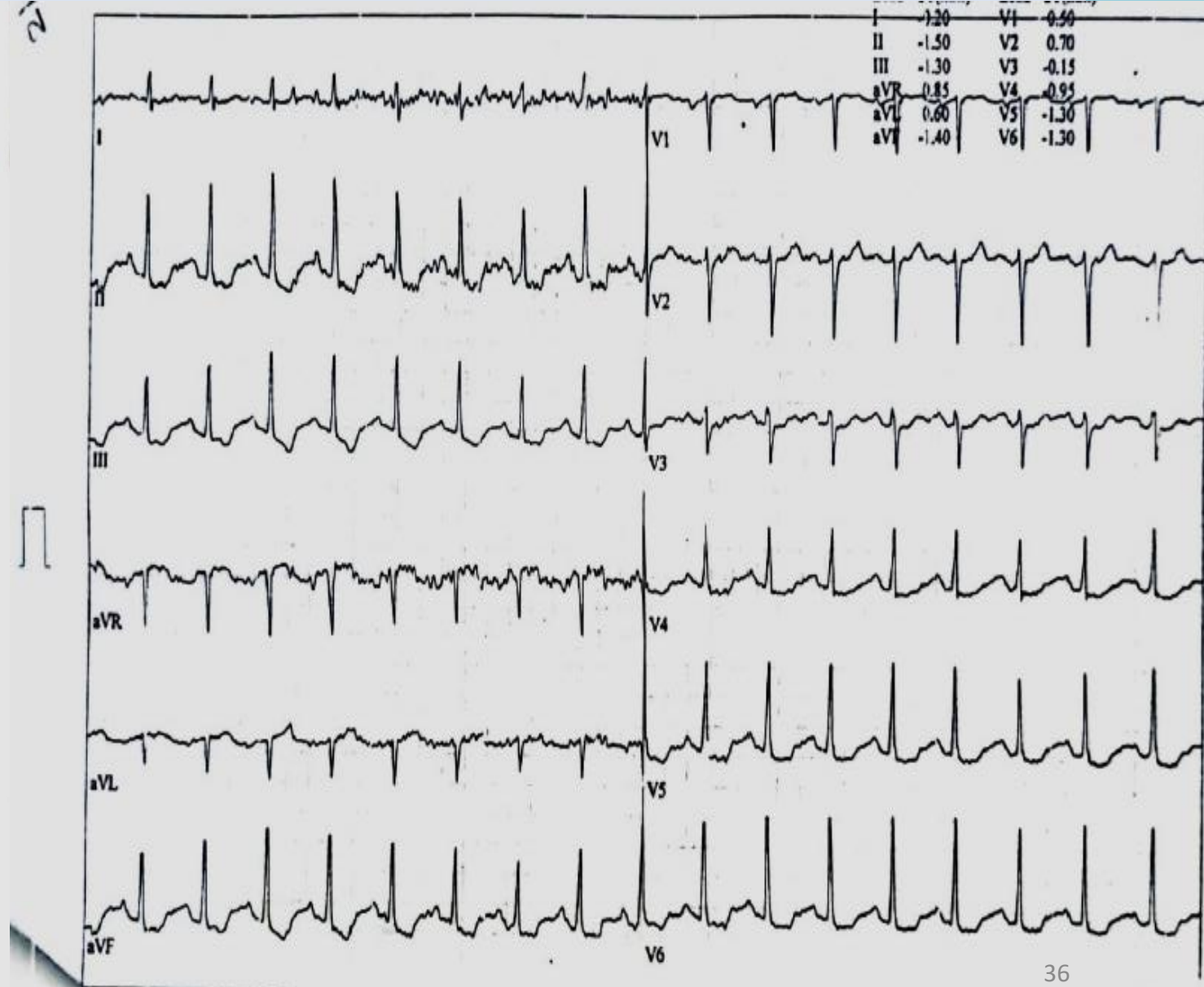
Interpretation

Resting ECG: normal Function Capacity: normal HR Response to Exercise: appropriate BP Response to Exercise: normal resting BP - appropriate response Chest Pain: none ST Change: Depression upsloping Arrhythmias: none Overall impression: Positive stress test suggestive of ischemia

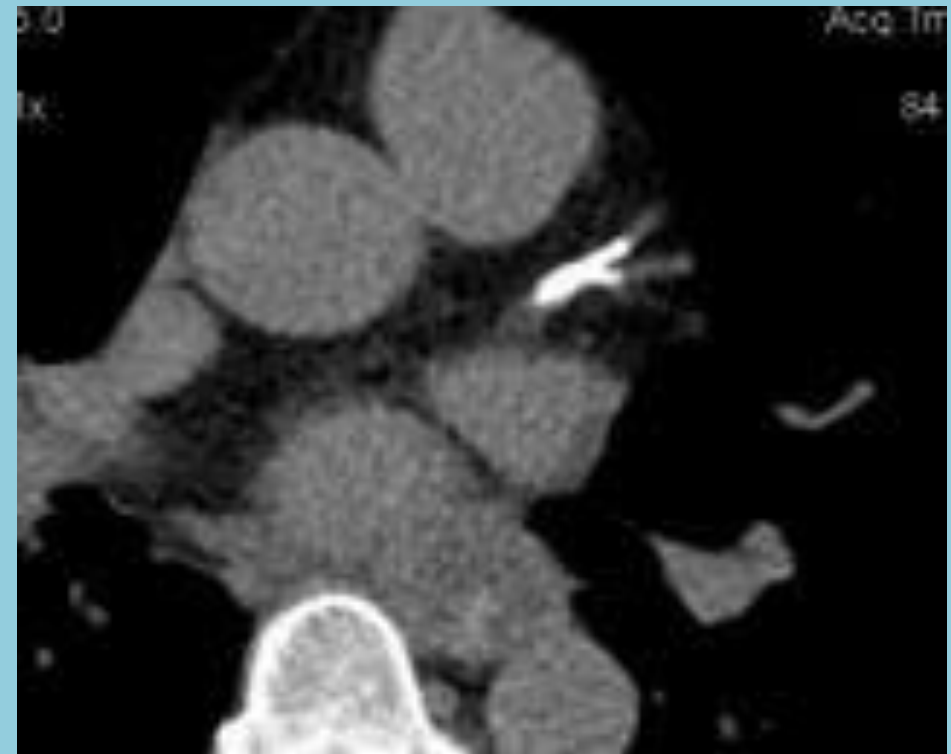
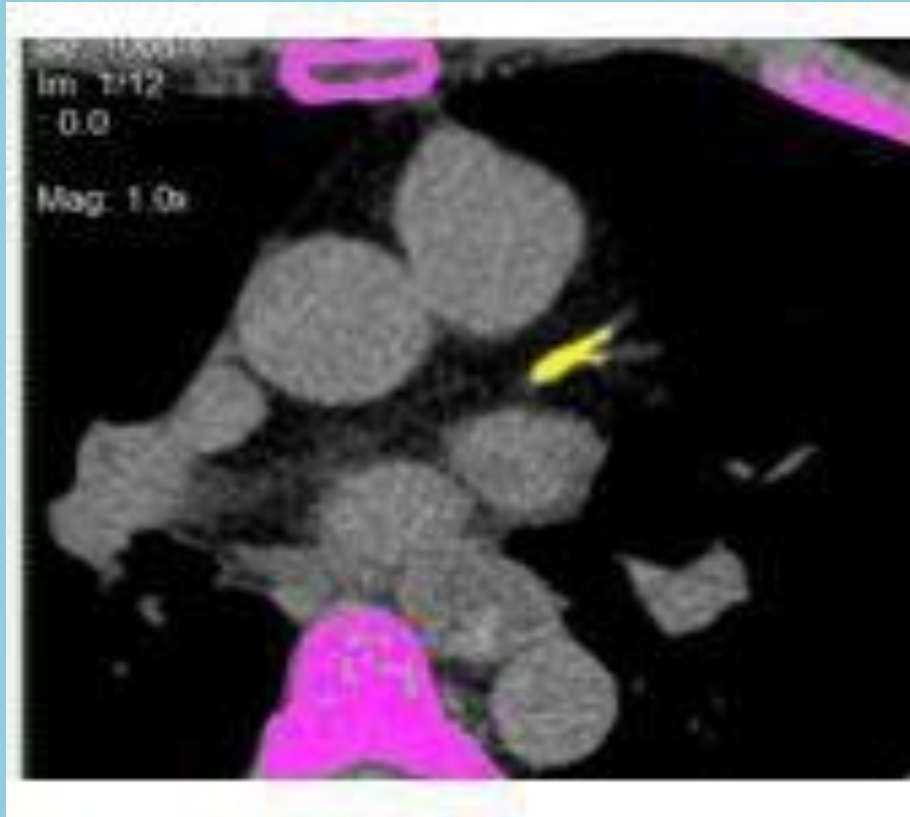
Conclusions

Positive EST suggestive of myocardial ischemia.

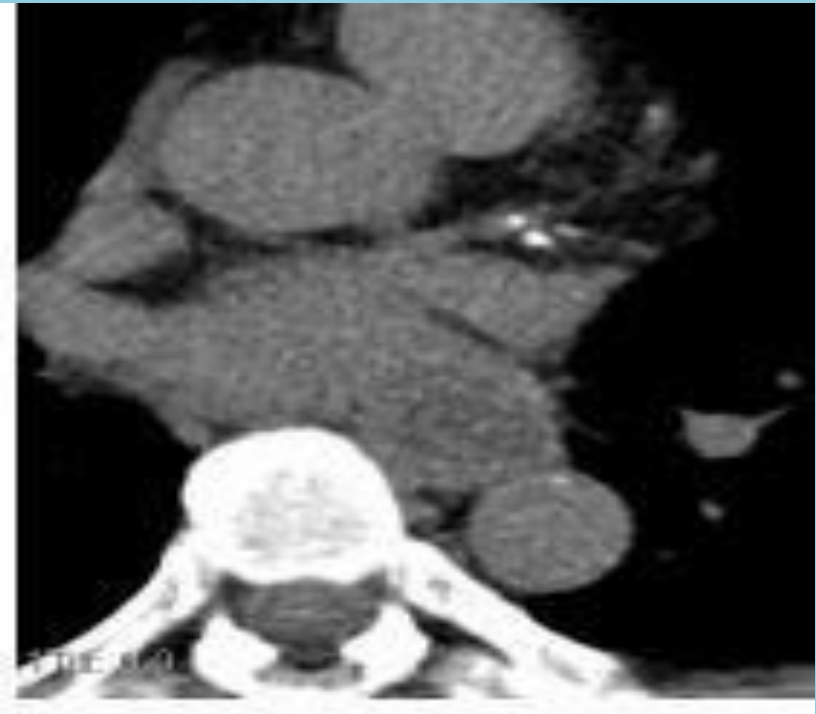
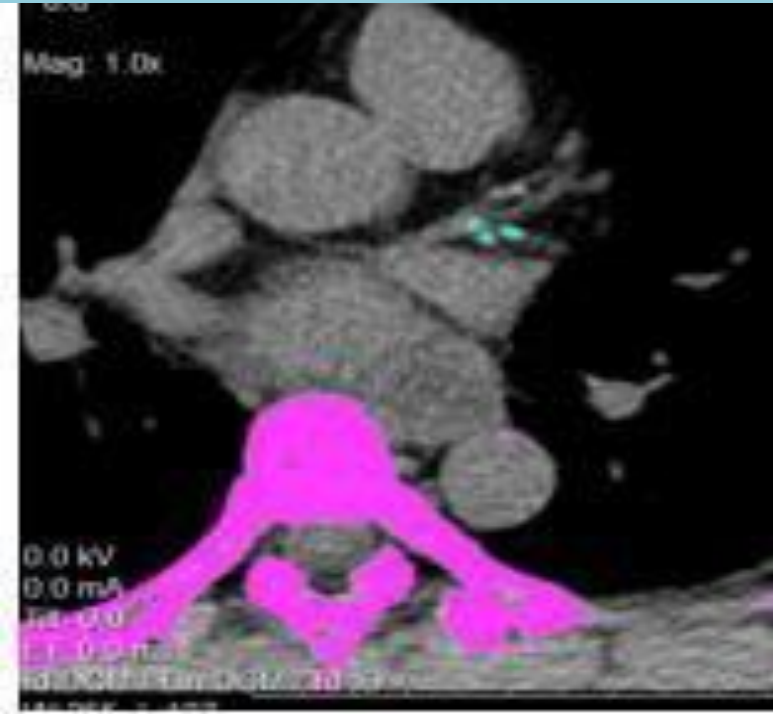
CCTA or other cardiac imaging study was recommended to exclude significant coronary stenosis if clinically indicated.



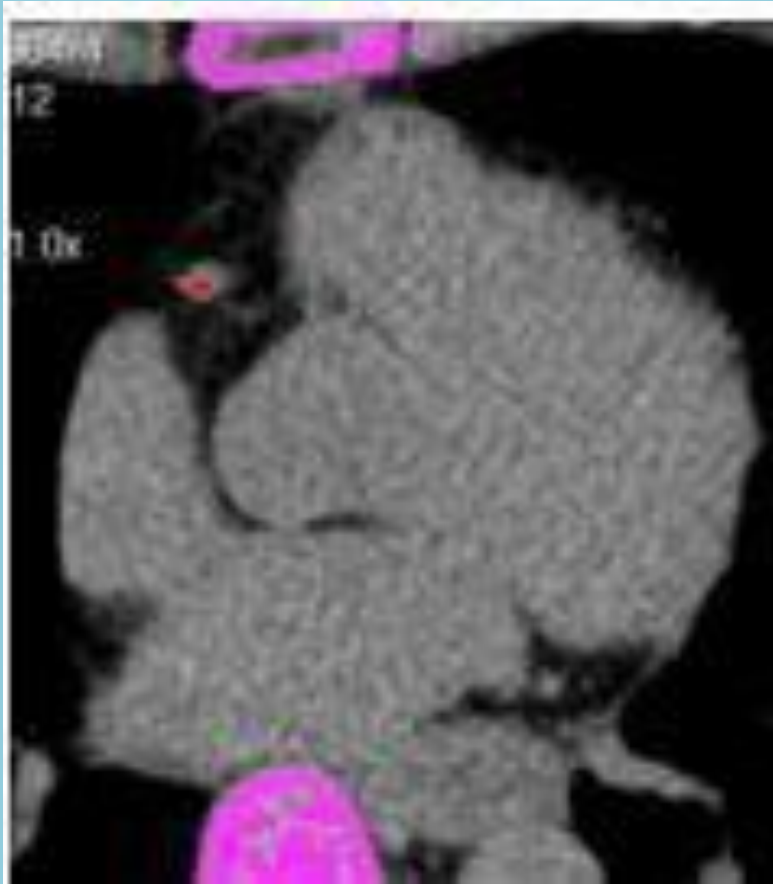
LAD



LCX



RCA



RESULTS:

Artery	Volume (mm ³)	Calcium Score
Left Main	0.00	0.00
Left Anterior Descending	199.9	255.5
Left Circumflex	46.6	51
Right Coronary	43.8	35.6
Total	290.3	342.1

Invasive Coronary Angiogram

LAD

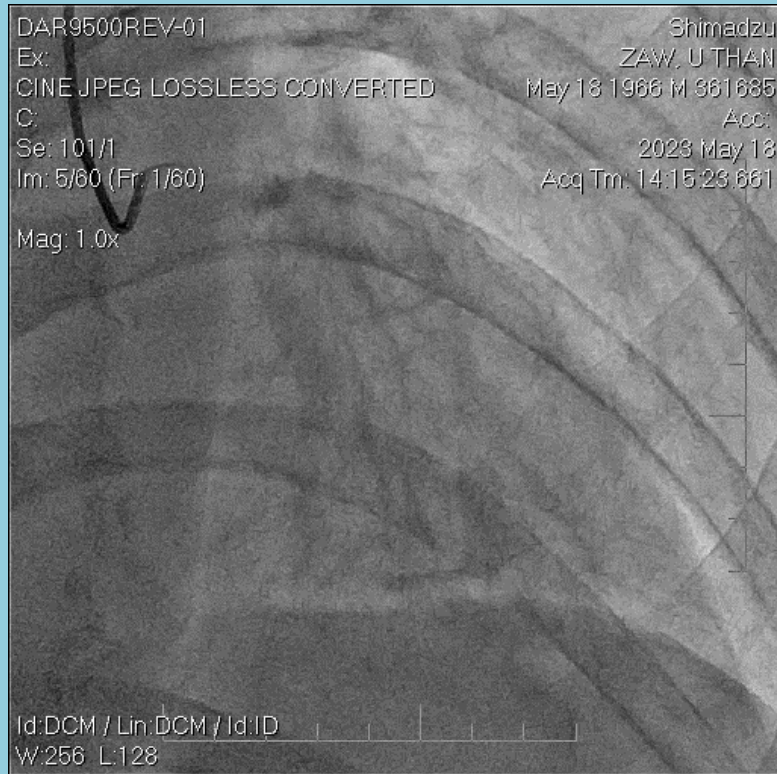


Post PCI



Invasive Coronary Angiogram

LAD



LAD: Post PCI



Invasive Coronary Angiogram

RCA



Post PCI



Medications

- Aspirin 81 mg OD
- Clopidogrel 75 mg OD
- Atorvastatin 40 mg HS
- Fenofibrate 160mg HS
- Bisoprolol 2.5 mg BD
- Febuxostat 40mg OD
- Pantoprazole 40 mg OD
- Plan to add ACEI after renal function improved

Case 3: Case Summary

- **DOMM, 53 yr old**
- **Presenting with left sided cardiac sounding chest pain on and off x 2-3 months**
- **CVRF :**
 - **Mild hypertension**
 - **Newly diagnosed type 2 DM**
 - **Dyslipidaemia (on treatment)**

53 Years

16-May-23 11:05:24

Rate 85 . Sinus rhythm.....normal P axis, V-rate 50-99
 PR 147 . RSR' in V1 or V2, probably normal variant.....small R' only
 QRS 84 . Nonspecific repol abnormality, diffuse leads.....ST dep, T flat/neg, ant/lat/inf
 QT 384
 QTc 452

BP. 146/85 mmHg
 HR - 81/min

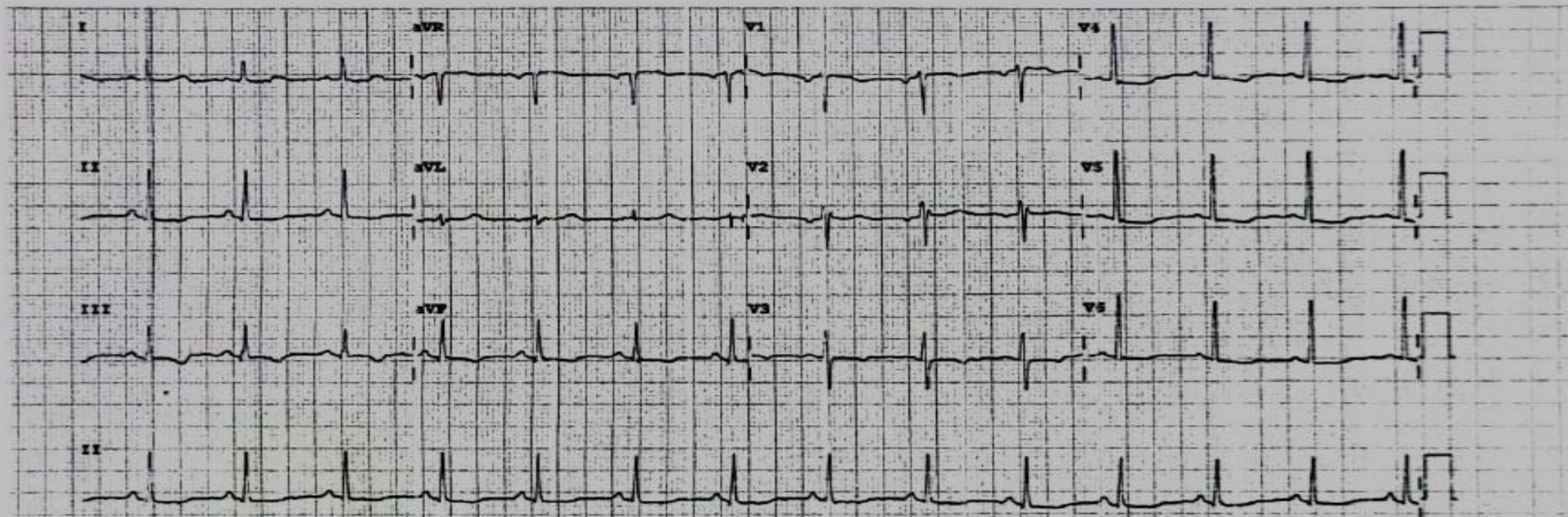
--AXIS--

P 71
 QRS 56
 T -70

- ABNORMAL ECG -

12 Lead; Standard Placement

Unconfirmed Diagnosis



Device: Speed: 25 mm/sec Limb: 10 mm/mV Chest: 10.0 mm/mV

F 60- 0.15-100 Hz PH100B CL PP

Blood tests

Hb	11.5
WBC	7.94
Platelet	316
Creatinine	62 umol/l
Na	142
K	4.2
Cl	106
HCO3	22
AST	21
ALT	25

HbA1C	6.7
Total cholesterol	3.7
LDL	2.02
TG	0.7
HDL	1.58
Uric acid	112
Trop I	0.02
TSH	2.35
Urine RE	No proteinuria
Serology screening	Non reactive

YANGON GENERAL HOSPITAL

CARDIOLOGY DEPARTMENT

ECHOCARDIOGRAM REPORT

Patient Demographics

Study Date: 30/05/2023				
Patient ID: 33031120230530				
Age:	Gender: F	Ht:	Wt:	BSA:
Referring Physician:			Performed By:	

Adult Echo: Measurements and Calculations

2D

MPA Diam	2.0 cm
----------	--------

MMode

IVSd (MM)	0.763 cm	LVIDs (MM)	2.63 cm	AoR Diam (MM)	2.0 cm
LVIDd (MM)	4.20 cm	LVPWs (MM)	1.53 cm	AV Cusp Sep	1.6 cm
LVPWd (MM)	0.915 cm	EF (MM-Teich)	67.8 %	LA/Ao (MM)	1.10
IVSs (MM)	1.14 cm	LA Dimen (MM)	2.2 cm		

Left Ventricle

EDV (MM-Teich)	78.6 ml	EF (MM-Teich)	67.8 %	ESV (A4C)	35.4 ml
ESV (MM-Teich)	25.3 ml	A4Cd	89.8 ml	LV Mass (Cubed)	108 g
SV (MM-Teich)	53.3 ml	A4Cs	35.3 ml	SV (A4C)	54.4 ml
FS (MM-Teich)	37.4 %	EDV (A4C)	89.8 ml	EF (A4C)	60.6 %

Left Atrium

LA Dimen (MM)	2.2 cm
---------------	--------

Aortic Valve

AV Vmax		AV VTI	
Max PG	3 mmHg	Mean PG	2 mmHg
Vmax	0.889 m/s	VTI	20.3 cm
		Vmean	0.591 m/s

Peak E Vel	0.781 m/s	MV Peak A Vel	0.694 m/s	MV E/A	1.1
Tricuspid Valve					
TR Vmax		RVSP		35 mmHg	
Max PG	25 mmHg				
Vmax	2.51 m/s				

Pulmonic Valve and Vessels

MPA Diam		PV Vmax		PV Accel Time	
Dist	2.0 cm	Max PG	2 mmHg	Slope	392 cm/s ²
		Vmax	0.786 m/s	Time	187 ms
				P/t	57.2 ms

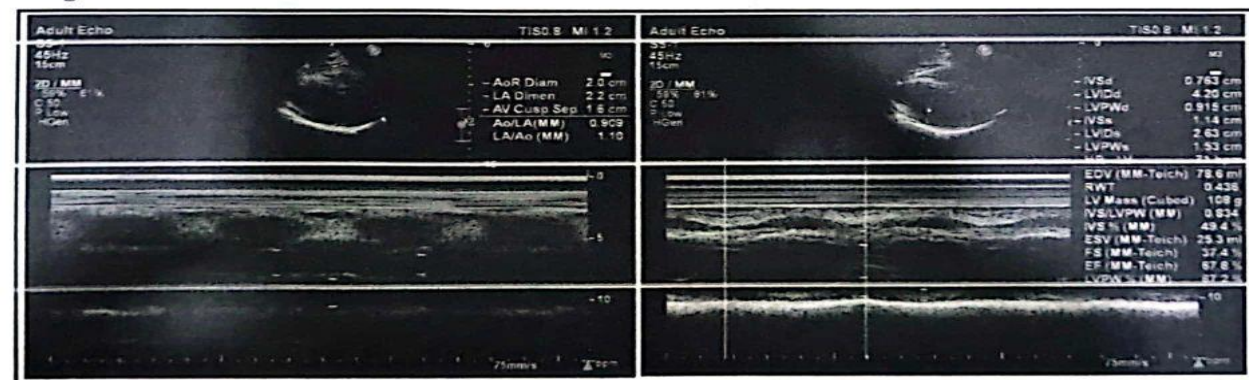
Other Measurements

Dimensions: Diameters	
HR - LV-	71 bpm
RWT	0.436

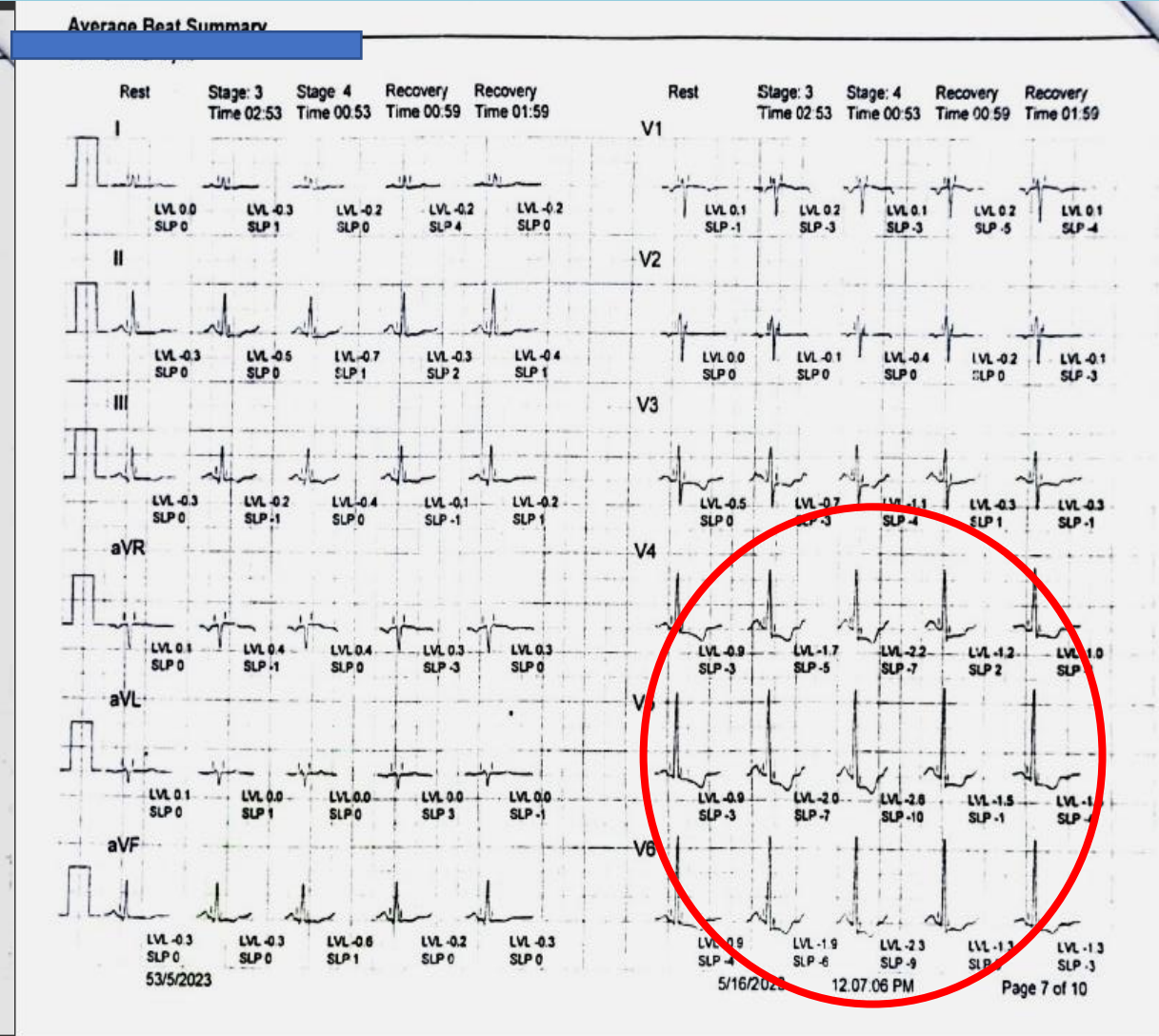
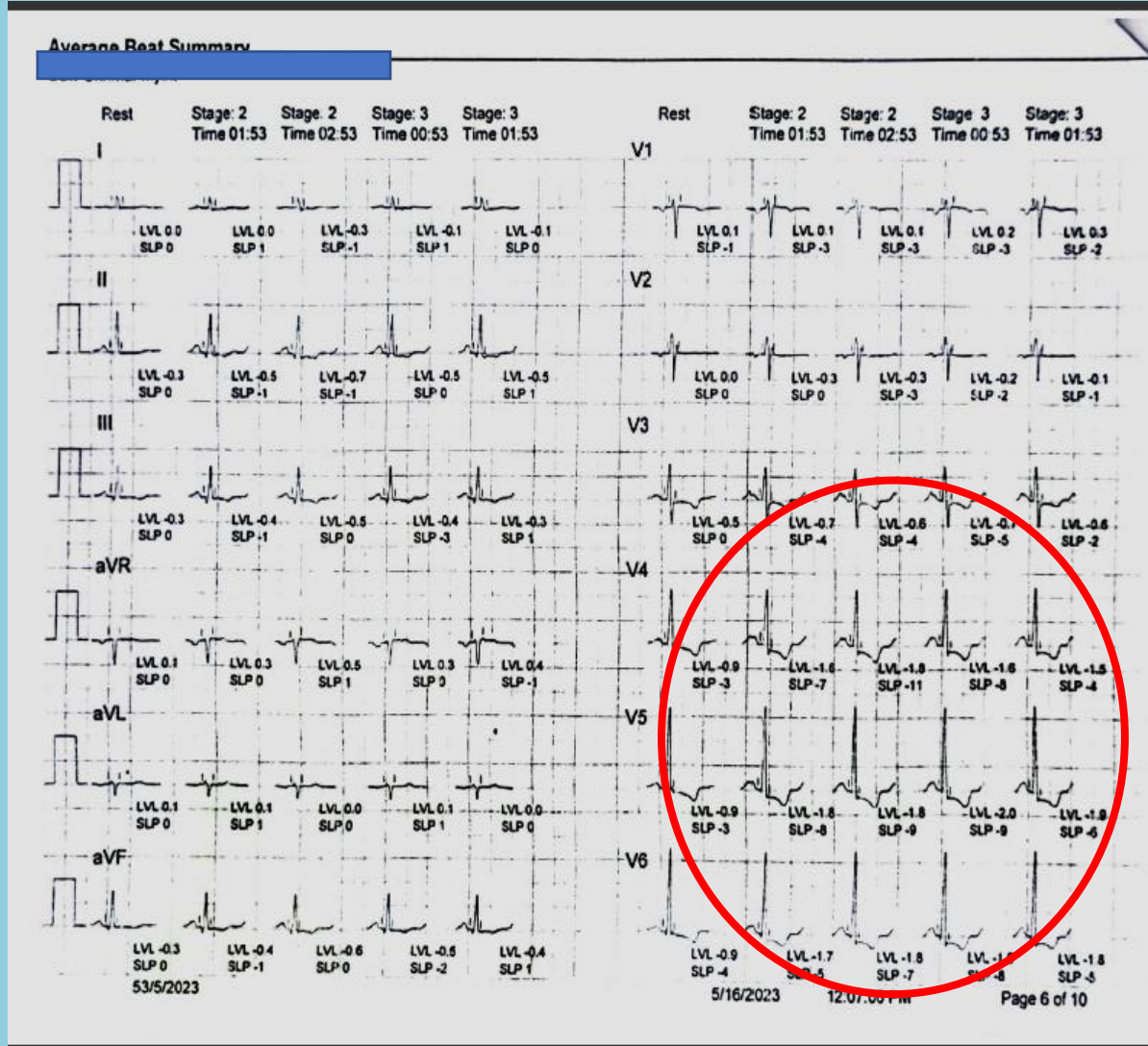
Comments

NORMAL LV SYSTOLIC FUNCTION
 EF 67%
APICOSEPTAL LV WALL DYSKINESIA
IMPAIRED VENTRICULAR RELAXATION
VALVES ARE MORPHOLOGICALLY NORMAL
 NO PULMONARY HYPERTENSION
 NO SEC, NO THROMBUS, NO VEGETATION
 CHAMBERS ARE NOT DILATED
 RV FUNCTION IS NORMAL
 NO PERICARDIAL EFFUSION

Images



Exercise Treadmill Test



Q-Stress Final Report

Cardiac Medical (YGH)
Yangon General Hospital, Cardiac Medical

Institution ID YGN 2013.1
5/16/2023 12 07 06 PM

Yangon 951 Yangon Myanmar Attending Referring Prof Nwe Nwe Dr Aung Kyaw Soe

Patient Daw Ohnmar Myint

MRN 53/5/2023

DOB --- Age 53 Ht ---

Sex UNSPECIFIED Wt ---

Medication Beta Blocker in last 24 hours: Unspecified

Resting HR	104	Target HR	142	Max HR	149	Protocol	Modified Bruce
Resting SBP	---	Max Predicted HR	167	Max SBP	---	HRxBP	---
Resting DBP	---	% Max HR	89	Max DBP	---	Billing Code	
Worst-case ST Level		-2.6 V5		Total Exercise Time		09:54	
Worst-case ST Slope		-10 V5		METs(a)		7.0	

Reason for Test

Reason for Ending Test

Patient reached target heart rate

ETT: positive.

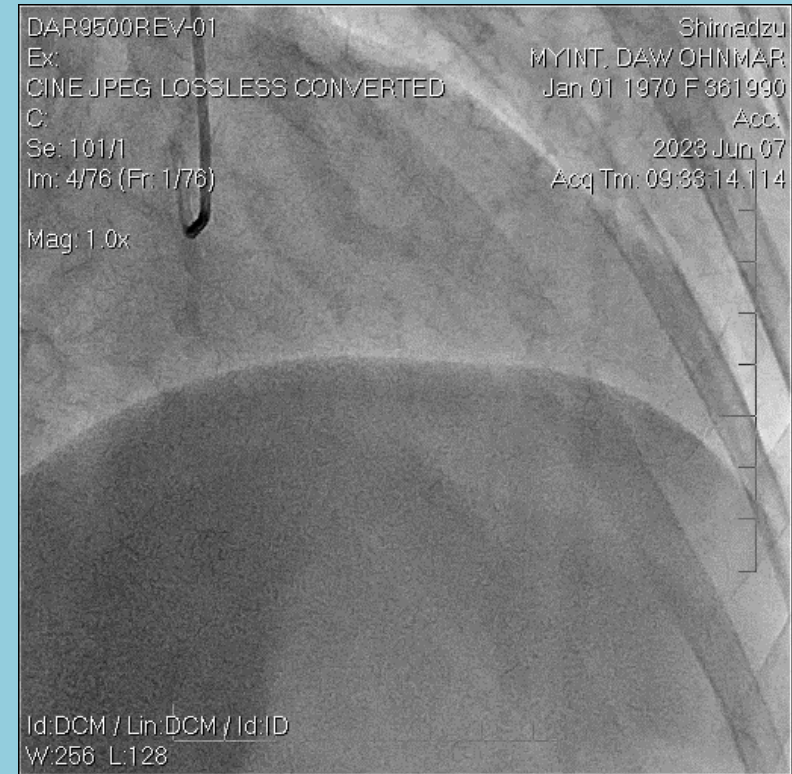
	Total Stage Time	HR	ER	SpO2	BP	HRxBP	TM Speed mph	TM Grade %	LVL II	LVL V2	LVL V5
REST	01:46	104	0	---	---/---	---	1.2	0.0	-0.3	0.0	-0.9
Stage 1	01:00	136	0	---	---/---	---	1.7	0.0	-0.6	-0.3	-1.9
	02:00	142	0	---	---/---	---	1.7	0.0	-0.6	-0.1	-2.1
	03:00	126	0	---	---/---	---	1.7	0.0	-0.3	0.0	-1.8
Stage 2	01:00	120	0	---	---/---	---	1.7	5.0	-0.5	-0.1	-1.8
	02:00	119	0	---	---/---	---	1.7	5.0	-0.5	-0.3	-1.8
	03:00	120	0	---	---/---	---	1.7	5.0	-0.7	-0.3	-1.8
Stage 3	01:00	125	0	---	---/---	---	1.7	10.0	-0.5	-0.2	-2.0
	02:00	129	0	---	---/---	---	1.7	10.0	-0.5	-0.1	-1.9
	03:00	133	0	---	---/---	---	1.7	10.0	-0.5	-0.1	-2.0
Stage 4	00:54	147	0	---	---/---	---	2.5	12.0	-0.7	-0.4	-2.6
Stop exercise at 09:54											
RECOVERY	01:00	123	0	---	---/---	---	0.0	0.0	-0.3	-0.2	-1.5
	02:00	101	0	---	---/---	---	0.0	0.0	-0.4	-0.1	-1.5
	03:00	95	0	---	---/---	---	0.0	0.0	-0.2	-0.2	-1.5
	03:11	92	0	---	---/---	---	0.0	0.0	-0.2	-0.2	-1.5

Invasive Coronary Angiogram

LAD



LAD



Invasive Coronary Angiogram

LCX

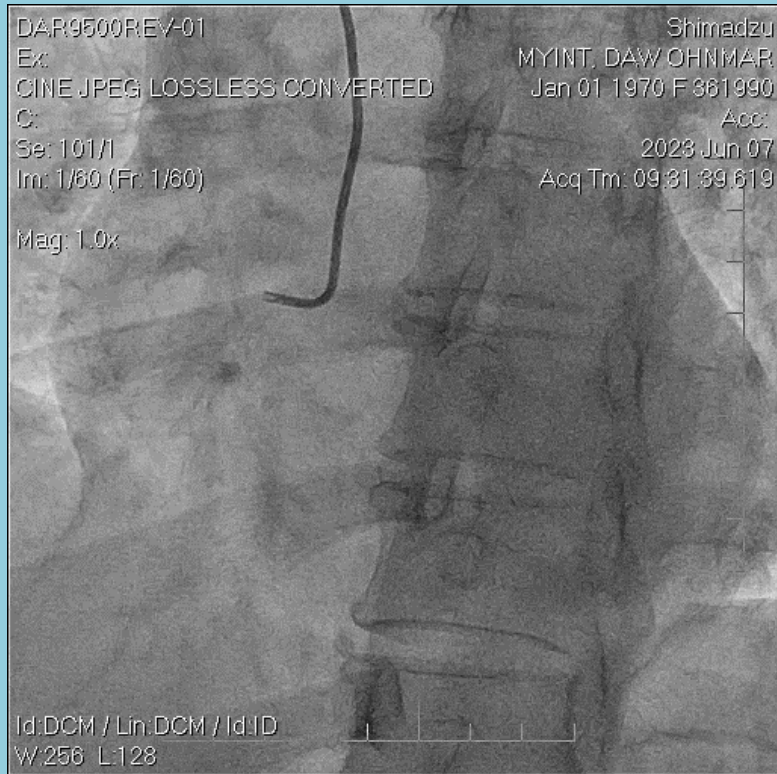


LCX



Invasive Coronary Angiogram

RCA



RCA

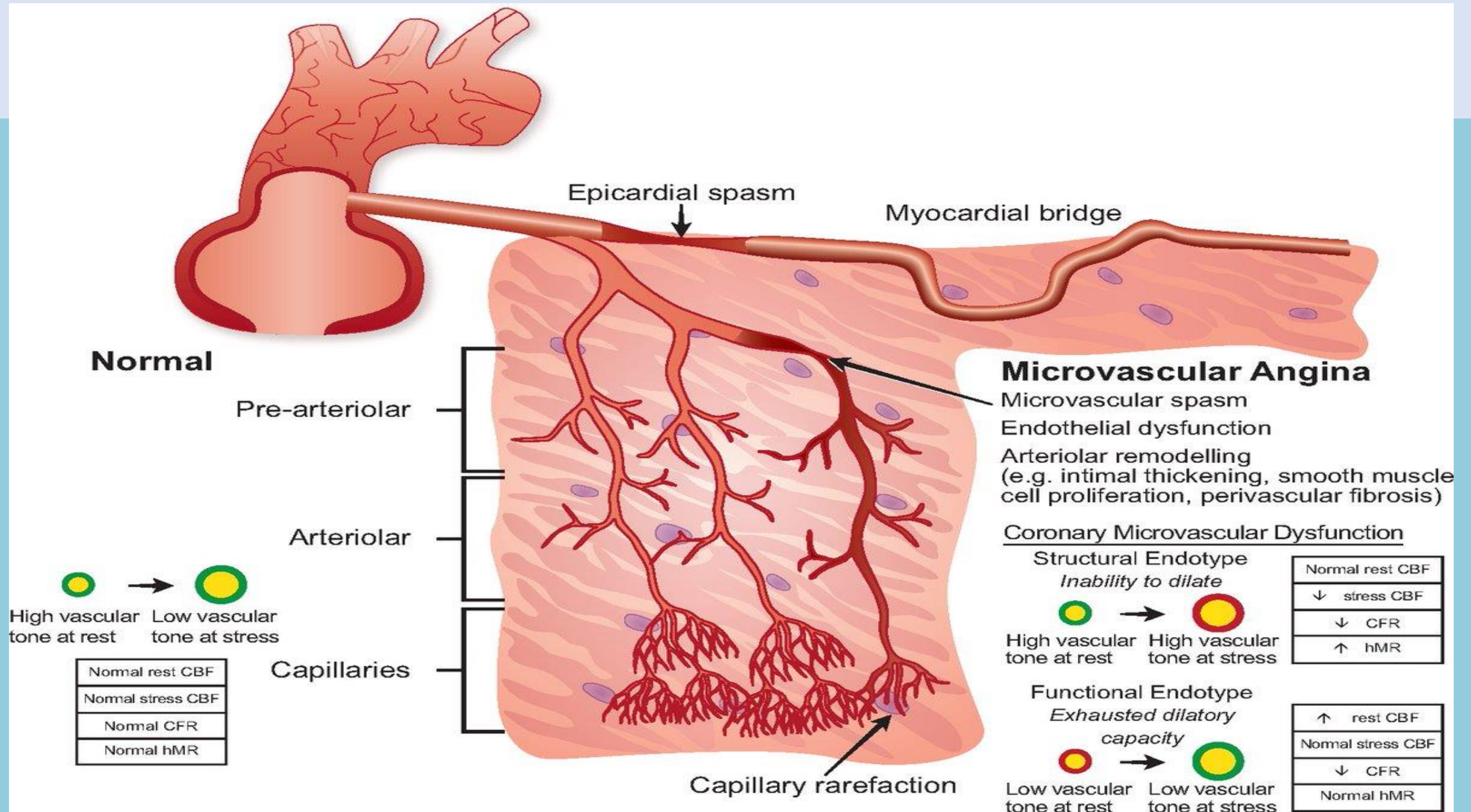


Medications

- **Aspirin 81 mg OD**
- **Atorvastatin 20 mg HS**
- **Metoprolol XL 12.5 mg BD**
- **Coversyl 5mg HS**
- **Metformin 500mg BD**

Angina without obstructive disease in the epicardial coronary arteries

- Discrepancy between
 - findings regarding coronary anatomy
 - presence of symptoms
 - result of non-invasive tests frequently occurs
- (i) Stenoses with **mild or moderate angiographic severity**, or **diffuse coronary narrowing**, with underestimated functional significance identified by ICA
- (ii) Disorders affecting the **microcirculatory domain** that escape the resolution of angiographic techniques
- (iii) **Dynamic** stenoses by **coronary spasm** or intramyocardial **bridges**



Angina without obstructive disease in the epicardial coronary arteries

1. Microvascular angina

- exercise-related angina
- evidence of ischemia in non-invasive tests
- either no stenoses or mild-to-moderate stenoses (40-60%) in ICA or CTA

2. Vasospastic angina

- Anginal symptoms at rest, with maintained effort tolerance
- Circadian pattern with more episodes at night and in the early morning
- Younger patients with fewer cardiovascular risk factors

Diagnosis

- Testing the two main mechanisms
 1. Impaired microcirculatory conductance
(when CFR < 2.0 or IMR ≥ 25 units)
 2. Arteriolar dysregulation
(by infusion of intracoronary acetylcholine -> paradoxical vasoconstriction.....development of anginal symptom without angiographically evident spasm)

Figure 2: Diagnosis and Treatment Based on Fractional Flow Reserve and Coronary Flow Reserve Values

<p>FFR \leq 0.80 CFR $>$ 2.0</p> <p>Diagnosis = Flow-limiting stenosis Preserved microvascular function</p> <p>Treatment = PCI</p>	<p>FFR $>$ 0.80 CFR $>$ 2.0</p> <p>Diagnosis = Non-flow-limiting stenosis Preserved microvascular function</p> <p>Treatment = Medical therapy, no PCI</p>
<p>FFR \leq 0.80 CFR $<$ 2.0</p> <p>Diagnosis = Flow-limiting stenosis Microvascular dysfunction</p> <p>Treatment = PCI</p>	<p>FFR $>$ 0.80 CFR $<$ 2.0</p> <p>Diagnosis = Non-flow-limiting stenosis Microvascular dysfunction</p> <p>Treatment = Medical therapy, no PCI</p>

CFR = coronary flow reserve; FFR = fractional flow reserve; PCI = percutaneous coronary intervention.

Treatment

- Impaired microcirculatory conductance type - beta blockers, ACEI, and statins along with lifestyle and weight loss
- Arteriolar dysregulation – treated like vasospastic angina

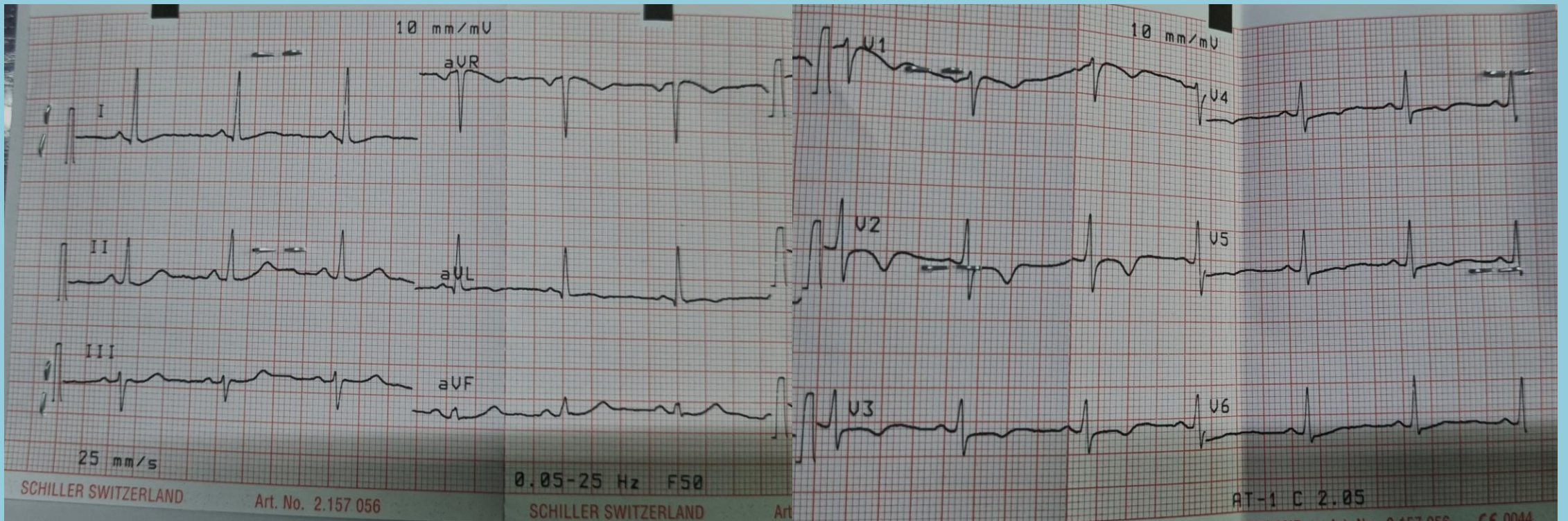
Case 4: Case Summary

- DTTA, 43 yr old
- Presenting with left sided chest pain on and off x 2 weeks
- CVRF :
 - Dyslipidaemia
- Family history of AMI in father

Blood tests

Hb	12.8
WBC	5.47
Platelet	346
Creatinine	56 umol/l
Na	141
K	4.3
Cl	108
HCO ₃	24
AST	23
ALT	21

HbA1C	5.4
Total cholesterol	4.5
LDL	2.0
TG	1.8
HDL	0.7
Uric acid	240
Trop I	0.01
TSH	3.1
Urine RE	No proteinuria
Serology screening	Non reactive



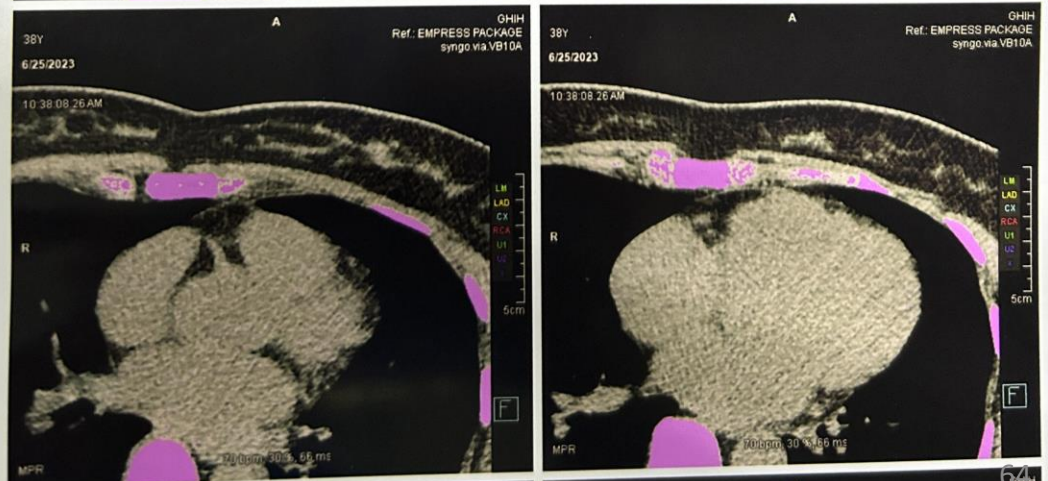
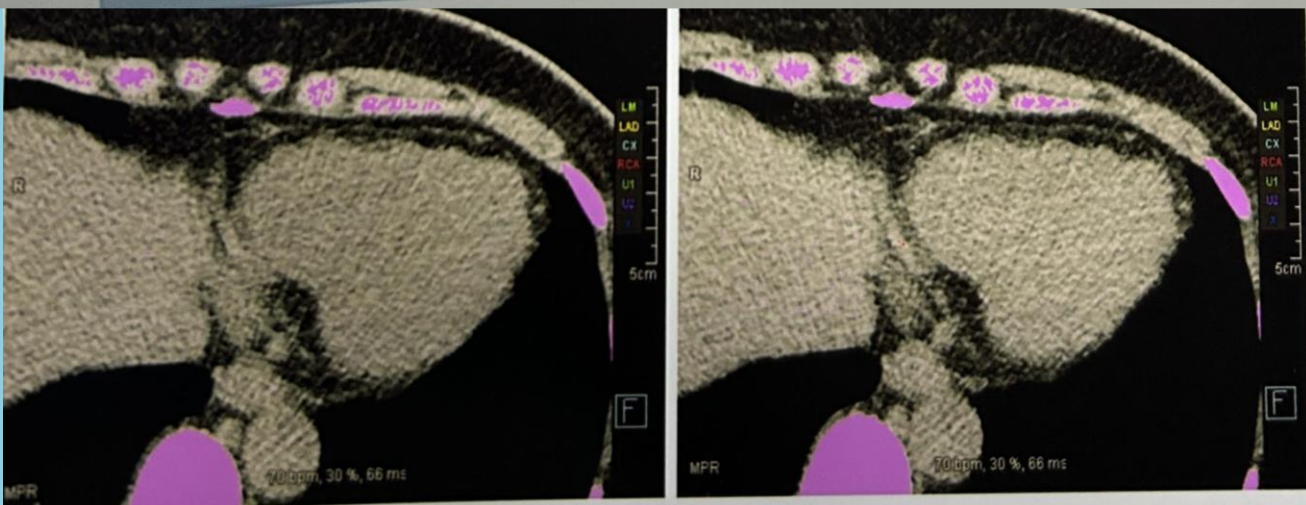
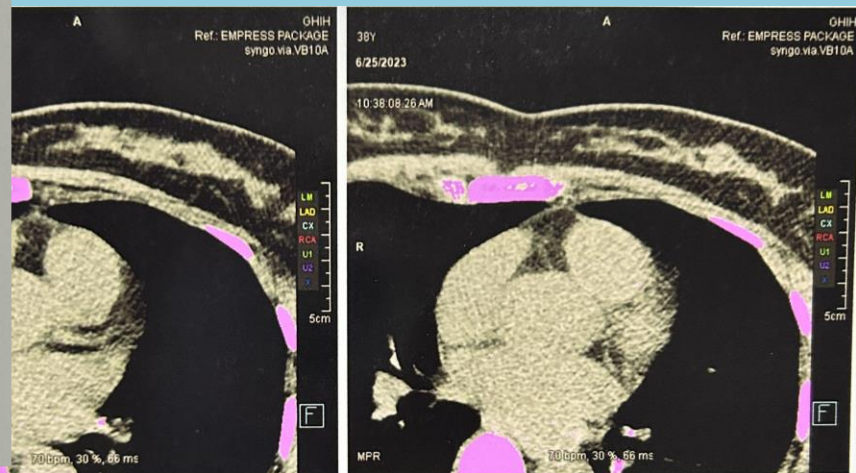
Echo : Normal LVEF with no RWMD

Calcium Scoring

This evaluation is based on a high resolution, ECG synchronized Computed Tomography of the heart.

The Total Calcium Score is 0.80 .

	Lesions	Volume[mm ³]	Score
LM	0	0 mm ³	0
LAD	0	0 mm ³	0
CX	0	0 mm ³	0
RCA	2	1.50 mm ³	0.80
Total	2	1.50 mm ³	0.80

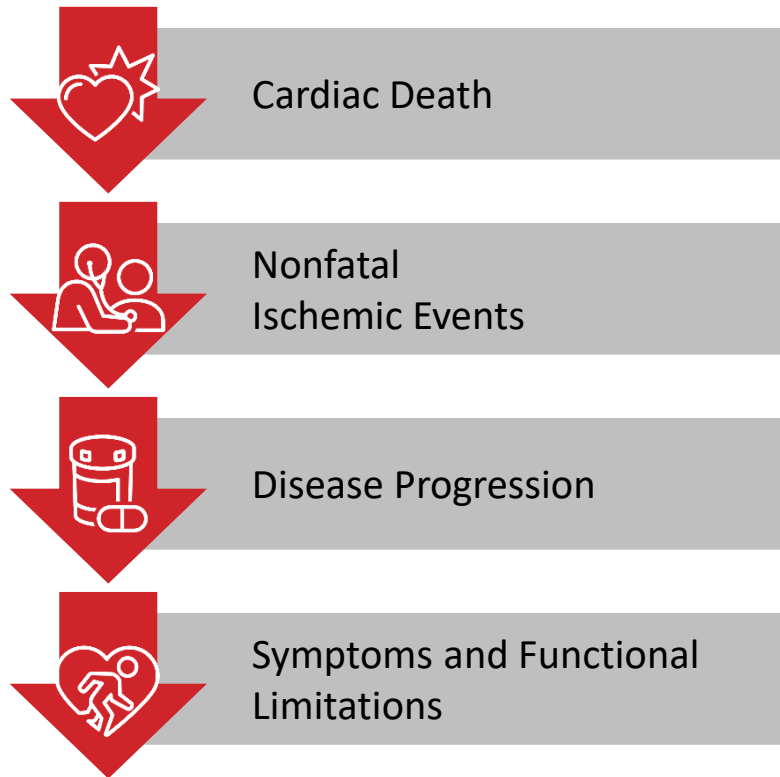


Medications

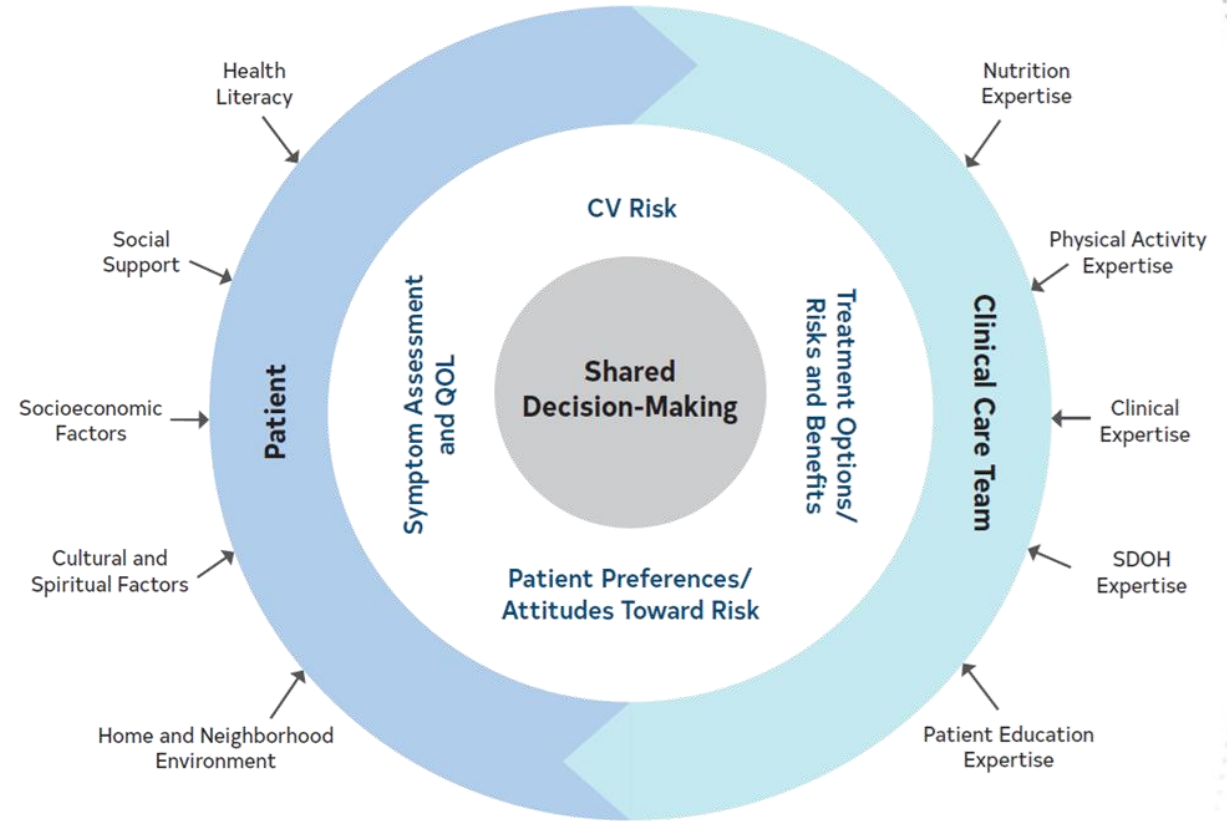
- **Atorvastatin 20 mg HS**
- **Metoprolol XL 12.5 mg BD**

Management of CAD patients

Goals of Treatment



Treatment Domains



Abbreviations: CCD indicates chronic coronary disease; CV, cardiovascular; SDOH, social determinants of health; and QOL, quality of life.

Lifestyle management

1. Smoking cessation

2. Healthy Diet

3. Physical activity

4. Healthy Diet

Pharmacological Management



Anti-ischaemic drugs

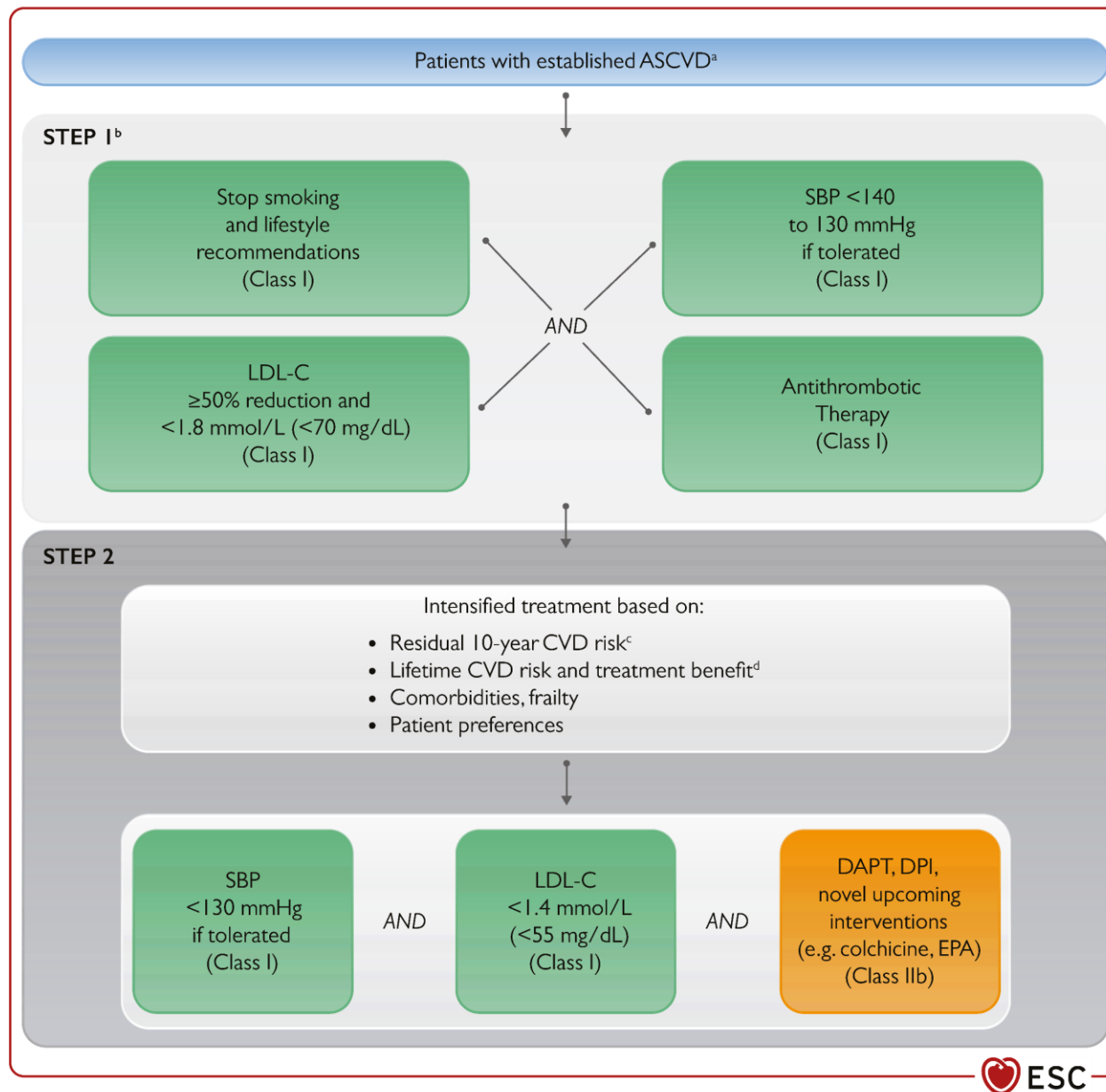


Event prevention

Recommendations for event prevention

- **1. Aspirin**
 - **Previous MI/Previous Revascularization**
 - **Post PCI/CABG – dual antiplatelet**
 - **NOAC – with AF/indication for anti-thrombotics**

- **2. Lipid lowering medication**
 - **Statin**
 - **Ezetimibe**
 - **PCSK9 inhibitors**



Cardiovascular risk and risk factor treatment in patients with established cardiovascular disease

Pharmacological Management



Anti-ischaemic drugs

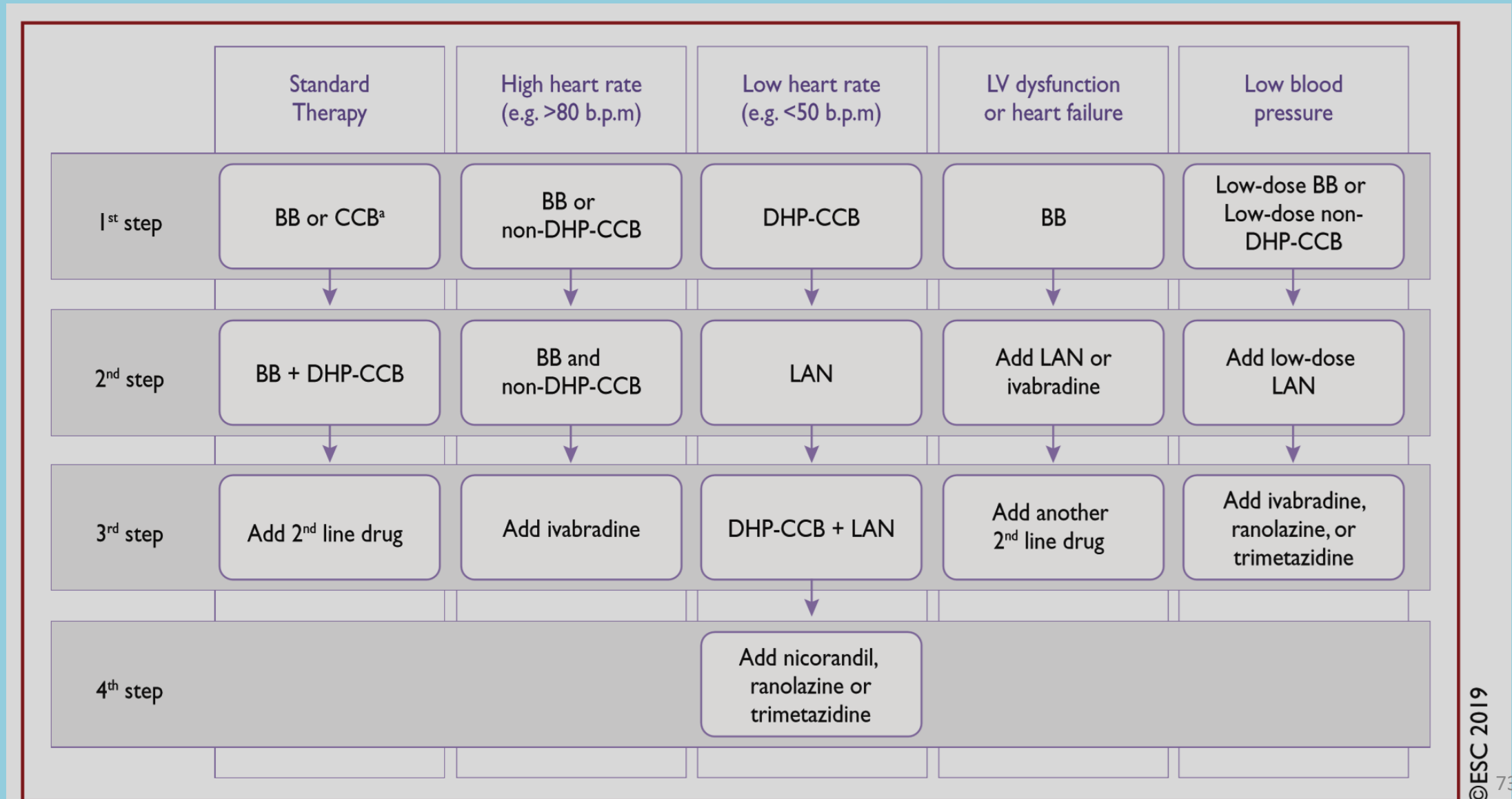


Event prevention

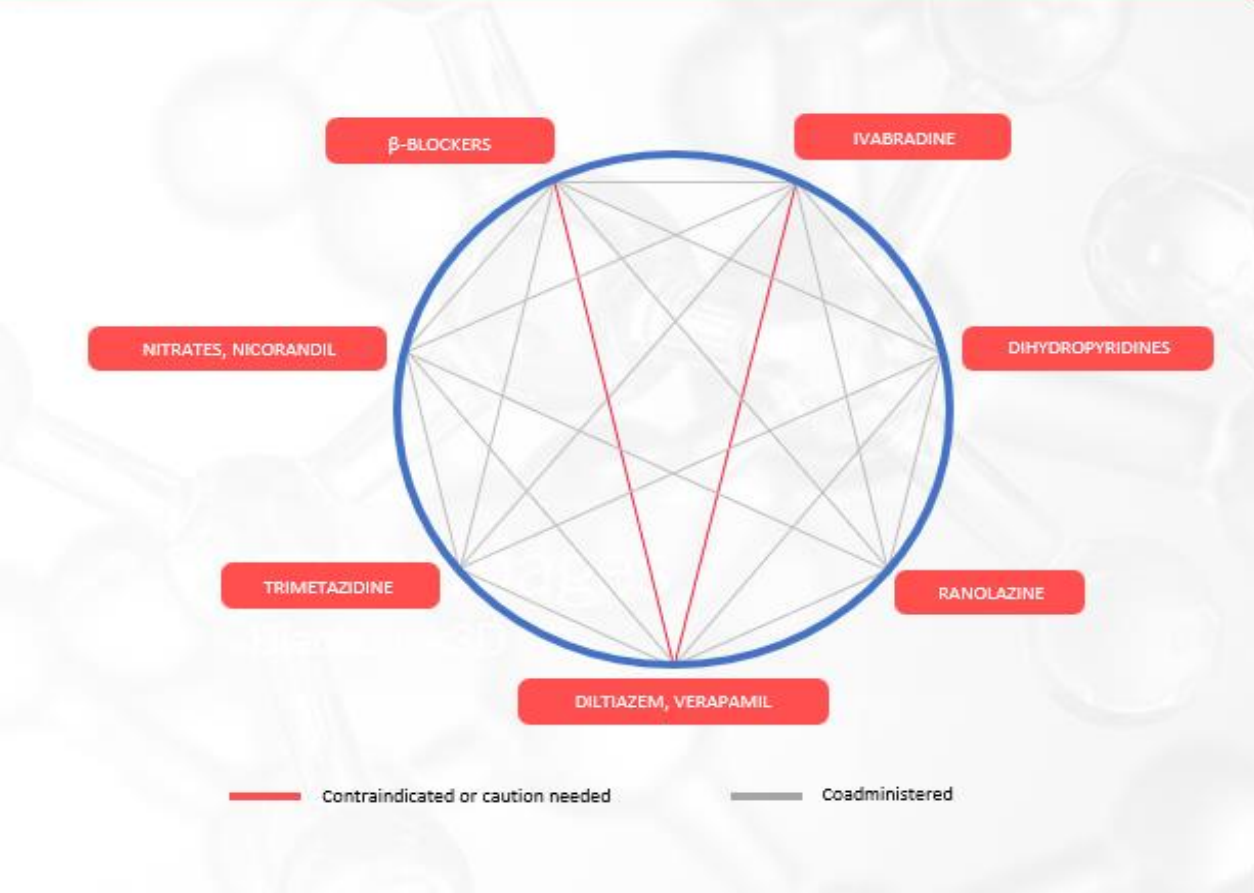
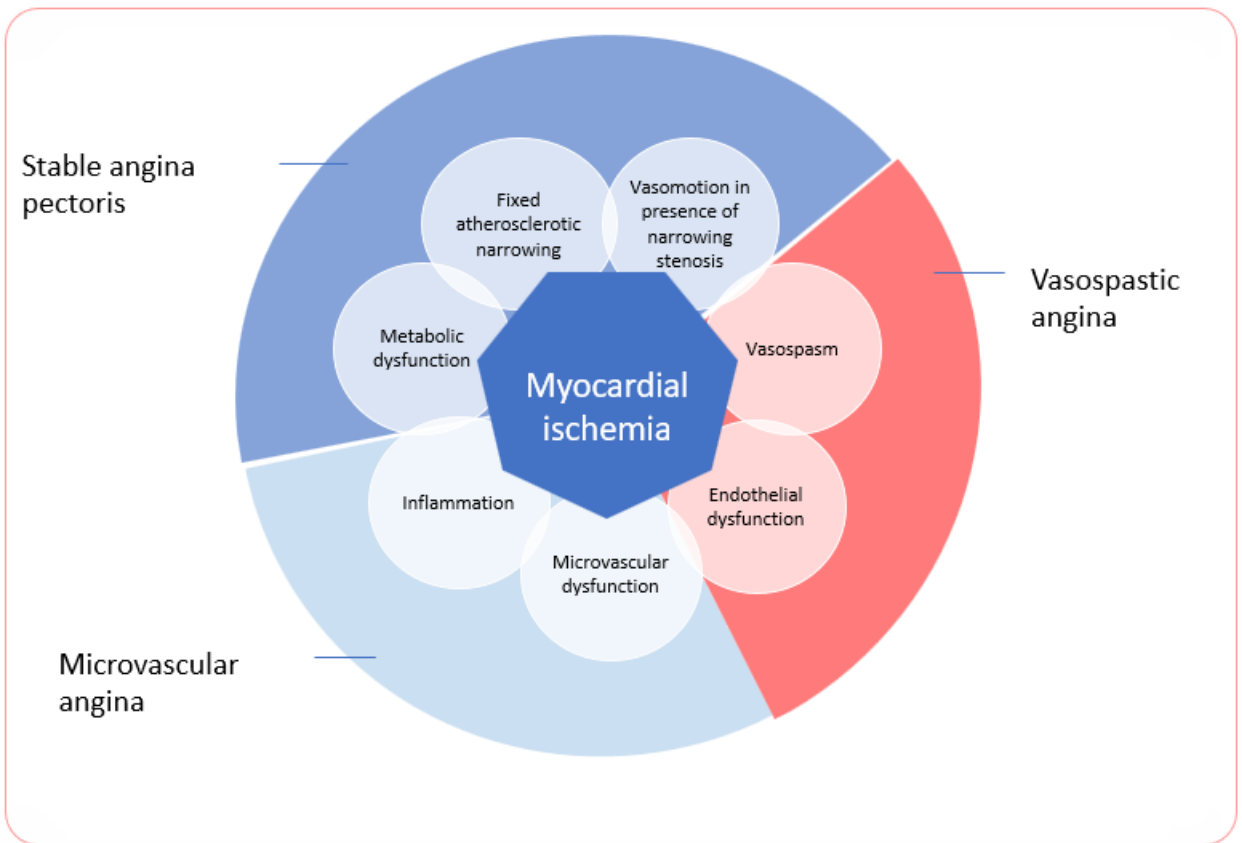
Anti-ischaemic drugs	
Short Acting nitrates for immediate relief of angina	IB
First line treatment – BB and/or CCB	IA
S/T not relieved – combination of BB with a DHP-CCB	Ila, C
Long acting nitrate as 2 nd line treatment option	Ila, B
Nicorandil, ranolazine, ivabradine or trimetazidine as 2 nd line treatment option	Ila, B
Nitrates are not recommended in patients with HOCM or co-administration of phosphodiesterase inhibitors	IIIB

Pharmacological management

Stepwise strategy for long-term anti-ischemic drug therapy in CCS



Multifactorial disease requires multitargeted approach



New algorithm for optimal antianginal therapy

Trimetazidine and ivabradine recommended in the majority of situations

Significant AV conduction abnormalities*

DHPs, LAN, ranolazine, Trimetazidine

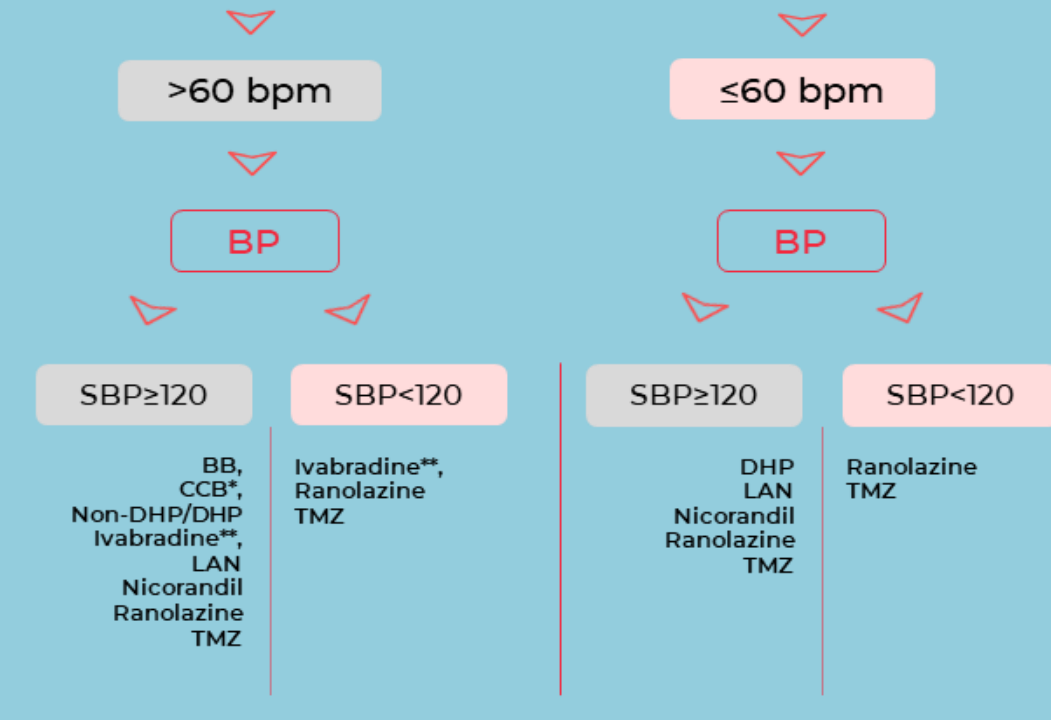
Microvascular angina*

Vasodilating BB, CCBs, non-DHP/DHP, ivabradine, ranolazine, Trimetazidine

Atrial fibrillation*

BB, CCBs, non-DHP/DHP, LAN, ranolazine, Trimetazidine

HEART RATE



Heart failure*

BB, ivabradine, Trimetazidine, LAN, ranolazine (NYHA, I, II)

Chronic obstructive pulmonary disease*

Cardioselective BB, CCBs, ivabradine, LAN, nitrates, ranolazine, Trimetazidine

Diabetes mellitus*

Vasodilating BB, CCBs, ivabradine, LAN, ranolazine, Trimetazidine

*Normal ejection fraction, **heart rate >70 bpm
 *proposed drugs according to certain comorbidities
 Yellow: Preferred - White: Possible - The proposed drugs are in alphabetical order

THANK YOU