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INTERNAL MEDICINE DEPARTMENT

TYPICAL ATRIAL FLUTTER “IN THE SECTION”: DRUG THERAPY AND INTERVENTIONAL THERAPY IN A PATIENT WITH POST MYOCARDITIS CARDIOSCLEROSIS

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2017

BACKGROUND

- Since the description of **Atrial Flutter (AFLt)** a century ago, different discoveries has led to a better understanding of AFLt circuits and foci location and technological improvements have also facilitated curative treatment with **radiofrequency catheter ablation (RFCA)**
- Typical **AFLt** make up 22% of all 8,546 ablation procedures in the Spanish National Ablation's Registry (behind atrioventricular nodal reentrant tachycardia, accessory pathways but ahead of atrial fibrillation (AF))
- **AFLt** is considered to hold as much risk as AF for thromboembolic events (3-4% per year); **AFLt** also carries a proarrhythmic risk, and additionally, rhythm control and ventricular rate response can only hardly be achieved with medical treatment.
- **AFLt** occurs 2.5 times more frequently in men than women; it is seen in 25% - 35% of patients with AF

https://www.uptodate.com/contents/overview-of-atrial-flutter
https://online.epocrates.com/diseases/18323/Atrial-flutter/Epidemiology
https://www.escardio.org/Journals/E-Journal-of-Cardiology-Practice/Volume-11/Atrial-flutter-common-and-main-atypical-forms

INTRODUCTION 1.9.

- Typical **AFLt** (Type I Atrial Flutter ,organised atrial tachycardia) is defined as a macroreentry tachycardia confined to the right atrium
- This arrhythmia has a 200-260 ms cycle length, although it may fluctuate depending on patient's previous treatment or ablation, congenital heart disease, etc.
- Ventricular rate response will be limited by the atrioventricular (AV) node conductions, usually presenting a 2:1 or 3:1 response, during AFLt

https://www.escardio.org/Journals/E-Journal-of-Cardiology-Practice/Volume-11/Atrial-flutter-common-and-main-atypical-forms

INTRODUCTION 2.9.

- Typical **AFLt** originates in a well-known circuit around the tricuspid annulus limited by anatomical barriers such as both the superior and inferior cava veins, the coronary sinus and crista terminalis; the wave front may rotate around this circuit **counterclockwise** (*anticlockwise)* or **clockwise** (see next slide)
- ***Anticlockwise Reentry*** is the commonest form of atrial flutter (90% of cases)

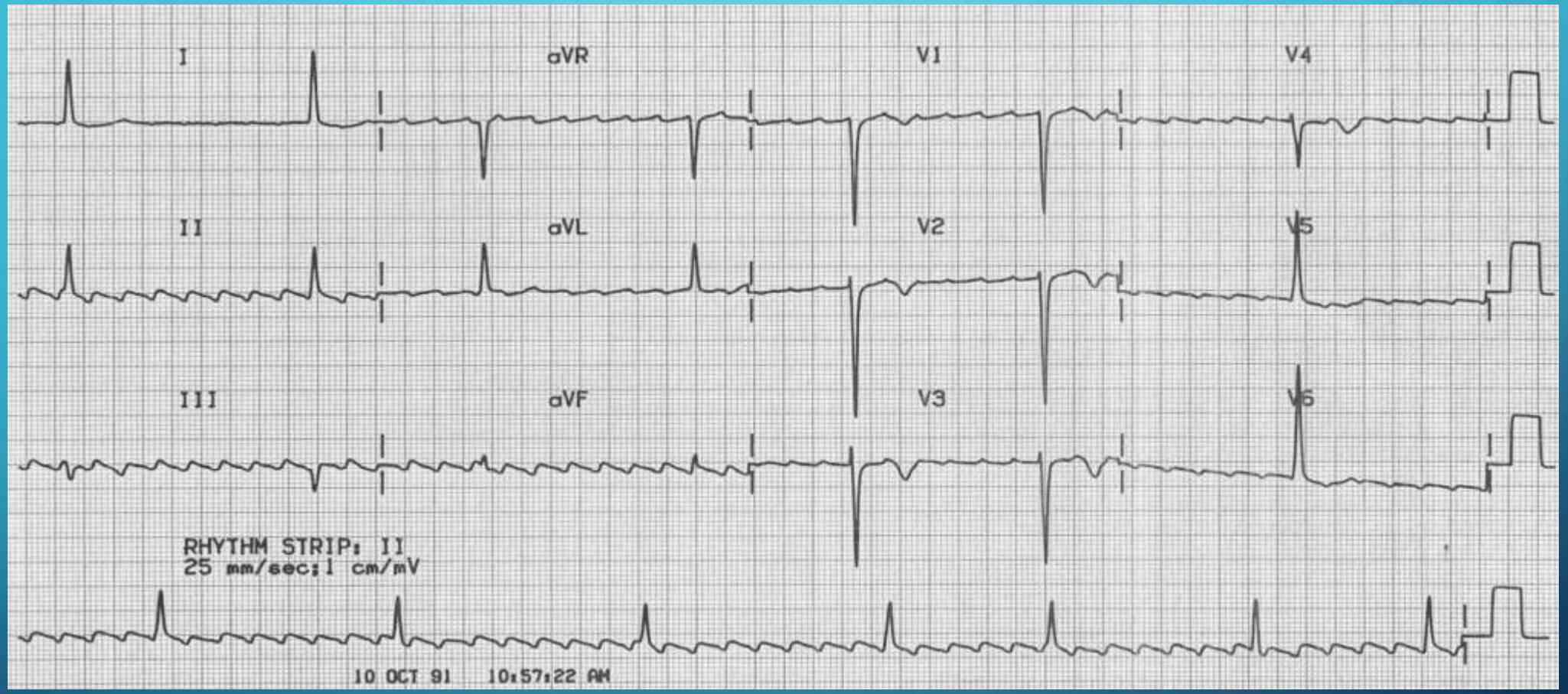
Retrograde atrial conduction produces:

- Inverted flutter waves in leads II,III, aVF
- Positive flutter waves in V1 – may resemble upright P waves

- ***Clockwise Reentry*** uncommon variant produces the opposite pattern:
  - Positive flutter waves in leads II, III, aVF
  - Broad, inverted flutter waves in V1

https://www.escardio.org/Journals/E-Journal-of-Cardiology-Practice/Volume-11/Atrial-flutter-common-and-main-atypical-forms
https://lifeinthefastlane.com/ecg-library/atrial-flutter/

INTRODUCTION 3.9.



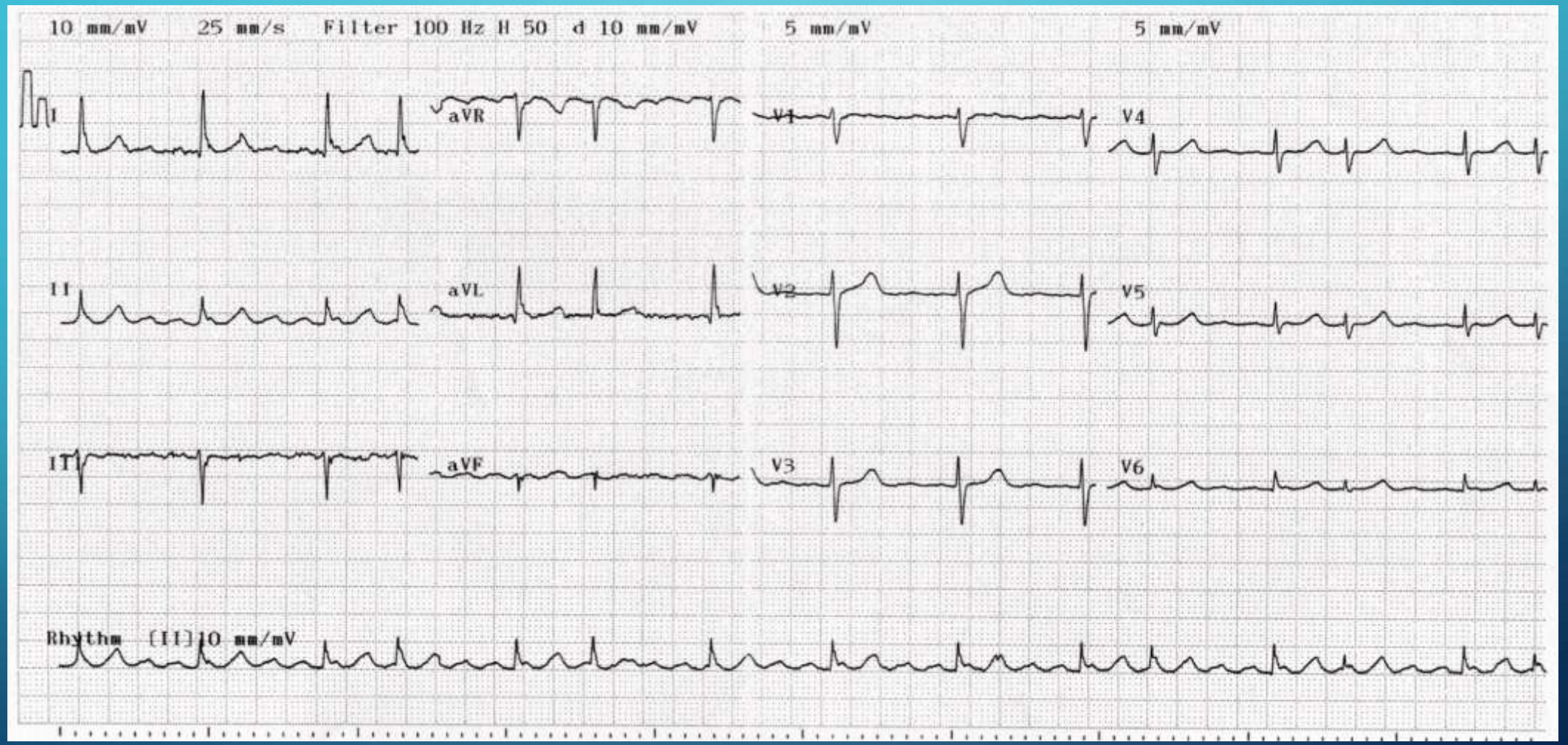
AFLt with High-Grade AV Block

There is anticlockwise flutter with marked AV block (varying from 5:1 up to 8:1).

The very low ventricular rate suggests treatment with AV nodal blocking drugs (e.g. digoxin, beta-blockers); other possibilities could include intrinsic conducting system disease (true "AV block") or electrolyte abnormality (e.g. hyperkalaemia)

https://lifeinthefastlane.com/ecg-library/atrial-flutter/

INTRODUCTION 4.9.



AFLt with Variable Block
The block varies between 2:1 and 4:1
The presence of positive flutter waves in lead II suggests a clockwise re-entry circuit

http://www.ems12lead.com/2015/12/28/12-rhythms-of-christmas-atrial-flutter/

INTRODUCTION 5.9.

Some conditions may make the ECG diagnosis difficult:

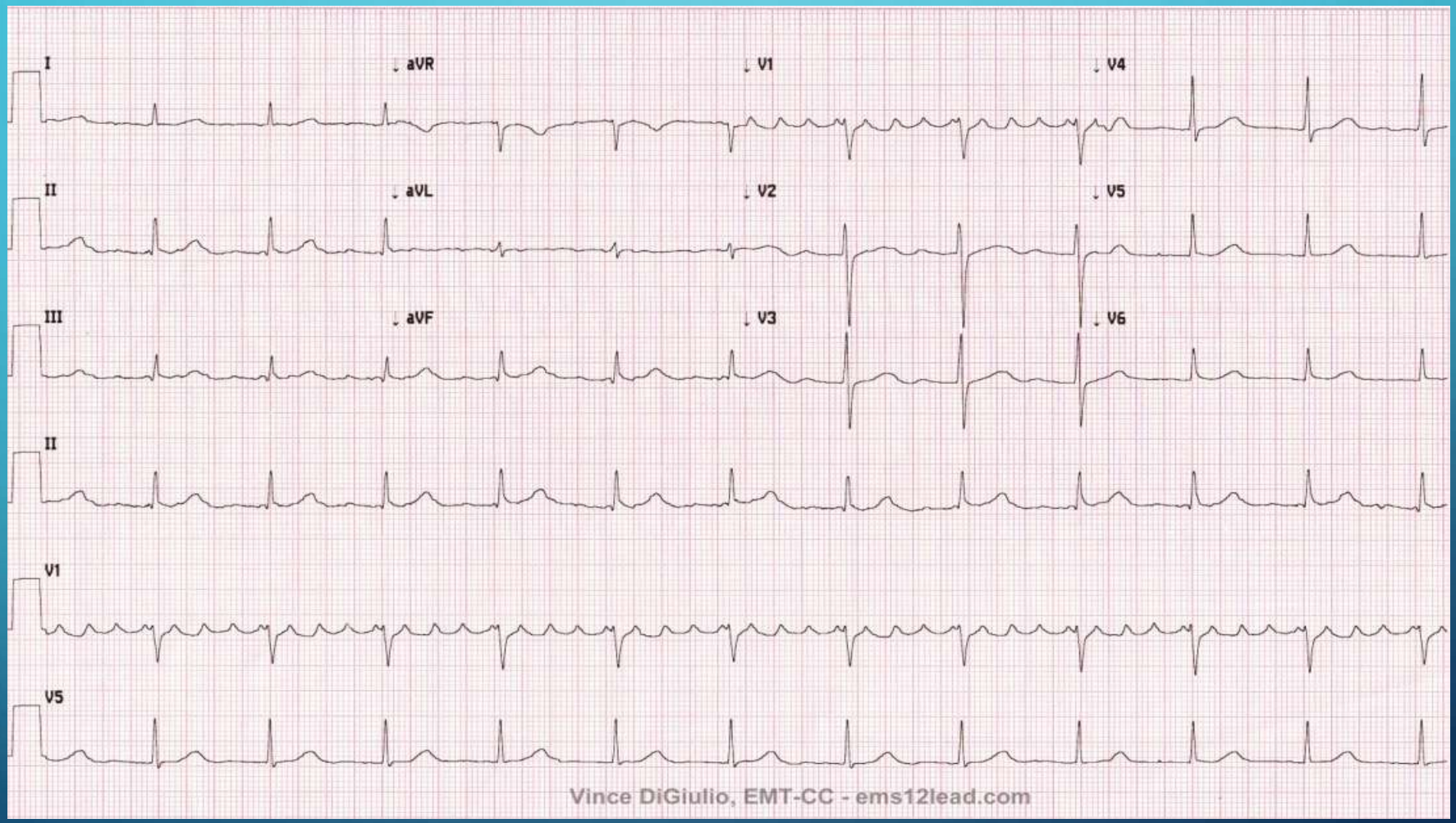
- Scarred atria with low areas of voltage could mimic isoelectric baseline despite atrial continuous electrical activity (see next slide)
- Concomitant circuits could also change the typical atrial appearance
- Both high and irregular ventricular rate responses may make the diagnosis difficult; in the first case, vagal maneuvers or AV node blocking drugs, such as adenosine, may be useful, in the second case, a regular irregularity has to be always ruled out

Electrophysiological studies (EPs) are indicated:

- In AFLt recurrences despite medical treatment (Class I indication)
- After the first episode of AFLt (Class IIa indication), especially in those presenting with poor hemodynamic tolerance or tachymiocardiopathy

https://www.escardio.org/Journals/E-Journal-of-Cardiology-Practice/Volume-11/Atrial-flutter-common-and-main-atypical-forms

INTRODUCTION 6.9.



AFLt with F-waves only visible in V1

http://www.ems12lead.com/2015/12/28/12-rhythms-of-christmas-atrial-flutter

INTRODUCTION 7.9.

- The ablation procedure's main target is to achieve bidirectional block through the CTI
- Acute success rate is almost 95% in the registries
- However, at 5 year follow-up almost 70% of these patients might develop AF or atypical AFLt, which is probably related to the baseline characteristics, structural heart disease and uncontrolled risk factors

https://www.escardio.org/Journals/E-Journal-of-Cardiology-Practice/Volume-11/Atrial-flutter-common-and-main-atypical-forms

INTRODUCTION 8.9.: CATHETER ABLATION OF CTI

INTRODUCTION 9.9.

- **Cardiosclerosis** (from Greek «kardia» - "heart" and «sklerosis» - "condensation"; the synonymic name - myocardiosclerosis) - partial replacement of a fabric of a myocardium by a connecting fabric
- Differently**, cardiosclerosis** - formation of a cicatricial fabric in a muscle of heart which replaces with itself a myocardium and it is capable to deform valves of heart hypertension symptoms
- **Post myocarditis cardiosclerosis** occurs mainly in the population aged 20 to 40 years; the cause of its development is the prevalence of infectious diseases, allergic reactions and other inflammatory or chronic processes in the body
- **Post myocarditis cardiosclerosis, like atherosclerotic, is mainly diffuse**

http://brulanta.com/health/cardiosclerosis-symptoms-and-treatment/
http://www.8med.ru/view_article.php?id=42

OUR CLINICAL CASE

- Patient A is a 39 year old employed man, admitted to the hospital on the 19th of September, 2017

MAIN COMPLAINTS

- Palpitations that was not evidenced to be connected with physical exercises, arrhythmias
- Breathlessness while ascending the stair case to the third floor and

ANAMNESIS OF THE DISEASE 1.2.

- Over a year noticed increased blood pressure (max 150/100 mmHg, valsartan was prescribed to lower BP to 120/80mmHg)
- 20/03/2017 –upper respiratory tract infection (URTI), was treated by himself
- After one week of URTI, patient presented to the regional hospital with leg edema, tiredness, palpitations and cough with rose sputum; was admitted to a hospital with preliminary diagnosis: **Dilated cardiomyopathy, paroxysmal AFLt**; treatment commenced in the hospital with amiodarone 200 mg/d, carvedilol 6.25mg/bd and rivaroxaban 20mg/d; transferred to a specialist hospital where was improved heart failure signs; in spite of treatment tachyform of AFLt persisted

ANAMNESIS OF THE DISEASE 2.2.

- 22/06/2017–04/07/2017 was admitted to cardiological department where diagnosis was made: **Subacute (27/03/17) diffuse myocarditis unknown etiology, severe severity; AFLt, permanent form. Exudative pericarditis (27/03/17)** and was discharged from the hospital with some improvement of symptoms (intook amiodarone 200 mg/d, carvedilol 6.25mg/bd and rivaroxaban 20mg/qd, valsartan 80 mg/d)
- 19/09/17 – admitted to the Kharkiv clinical hospital on railway transport #1 of "Healthcare Center" subdivision of public joint-stock company "Ukrainian railway" for reevaluation and correction of treatment plan

ANAMNESIS VITAE

- The patient due to his sedentary lifestyle and high calorie diet gained approximately 10kg in the course of the year
- He was diagnosed with hepatitis A as a child
- There is negative history of tuberculosis, has no known allergic reactions to drugs
- There is a positive family history of cardiovascular disease, his father was diagnosed with myocardial infarction at age 56
- Patient admitted to smoking about 5 sticks of cigarette daily and drinking a small quantity of alcohol occasionally

OBJECTIVE EXAMINATION 1.2

- **General condition** is relatively satisfactory, no evidence of physical distress, clear consciousness; height – 171 sm, weight – 128 kg; BMI= 44 kg/m2
- **Skin and visible mucous** membranes are clean, pale pink and acyanotic, but face was flushed
- **Peripheral lymph nodes** are not palpable
- **Thyroid gland** is painless and not palpable
- **Cardiovascular system:** heart rate=90bpm, pulse=90 bpm;

BP left hand = 120/85 mmHg, right hand = 130/90 mmHg (on the background of antihypertensive therapy)

On auscultation, the apex beat is shifted to the left, second heart sound is accentuated over the aorta

OBJECTIVE EXAMINATION 2.2

- **Respiratory system:** RR=17breaths/min; auscultation - weakened vesicular breathing, no adventitious sounds
- **Abdomen** is enlarged due to subcutaneous fat, painless on palpation, liver protrudes about 2-3cm below the costal arch margin, painless on palpation
- There is symmetric edema of the lower limbs
- Pasternasky's sign is negative

PRELIMINARY DIAGNOSIS

- Post myocarditis cardiosclerosis
- AFLt, persistent form, tachysystolic
- Chronic heart failure
- Obesity

RECOMMENDED EXAMINATIONS

- Complete blood test
- General urine test
- ECG
- EchoCG
- 24-h ambulatory ECG monitoring
- Coagulogram
- TSH, T4, anti-thyroid gland antibodies (anti-TG Ab)
- Fasting glucose level
- Biochemical blood test (ALT, AST, AP, bilirubin)
- Renal function tests (creatinine)
- Consultation of ophthalmologist, arrhythmologist
- Blood lipid spectrum
- Ultrasound of abdomen
- Glycated hemoglobin (HbA1C)
- Blood electrolytes
- Biomarkers: troponin and BNP levels
- Serum cardiac autoantibodies

*was made in the hospital

COMMON BLOOD TEST (20/09/2017)

Measure	Result	Rate	Measure	Result	Rate
Hemoglobin (Hb)	165	130 – 160 g/L	Segmented Neutrophils	62.5	47.0 -72.0
			Neutrophils		
Erythrocyte	5.58	4.0 – 5.0 T/L	Eosinophils	1.7%	0.5 – 5.0%
Color Index	0.92	0.8 -1.2	Basophils	1.3%	0 – 1.0%
Leukocytes	7.2	4.0 – 9.0 g/L	Monocytes	7.3%	3.0 -11.0%
ESR	8	M 1-10 mm/h	Lymphocytes	27.2%	19.0 -37.0%
Platelets	244	180 -320 g/L	Hematocrit	48.9%	40 – 48%
Neutrophils	62.5	48.06 – 78%			

Conclusion: A rise in Hemoglobin, erythrocyte and basophils level in the blood

GENERAL URINE TEST (20/09/2017)

MEASURE	RESULT	NORMAL RANGE
SPECIFIC GRAVITY	1.015	1.001 – 1.040
pH	5.0	5.0 – 7.0
PROTEIN	ABSENT	To 0.033g/l
GLUCOSE	ABSENT	ABSENT
EPITHELIUM TRANSITION	ABSENT	Not detected
BACTERIA	ABSENT	Not detected

Conclusion: Normal

BIOCHEMICAL BLOOD TEST (20/09/2017)

MEASURE	RESULT	RANGE
Total Bilirubin	6.0	1.7 – 21mmol/l
AST	20.1	To 37 U/L
ALT	27.0	To 41 U/L
Creatinine	70	62 – 106 µmol/L

Conclusion: Normal

GLOMERULAR FILTRATION RATE

ESTIMATED GFR	NORMAL RANGE
The Modification of Diet in Renal Disease (MDRD) (GFR (mL/min/1.73 m2) = 175 × (Scr) -1.154 × (Age)-0.203 × (0.742 if female) × (1.212 if African American)) Study Equation **109 mL/min/1.73 m²**	Age (30 - 39) 67-125 ml/min/1.73 m2

Conclusion: Normal kidney function

FASTING GLUCOSE TEST (20/09/2017)

MEASURE	RESULT	NORMAL RANGE
Fasting Blood Glucose	6.22	3.9 – 6.1 mmol/L

Conclusion: Normal

ULTRASOUND OF ABDOMEN

- Hepatomegaly with steatohepatosis
- Diffuse changes of liver and pancreas
- Sludge in the gallbladder

THYROID FUNCTION TESTS (20/09/17)

MEASURE	RESULT	RANGE
TSH	2.15	0.27-4.2µmol/ml
Free T3	2.84	2.0-4.4pg/ml
Free T4	1.13	0.93-1.17ng/dl
Anti-TPO	17.3	To 34 MO/ml
Antibodies to Thyrogloblulin	18.54	To 115 MO/ml
Thyrotropin receptor, antiter IgG	<0.3	to 1.75 MO/l

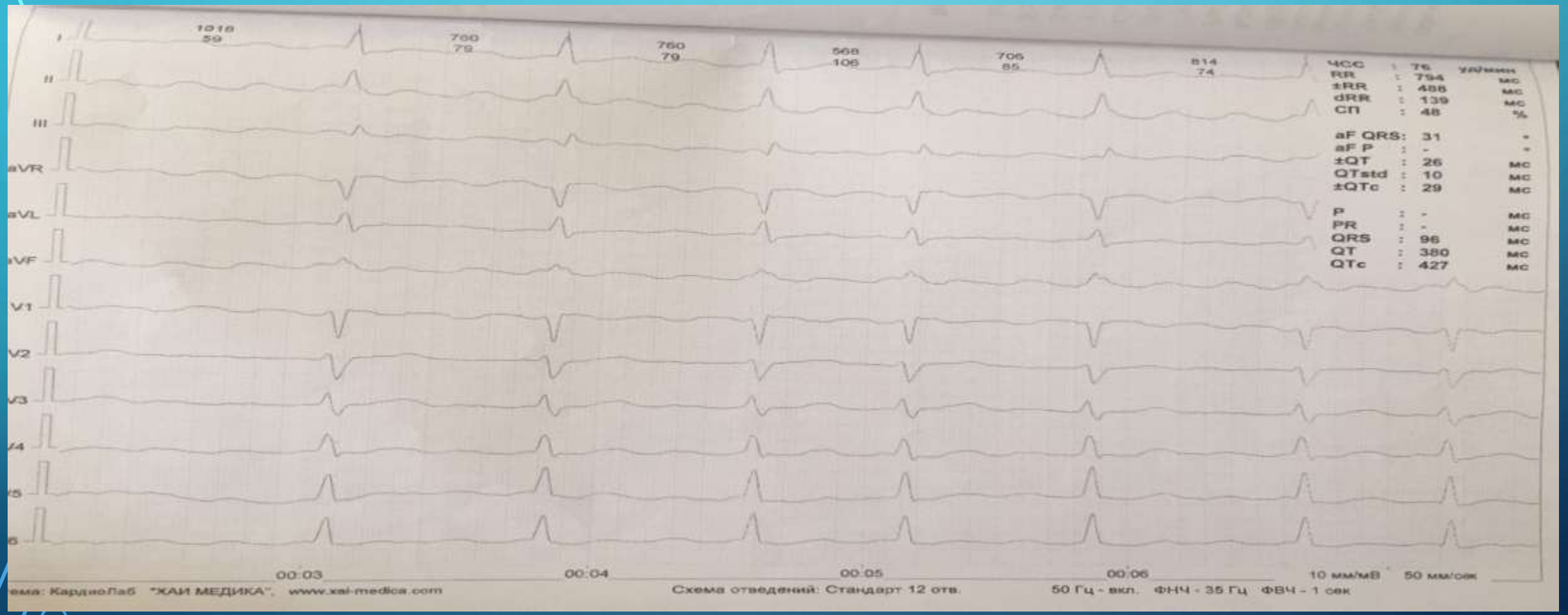
Conclusion: Normal

BLOOD LIPID SPECTRUM (20/09/2017)

MEASURE	RESULT	RATE
TOTAL CHOLESTEROL	5.10	≤ 5.2 mmol/l
VLDL	1.19	< 1.0 mmol/l
LDL	3.08	<3.5 mmol/l
HDL- Cholesterol levels	0.82	>0.9 mmol/l
Triglycerides	2.65	<2.3 mmol/l
COEFFICIENT of atherogenecity	5.21	To 3.0 mmol/l

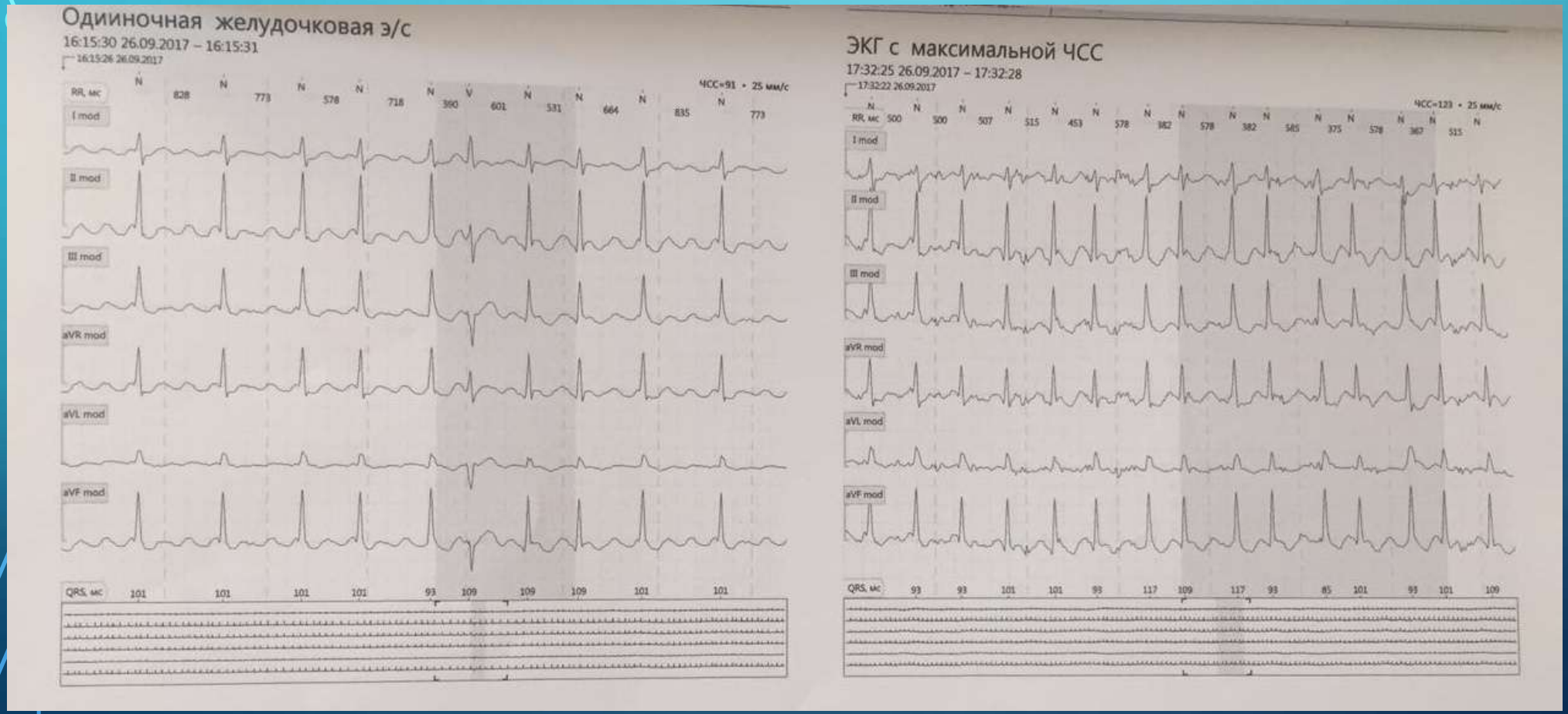
Conclusion: Dyslipidemia II b type

ECG WITH TYPICAL AFLT



Conclusion: AFLt with AV node conductions from 3:1 to 5:1 response with low areas of F waves voltage ; heart rate 75 bpm

24-H AMBULATORY ECG WITH TYPICAL AFLT AND PREMATURE VENTRICLE CONTRACTION



24-H AMBULATORY ECG MONITORING: CONCLUSION

- During the 18 hour monitoring AFLt was registered and with a mean heart rate of 81 bpm (maximum HR 116 bpm, minimum HR 63 bpm)
- Was recorded: ventricular premature contractions (total 167)
- Ischemic changes have not been identified

ECHOCARDIOGRAPHY 1.2.

Name	Result before Ablation	Result after ablation	Normal
1) Acoustic window	poor		normal
2) Aorta	30.6		20 – 37 mm
3) Aortic valve	18.8		17 – 26 mm
4) Left Atrium	41		To 38 mm
5) Mitral Valve	No regurgitation		No regurgitation
6) Posterior Wall of the LV	12		6 -11mm
7) Interventricular Septum	12		6 – 11mm
8) Right Ventricle	27.5		D.: (9-26 mm)

ECHOCARDIOGRAPHY 2.2.

Name	Result before ablation	Result after ablation	Normal
9) Right atrium	44		<38mm
10) Tricuspid valve	Regurgitation 1st degree		No regurgitation
11) Ejection Fraction	66		55 – 78%

Conclusion: Sclerotic changes of the aorta, aortic and mitral cusps, dilatation of both atriums, dilatation of right ventricle, hypertrophy of left ventricle; ECHO signs of diastolic dysfunction

BASIC CLINICAL SYNDROMES

- Atherosclerosis (sclerotic changes of aorta and aortic valve)
- Arterial hypertension
- Arrhythmias
- Heart failure
- Metabolic syndrome
- Hypertensive heart (LVH, atrial enlargement, diastolic dysfunction)

CLINICAL DIAGNOSIS ACCORDING TO CURRENT CLASSIFICATIONS

CARDIOSCLEROSIS CLASSIFICATION

Forms:

- **Focalized cardiosclerosis**
- **Diffuse cardiosclerosis**

Etiology:

- **Postinfarction cardiosclerosis** , formed as a result of an experienced attack of myocardial infarction
- **Atherosclerotic cardiosclerosis** is formed on the basis of coronary artery atherosclerosis
- **Post myocarditis cardiosclerosis** is formed due to the development of inflammatory processes in the myocardium

http://brulanta.com/health/cardiosclerosis-symptoms-and-treatment/

PATTERNS OF AF/AFLT

AF/AFLt pattern	Definition
First diagnosed AF/AFLt	AF/AFLt that has not been diagnosed before, irrespective of the duration of the arrhythmia or the presence and severity of AF-related symptoms
Paroxysmal AF/AFLt	Self-terminating, in most cases within 48 hours. Some AF/AFLt paroxysms may continue for up to 7 days. AF/AFLt episodes that are cardioverted within 7 days should be considered paroxysmal
Persistent AF/AFLt	AF/AFLt that lasts longer than 7 days, including episodes that are terminated by cardioversion, either with drugs or by direct current cardioversion, after 7 days or more
Long-standing persistent AF/AFLt	Continuous AF/AFLt lasting for ≥1 year when it is decided to adopt a rhythm control strategy
Permanent AF/AFLt	AF/AFLt that is accepted by the patient (and physician). Hence, rhythm control interventions are, by AF/AFLt. Should a rhythm control strategy be adopted, the arrhythmia would be re-classified as ‘long-standing definition, not pursued in patients with permanent persistent AF/AFLt’

MODIFIED EUROPEAN HEART RHYTHM ASSOCIATION SYMPTOM SCALE (MODIFIED FROM WYNN ET AL)

Modified EHRA score	Symptoms	Description
I	None	AF does not cause any symptoms
2a	Mild	Normal daily activity not affected by symptoms related to AF[a]
2b	Moderate	Normal daily activity not affected by symptoms related to AF, but patient troubled by symptoms[a]
3	Severe	Normal daily activity affected by symptoms related to AF
4	Disabling	Normal daily activity discontinued

AF = atrial fibrillation; EHRA = European Heart Rhythm Association.
[a]EHRA class 2a and 2b can be differentiated by evaluating whether patients are functionally affected by their AF symptoms. AF-related symptoms are most commonly fatigue/tiredness and exertional shortness of breath, or less frequently palpitations and chest pain.[42,194,200–202]

2016 ESC Guidelines for the management of atrial fibrillation developed in collaboration withEACTS

AFLT/FIBRILLATION CHA2-DS2-VASC SCORE FOR STROKE

Score	CHA_2DS_2-VASc Risk Criteria
1 point	Congestive heart failure
1 point	Hypertension
2 points	Age ≥75 years
1 point	Diabetes mellitus
2 points	Stroke/Transient Ischemic Attack/Thromboembolic event
1 point	Vascular disease (prior MI, PAD, or aortic plaque)
1 point	Age 65 to 74 years
1 point	Sex category (i.e, female sex)

Conclusion: patient's CHA2-DS2-VASc score for stroke=2; risk of developing a stroke within a year is only 2.2%

https://emedicine.medscape.com/article/2172597-overview

MODIFIABLE AND NON-MODIFIABLE RISK FACTORS FOR BLEEDING IN ANTICOAGULATED PATIENTS BASED ON BLEEDING RISK SCORES

Hypertension (especially when systolic blood pressure is >160 mmHg)[a,b,c]
Labile INR or time in therapeutic range <60%[a] in patients on vitamin K antagonists
Medication predisposing to bleeding, such as antiplatelet drugs and non-steroidal anti-inflammatoy drugs[a,d]
Excess alcohol (≥8 drinks/week)[a,b]
Anaemia[b,c,d]
Impaired renal function[a,b,c,d]
Impaired liver function[a,b]
Reduced platelet count or function[b]
Age[e] (>65 years)[a] (≥75 years)[b,c,d]
History of major bleeding[a,b,c,d]
Previous stroke[a,b]
Dialysis-dependent kidney disease or renal transplant[a,c]
Cirrhotic liver disease[a]
Malignancy[b]
Genetic factors[b]

Biomarker-based bleeding risk factors
High-sensitivity troponin[e]
Growth differentiation factor-15[e]
Serum creatinine/estimated CrCl[e]

ABC = age, biomarkers, clinical history; ATRIA = AnTicoagulation and Risk factors In Atrial fibrillation; CKD = chronic kidney disease; CrCl = creatinine clearance; HAS-BLED = hypertension, abnormal renal/liver function (1 point each), stroke, bleeding history or predisposition, labile INR, elderly (>65 years), drugs/alcohol concomitantly (1 point each); HEMORR$_2$HAGES = hepatic or renal disease, ethanol abuse, malignancy, older (age >75), reduced platelet count or function, rebleeding risk (prior bleed; 2 points), hypertension (uncontrolled), anaemia, genetic factors (CYP 2C9 polymorphisms), excessive fall risk (including neuropsychiatric disease), and stroke; INR = international normalized ratio; ORBIT = Outcomes Registry for Better Informed Treatment of Atrial Fibrillation; TTR = time in therapeutic range; VKA = vitamin K antagonist.

[a]Derived from the HAS-BLED score.[384]

[b]Derived from the HEMORR$_2$HAGES score.[383]

[c]Derived from the ATRIA score.[385]

[d]Derived from the ORBIT score.[388]

[e]Derived from the ABC bleeding score.[387]

2016 ESC Guidelines for the management of atrial fibrillation developed in collaboration with EACTS

CLASSIFICATION OF OFFICE BLOOD PRESSURE LEVELS (MMHG)

Category	Systolic		Diastolic
Optimal	<120	and	<80
Normal	120-129	and/or	80-84
High normal	130-139	and/or	85-89
Grade 1 hypertension	140-159	and/or	90-99
Grade 2 hypertension	160-179	and/or	100-109
Grade 3 hypertension	≥180	and/or	≥110
Isolated systolic hypertension	≥140	and	<90

https://academic.oup.com/eurheartj/article/34/28/2159/451304

TREATMENT RECOMMENDATIONS BASED ON CHA_2DS_2-VASC SCORE

CHA_2DS_2-VASc Score	Recommendation
0	None
1	None or aspirin or OAC
2 or more	OAC

Conclusion: patient should be placed on oral anticoagulant to further reduce stroke risk

https://emedicine.medscape.com/article/2172597-overview

AMERICAN HEART ASSOCIATION HEART FAILURE STAGES

Class	Objective Assessment
A	No objective evidence of cardiovascular disease. No symptoms and no limitation in ordinary physical activity.
B	Objective evidence of minimal cardiovascular disease. Mild symptoms and slight limitation during ordinary activity. Comfortable at rest.
C	Objective evidence of moderately severe cardiovascular disease. Marked limitation in activity due to symptoms, even during less-than-ordinary activity. Comfortable only at rest.
D	Objective evidence of severe cardiovascular disease. Severe limitations. Experiences symptoms even while at rest.

http://www.heart.org/HEARTORG/Conditions/HeartFailure/AboutHeartFailure/Classes-of-Heart-Failure_UCM_306328_Article.jsp#.WhPZMd-WbIU

NEW YORK HEART ASSOCIATION(NYHA) HEART FAILURE CLASSIFICATION SYSTEM

NYHA Class	Level of Clinical Impairment
I	No limitation of physical activity. Ordinary physical activity does not cause undue breathlessness, fatigue, or palpitations.
II	Slight limitation of physical activity. Comfortable at rest, but ordinary physical activity results in undue breathlessness, fatigue, or palpitations.
III	Marked limitation of physical activity. Comfortable at rest, but less than ordinary physical activity results in undue breathlessness, fatigue, or palpitations.
IV	Unable to carry on any physical activity without discomfort. Symptoms at rest can be present. If any physical activity is undertaken, discomfort is increased.

https://www.intechopen.com/books/primary-care-in-practice-integration-is-needed/integrated-care-for-heart-failure-in-primary-care

DEFINITION OF HEART FAILURE WITH PRESERVED EJECTION FRACTION (HFPEF)

Type of HF		HFrEF	HFmrEF	HFpEF
CRITERIA	1	Symptoms ± Signs[a]	Symptoms ± Signs[a]	Symptoms ± Signs[a]
	2	LVEF <40%	LVEF 40–49%	LVEF ≥50%
	3	–	1. Elevated levels of natriuretic peptides[b]; 2. At least one additional criterion: a. relevant structural heart disease (LVH and/or LAE), b. diastolic dysfunction (for details see Section 4.3.2).	1. Elevated levels of natriuretic peptides[b]; 2. At least one additional criterion: a. relevant structural heart disease (LVH and/or LAE), b. diastolic dysfunction (for details see Section 4.3.2).

BNP = B-type natriuretic peptide; HF = heart failure; HFmrEF = heart failure with mid-range ejection fraction; HFpEF = heart failure with preserved ejection fraction; HFr
heart failure with reduced ejection fraction; LAE = left atrial enlargement; LVEF = left ventricular ejection fraction; LVH = left ventricular hypertrophy; NT-proBNP = N-ter
pro-B type natriuretic peptide.

[a]Signs may not be present in the early stages of HF (especially in HFpEF) and in patients treated with diuretics.

[b]BNP>35 pg/ml and/or NT-proBNP>125 pg/mL.

2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure

CARDIOVASCULAR RISK STRATIFICATION CHART WITH RECOMMENDED FOLLOW-UP FREQUENCY FOR EACH CATEGORY

		Blood pressure (mmHg)				
Other risk factors, OD or disease		Normal SBP 120-129 or DBP 80-84	High normal SBP 130-139 or DBP 85-89	Grade 1 HT SBP 140-159 or DBP 90-99	Grade 2 HT SBP 160-179 or DBP 100-109	Grade 3 HT SBP ≥180 or DBP ≥110
No other risk factor	Risk level	Average risk	Average risk	Low added risk	Moderate added risk	High added risk
	Follow up visits /year	0	0	2	2	3.5
1-2 risk factors	Risk level	Low added risk	Low added risk	Moderate added risk	Moderate added risk	Very high added risk
	Follow up visits /year	3.5	3.5	3	2	3.5
3 or more risk factors, MS, OD or Diabetes	Risk level	Moderate added risk	High added risk	High added risk	High added risk	Very high added risk
	Follow up visits /year	3.5	3.5	3.5	3.5	3.5
Established CV or renal disease	Risk level	Very high added risk	Very high added risk	Very high added risk	Very high added risk	Very high added risk
	Follow up visits /year	3.5	3.5	3.5	3.5	3.5

https://www.researchgate.net/figure/38056846_fig1_Cardiovascular-risk-stratification-chart-with-recommended-follow-up-frequency-for-each

LIPOPROTEIN PATTERNS (FREDRICKSON PHENOTYPES)

Phenotype	Elevated Lipoprotein(s)	Elevated Lipids
Phenotype	**Elevated Lipoprotein(s)**	**Elevated Lipids**
I	Chylomicrons	TGs
IIa	LDL	Cholesterol
IIb	LDL and VLDL	TGs and cholesterol
III	VLDL and chylomicron remnants	TGs and cholesterol
IV	VLDL	TGs
V	Chylomicrons and VLDL	TGs and cholesterol
LDL = low-density lipoprotein; TGs = triglycerides; VLDL = very-low-density lipoprotein.		

https://www.msdmanuals.com/professional/endocrine-and-metabolic-disorders/lipid-disorders/dyslipidemia#v989709

WAIST TO HIP RATIO

	age	low	moderat	high	very high
female	20-29	<0,71	0,71-0,77	0,78-0,82	>0,82
	30-39	<0,72	0,72-0,78	0,79-0,84	>0,84
	40-49	<0,73	0,73-0,79	0,80-0,87	>0,87
	50-59	<0,74	0,74-0,81	0,82-0,88	>0,88
	60-69	<0,76	0,76-0,83	0,84-0,90	>0,99
male	20-29	<0,83	0,83-0,88	0,89-0,94	>0,94
	30-39	<0,84	0,84-0,91	0,92-0,96	>0,96
	40-49	<0,88	0,88-0,95	0,96-1,00	>1,00
	50-59	<0,90	0,90-0,96	0,97-1,02	>1,02
	60-69	<0,91	0,91-0,98	0,99-1,03	>1,03

[derived from Heyward VH, Stolarcyzk LM: Applied Bodie Composition Assessment. Champaign IL, Human Kinetics, 1996, p82.]

http://www.waist-to-hip-ratio.com/chart

CLASSIFICATION OF OVERWEIGHT AND OBESITY BY BMI, WAIST CIRCUMFERENCE AND ASSOCIATED DISEASE RISK

Health Risk Classification According to Body Mass Index (BMI)

Classification	BMI Category (kg/m^2)	Risk of developing health problems
Underweight	< 18.5	Increased
Normal Weight	18.5 - 24.9	Least
Overweight	25.0 - 29.9	Increased
Obese class I	30.0 - 34.9	High
Obese class II	35.0 - 39.9	Very high
Obese class III	>= 40.0	Extremely high

Note: For persons 65 years and older the 'normal' range may begin slightly above BMI 18.5 and extend into the 'overweight' range.

Source: Health Canada. Canadian Guidelines for Body Weight Classification in Adults. Ottawa: Minister of Public Works and Government Services Canada; 2003.

https://www.canada.ca/en/health-canada/services/food-nutrition/healthy-eating/healthy-weights/canadian-guidelines-body-weight-classification-adults/body-mass-index-nomogram.html

DEFINITIONS OF METABOLIC SYNDROME

	NCEP ATP III (2005 revision)	WHO (1998)	EGIR (1999)	IDF (2005)
Absolutely required	None	Insulin resistance* (IGT, IFG, T2D or other evidence of IR)	Hyperinsulinemia‡ (plasma insulin >75th percentile)	Central obesity (waist circumference§): ≥94 cm (M), ≥80 cm (F)
Criteria	Any three of the five criteria below	Insulin resistance or diabetes, plus two of the five criteria below	Hyperinsulinemia, plus two of the four criteria below	Obesity, plus two of the four criteria below
Obesity	Waist circumference: >40 inches (M), >35 inches (F)	Waist/hip ratio: >0.90 (M), >0.85 (F); or BMI >30 kg/m^2	Waist circumference: ≥94 cm (M), ≥80cm (F)	Central obesity already required
Hyperglycemia	Fasting glucose ≥100 mg/dl or Rx	Insulin resistance already required	Insulin resistance already required	Fasting glucose ≥100 mg/dl
Dyslipidemia	TG ≥150 mg/dl or Rx	TG ≥150 mg/dl or HDL-C: <35 mg/dl (M), <39 mg/dl (F)	TG ≥177 mg/dl or HDL-C <39 mg/dl	TG ≥150 mg/dl or Rx
Dyslipidemia (second, separate criteria)	HDL cholesterol: <40 mg/dl (M), <50 mg/dl (F); or Rx			HDL cholesterol: <40 mg/dl (M), <50 mg/dl (F); or Rx
Hypertension	>130 mmHg systolic or >85 mmHg diastolic or Rx	≥140/90 mmHg	≥140/90 mmHg or Rx	>130 mmHg systolic or >85 mmHg diastolic or Rx
Other criteria		Microalbuminuria†		

*IGT, impaired glucose tolerance; IFG, impaired fasting glucose; T2D, type 2 diabetes; IR, insulin resistance; other evidence includes euglycemic clamp studies.
†Urinary albumin excretion of ≥20 μg/min or albumin-to-creatinine ratio of ≥30 mg/g.
‡Reliable only in patients without T2D.
§Criteria for central obesity (waist circumference) are specific for each population; values given are for European men and women.
Rx, pharmacologic treatment.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2675814/

PATIENT COMPLETE MAIN DIAGNOSIS

MAIN:

- ❑ **DIFFUSE POST MYOCARDITIS CARDIOSCLEROSIS**
- ❑ **PERSISTENT AFLT, EUSYSTOLIC FORM, EHRA III SCORE**
- ❑ **CHA2-S2-VASc SCORE – 2**
- ❑ **ESSENTIAL ARTERIAL HYPERTENSION, GRADE 1**
- ❑ **HEART FAILURE WITH PRESERVED EJECTION FRACTION II FC, STAGE B**
- ❑ **HIGH ADDED CARDIOVASCULAR RISK**
- ❑ **DYSLIPIDEMIA-IIB**

CO-MORBIDITY

- Nonalcoholic fatty liver disease (NAFLD)
- OBESITY CLASS III

TREATMENT

GOAL BASED FOLLOW-UP

Category	Intervention	Follow-up aspects	Performance indicator (examples)
Prognostic	Comorbidity control (relevant examples given)	Obesity Arterial hypertension Heart failure Coronary artery disease Diabetes Valvular heart disease	Weight loss Blood pressure control Heart failure therapy and hospitalizations Statin and antiplatelet therapy; revascularization Glycaemic control Valve repair or replacement
Prognostic	Anticoagulation	Indication (risk profile; timing, e.g. post-cardioversion). Adherence (NOAC or VKA) and INR (if VKA). NOAC dosing (co-medications; age; weight; renal function).	Stroke Bleeding Mortality
Mainly symptomatic Partly prognostic	Rate control	Symptoms Average resting heart rate <110 bpm	Modified EHRA score Heart failure status LV function Exercise capacity Hospitalization Therapy complications
Symptomatic at present	Rhythm control	Symptoms vs. side effects Exclusion of pro-arrhythmia (PR; QRS; QTc interval)	
Relevant for implementation of therapy and adherence	Patient education and self-care capabilities	Knowledge (about disease; about treatment; about management goals) Capabilities (what to do if…)	Adherence to therapy Directed evaluation, preferably based on systematic checklists
Relevant for chronic care management	Caregiver involvement	Who? (spouse; GP; home nurse; pharmacist) Clearly spelling out participation roles Knowledge and capabilities	Directed evaluation of task performance (e.g. via patient card) Dispensed medication Log of follow-up visits

b.p.m. = beats per minute; mEHRA symptoms scale = modified European Heart Rhythm Association symptoms scale; GP = general practitioner; INR = international normalized ratio; LV = left ventricular; NOAC = non-vitamin K antagonist oral anticoagulant; VKA = vitamin K antagonist.

RISK FACTOR MANAGEMENT

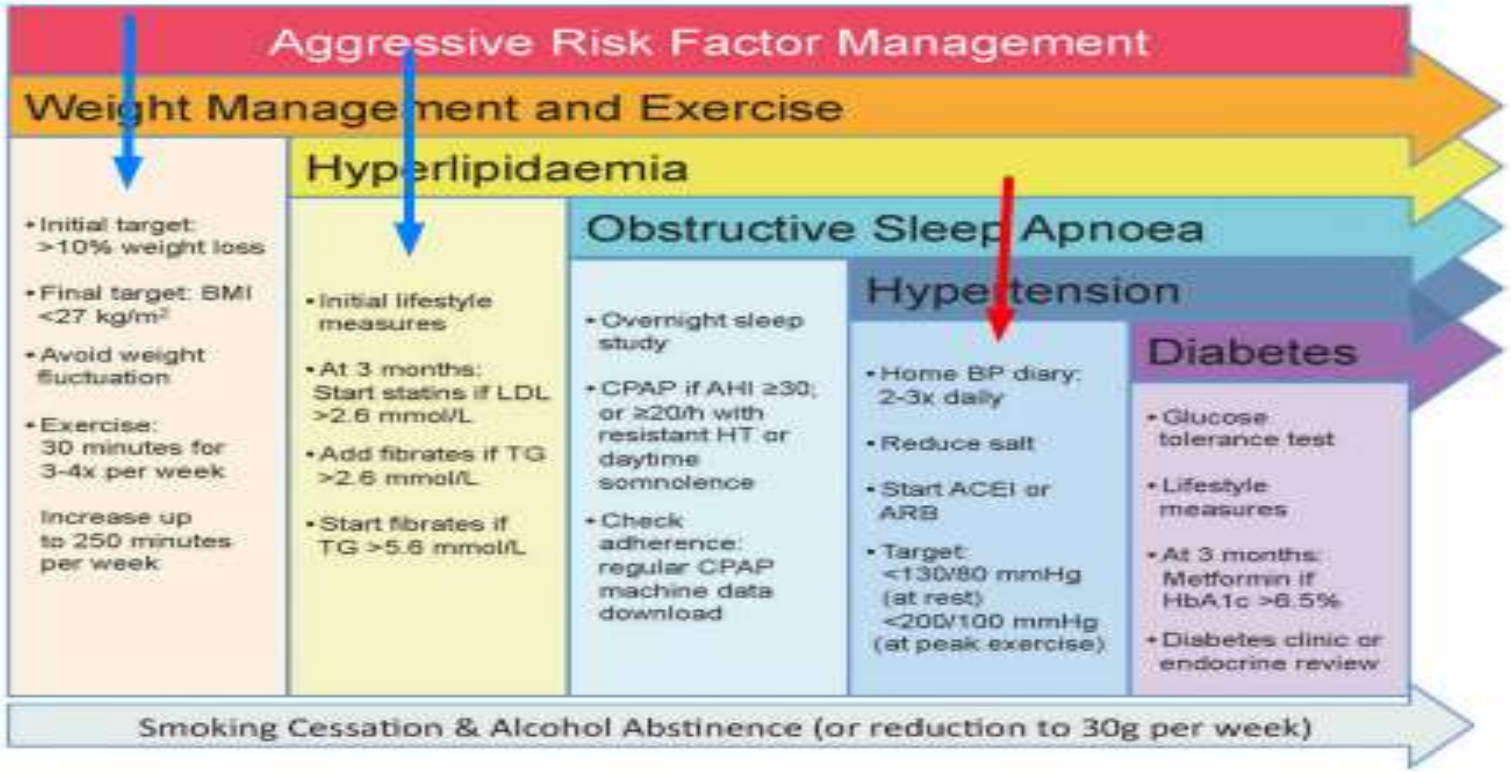


Figure 1. Aggressive risk factor management strategies from the ARREST-AF cohort study. Used with permission from Lau et al. [17]. (LDL – low density lipoprotein; TG – triglycerides; AHI – apnea-hypopnea index; ACEI – angiotensin converting enzyme inhibitor; ARB – angiotensin receptor blocker).

LIFESTYLE MODIFICATION

- Intensive weight reduction in addition to the management of other cardiovascular risk factors (in the range of 10–15 kg weight loss achieved), led to fewer AF/AFLt recurrences and symptoms compared with an approach based on general advice in obese patients with AF/AFLt
- DASH diet
- Smoking cessation
- Control of compliance to medical recommendations

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STROKE PREVENTION IN AF/AFLT 1.2

- Controlled trials studying OAC in AF/AFLt patients have been enriched for patients at high risk of stroke, and hence there is strong evidence that patients with a CHA2DS2-VASc risk score of 2 or more in men, and 3 or more in women, benefit from OAC
- NOACs, including the direct thrombin inhibitor dabigatran and the factor Xa inhibitors apixaban, edoxaban, and rivaroxaban, are suitable alternatives to VKAs for stroke prevention in AF/ AFLt
- Both VKAs and NOACs are effective for the prevention of stroke in AF/ AFLt Rivaroxaban was non-inferior to warfarin for the prevention of stroke and systemic embolism in the intent-to-treat analysis, while the per-protocol on-treatment analysis achieved statistical superiority with a 21% reduction in stroke or systemic embolism compared with warfarin

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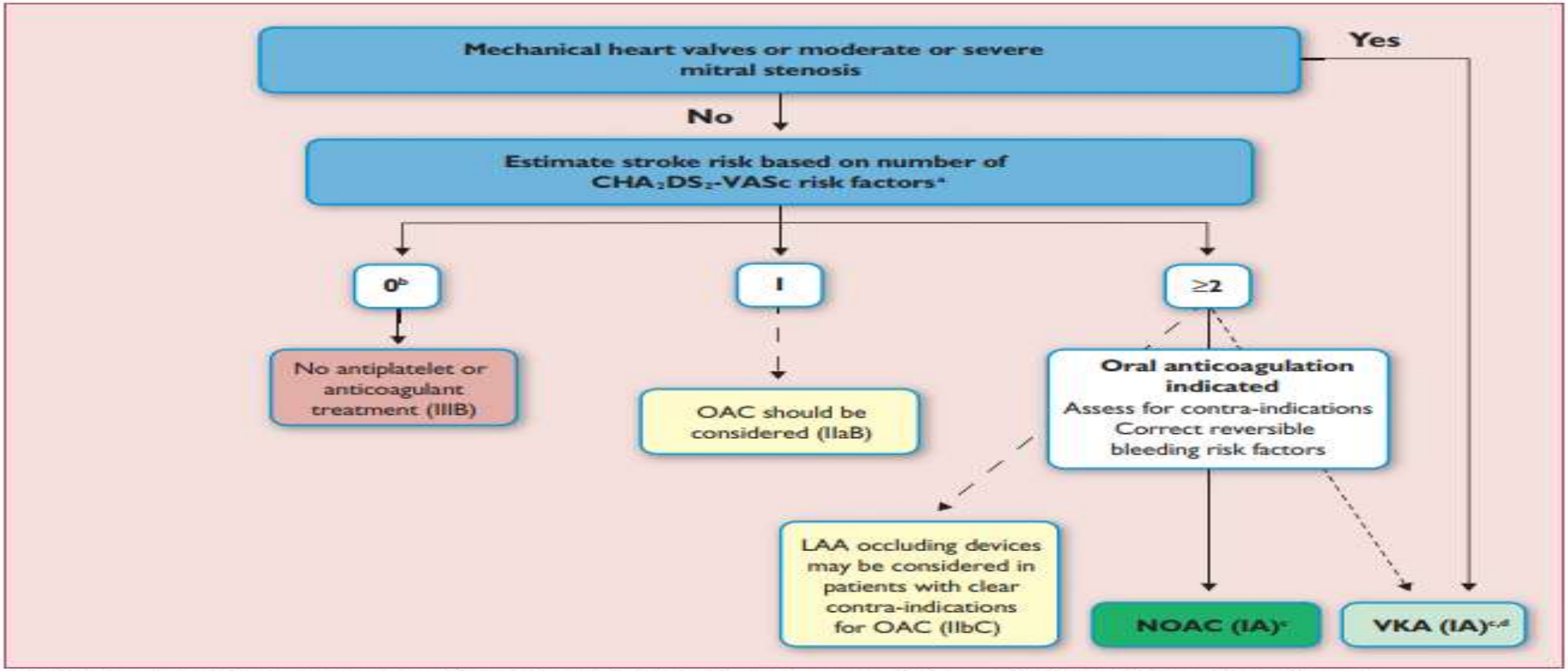
STROKE PREVENTION IN AF/AFLT 2.2



AF = atrial fibrillation; LAA = left atrial appendage; NOAC = non-vitamin K antagonist oral anticoagulant; OAC = oral anticoagulation; VKA = vitamin K antagonist.
[a]Congestive heart failure, Hypertension, Age ≥75 years (2 points), Diabetes, prior Sstroke/TIA/embolus (2 points), Vascular disease, age 65–74 years, female Sex.
[b]Includes women without other stroke risk factors.
[c]IIaB for women with only one additional stroke risk factor.
[d]IB for patients with mechanical heart valves or mitral stenosis.

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RHYTHM CONTROL

- Restoring and maintaining sinus rhythm is an integral part of AF/ AFLt management
- Antiarrhythmic drugs approximately double the rate of sinus rhythm compared with placebo
- RFCA or combination therapy is often effective when antiarrhythmic drugs fail

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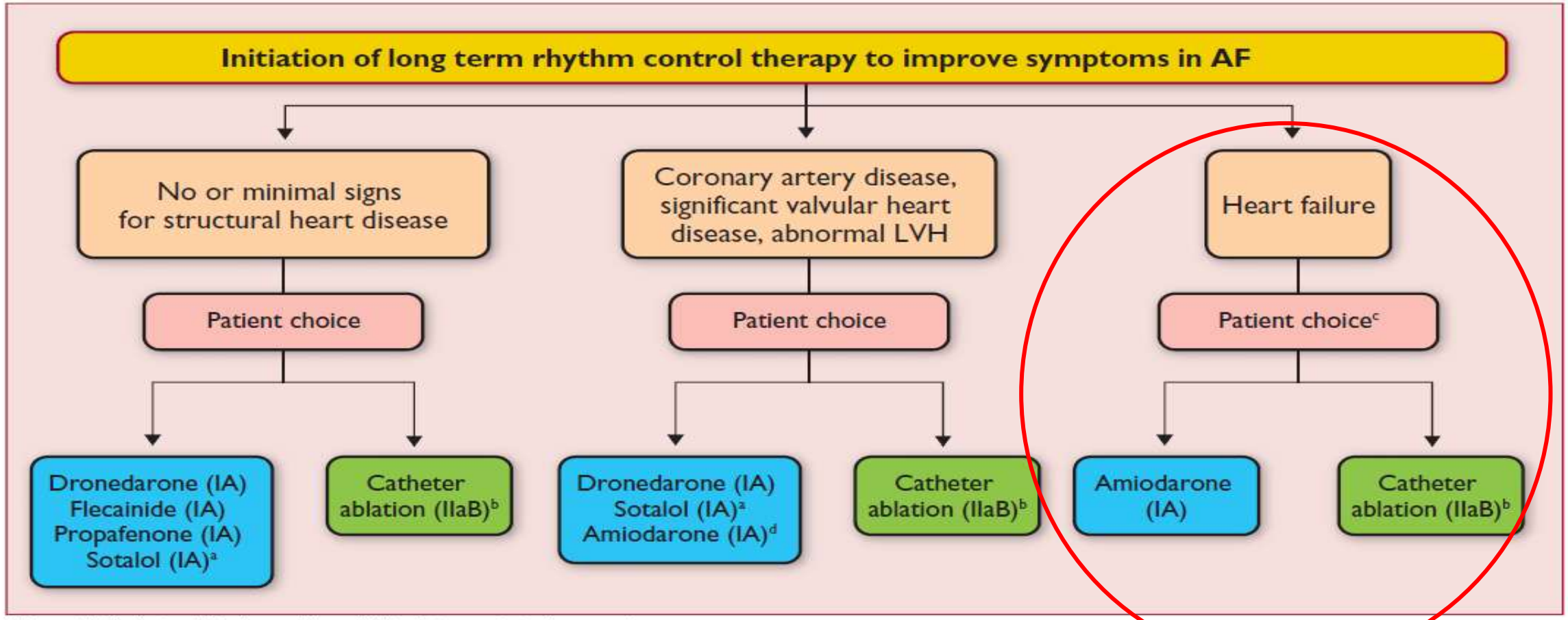
ORAL ANTIARRYTHMIC DRUGS USED FOR MAINTANING SINUS RHYTHM



AF = atrial fibrillation; HF = heart failure; LVH = left ventricular hypertrophy;
[a]Sotalol requires careful evaluation of proarrhythmic risk.
[b]Catheter ablation should isolate pulmonary veins and can be performed using radiofrequency or cryoballoon catheters.
[c]Catheter ablation as a first-line therapy is usually reserved for heart failure patients with tachycardiomyopathy.
[d]Amiodarone is a second-choice therapy in many patients because of its extracardiac side-effects.

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TREATMENT OF NAFLD

- Loss of at least 3-5% of body weight appears necessary to improve steatosis, but a greater weight loss (up to 10%) may be needed to improve necroin- flammation
- Patients with NAFLD and NASH are at increased risk for cardiovascular disease and several studies have established cardiovascular disease as their most common cause of death
- Statins are an important class of agents to treat dyslipidemia, and yet there is continued reluctance to use statins in patients with suspected or established chronic liver disease, including NAFLD

http://ps70.sb.marqui.com/files/Professional_Education___Partnerships/Information___Resources_for_HCP/AASLD_CPG_for_NAFLD_-_June_2012.pdf

PATIENT'S COMPLETE DRUG TREATMENT

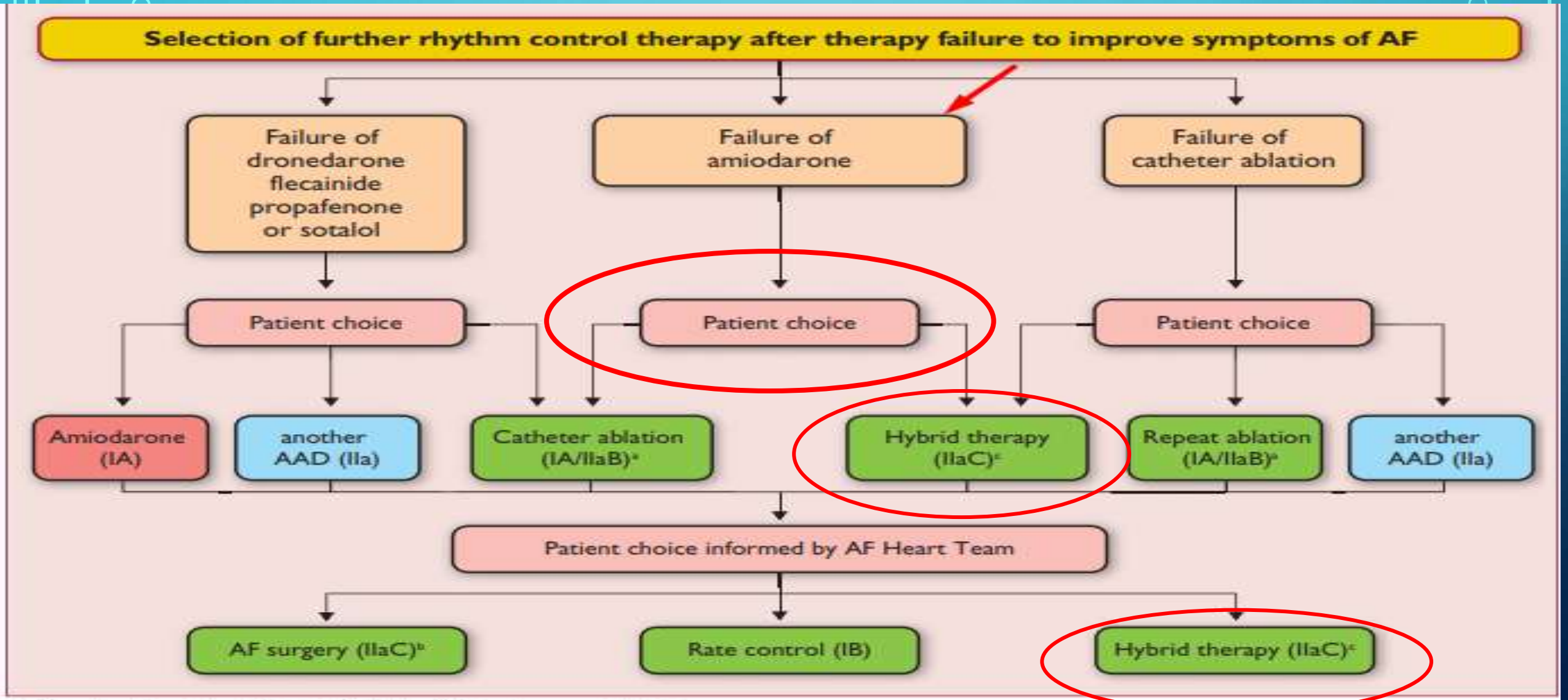
- TORASEMIDE 2,5 mg daily
- VALSARTAN - 40 – 80 mg twice daily under BP control
- AMIODARONE - 200mg twice daily
- CARVEDILOL -12,5 mg twice daily under BP and heart rate control
- RIVAROXABAN - 20mg daily
- ROSUVASTATIN - 10 mg daily under control of lipids level, ALT, AST

Despite this treatment there was no affect in restoring sinus rhythm

Patient was consulted by arrhythmologist with conclusion:

Typical AFLt, persistent form

Recommended RFCA CTI



AAD = antiarrhythmic drug; AF = atrial fibrillation; PVI = pulmonary vein isolation.
[a]catheter ablation should target PVI. IA for paroxysmal AF, IIaB for persistent and long-standing persistent AF.
[b]AF surgery may be PVI (e.g. in paroxysmal AF) or maze surgery (e.g. in therapy-refractory or persistent and long-standing persistent AF).
[c]Hybrid therapy involves combination of antiarrhythmic drugs, catheter ablation, and/or AF surgery.

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PATIENT CHOICE- HYBRID THERAPY (RFCA+AAD)

- Patient was transferred to SI «Zaycev V.T. Institute of General and Urgent Surgery NAMS of Ukraine» for RFCA 29/09/17
- 02/10/17 was performed RFCA of CTI (time 180 msec)
- Sinus rhythm was restored
- Postoperative period without complications

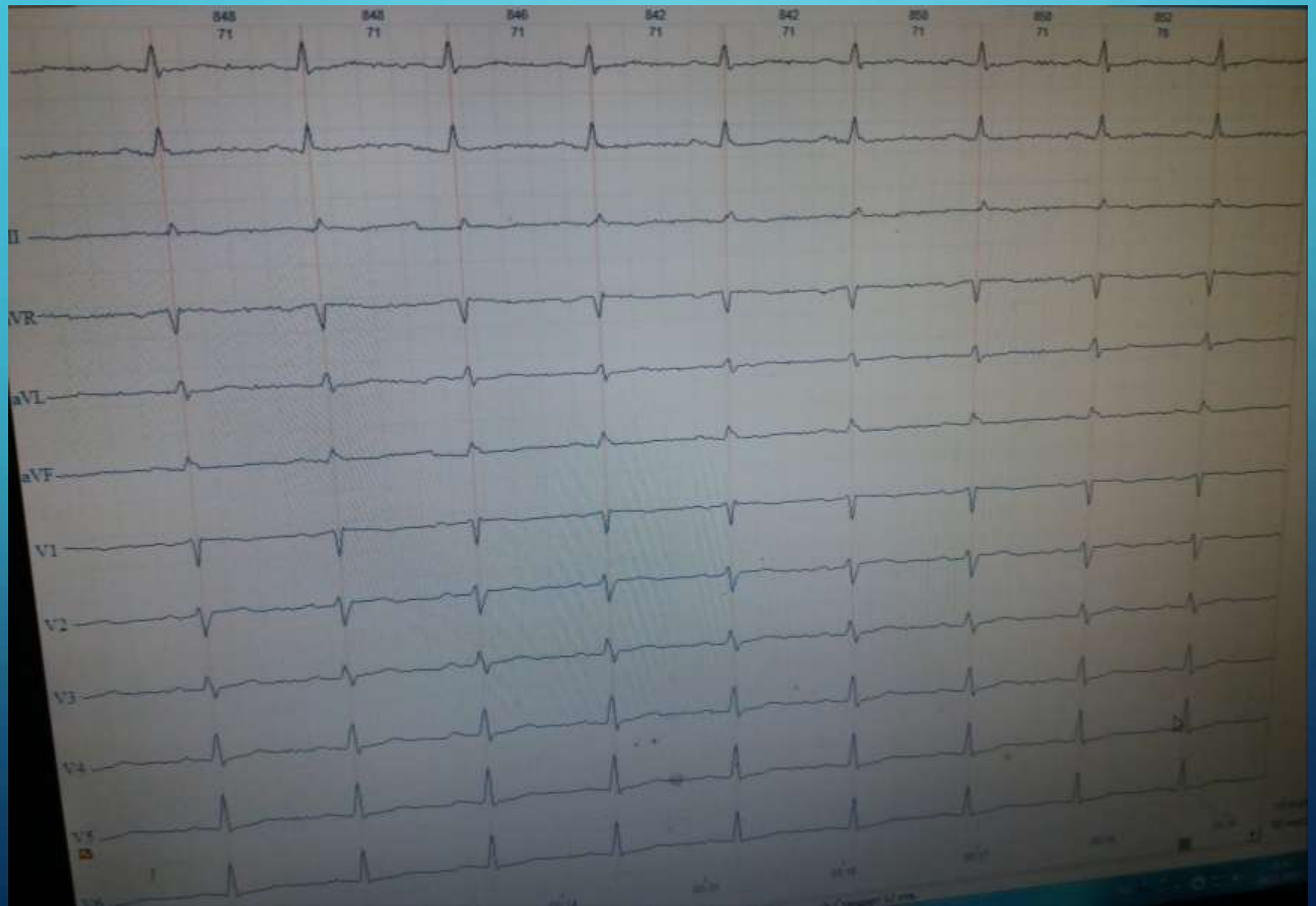
CHECK-UP 3 DAYS AFTER RFCA 1.7.

- No episodes of arrhythmia

ECG (see next slide)

- Sinus rhythm, HR- 71bpm
- Normal cardiac axis
- Signs of left ventricular hypertrophy, PQ -170ms, QRS- 75ms, QT- 360ms

CHECK-UP 3 DAYS AFTER RFCA (ECG)2.7.



CHECK-UP 3 DAYS AFTER RFCA 3.7. COMMON BLOOD TEST (29/09/2017)

Measure	Result	Rate	Measure	Result	Rate
Hemoglobin (Hb)	160	130 – 160 g/L	Segmented Neutrophils	62.5	47.0 -72.0
			Neutrophils		
Erythrocyte	5.0	4.0 – 5.0 T/L	Eosinophils	2%	0.5 – 5.0%
Color Index	0.92	0.8 -1.2	Basophils	1%	0 – 1.0%
Leukocytes	6.9	4.0 – 9.0 g/L	Monocytes	7.3%	3.0 -11.0%
ESR	8	M 1-10 mm/h	Lymphocytes	27.2%	19.0 -37.0%
Platelets	244	180 -320 g/L	Hematocrit	48.9%	40 – 48%
Neutrophils	62.5	48.06 – 78%			

Conclusion: Normal

CHECK-UP 3 DAYS AFTER RFCA 4.7. BIOCHEMICAL TESTS (29/09/2017)

MEASURE	RESULT	NORMAL RANGE
Fasting Blood Glucose	6.2	3.9 – 6.1 mmol/L
Prothrombin Index	85	78-142%

Conclusion: Normal

CHECK-UP 3 DAYS AFTER RFCA 5.7. ECHOCARDIOGRAPHY AFTER RFCA 1.2.

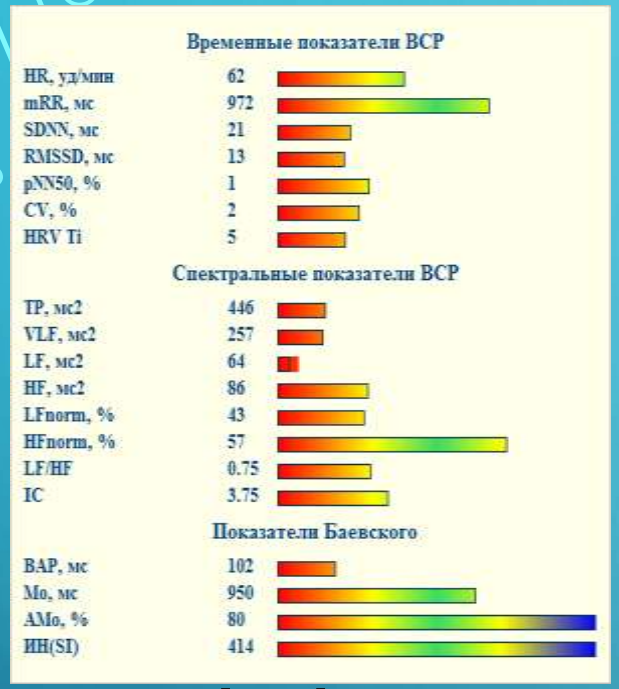
Name	Result before Ablation	Result after ablation	Normal
1) Acoustic window	poor		normal
2) Aorta	31		20 – 37 mm
3) Aortic valve	19		17 – 26 mm
4) Left Atrium	42		To 38 mm
5) Mitral Valve	Regurgitation 1st degree		No regurgitation
6) Posterior Wall of the LV	12		6 -11mm
7) Interventricular Septum	12		6 – 11mm
8) Right Ventricle	27.0		D.: (9-26 mm)

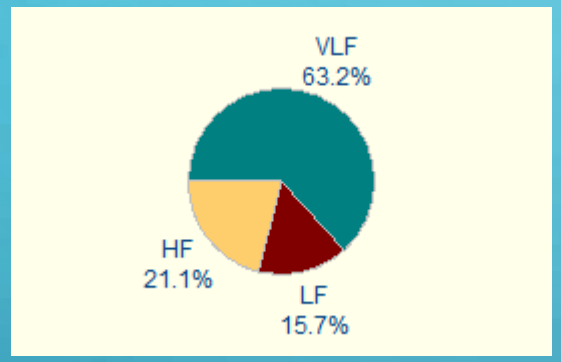
CHECK-UP 3 DAYS AFTER RFCA 6.7. ECHOCARDIOGRAPHY AFTER RFCA 2.2.

Name	Result before ablation	Result after ablation	Normal
9) Right atrium	44		<38mm
10) Tricuspid valve	Regurgitation 1st degree		No regurgitation
11) Ejection Fraction	74		55 – 78%

Conclusion: Mild dilatation of both atriums, dilatation of right ventricle, hypertrophy of left ventricle

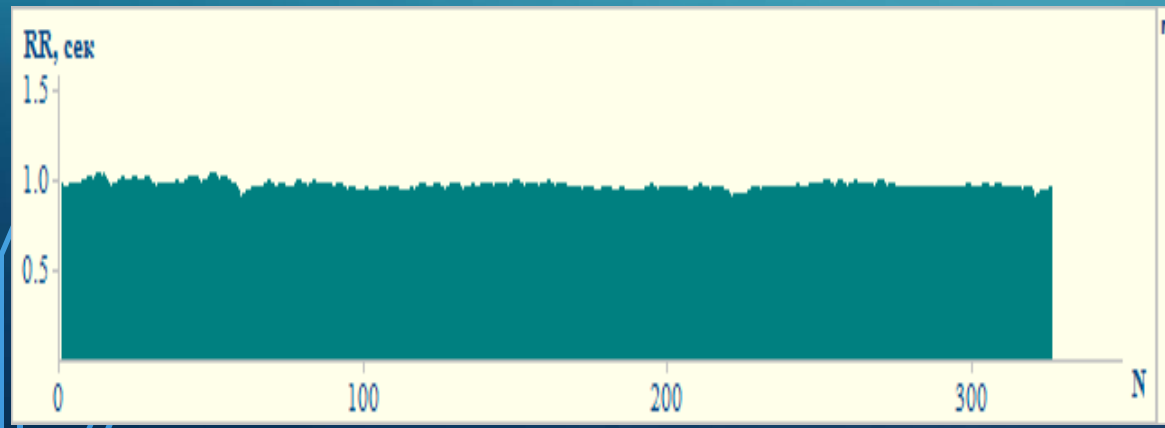
CHECK-UP 3 DAYS AFTER RFCA 7.7.: HEART RATE VARIABILITY (HRV)



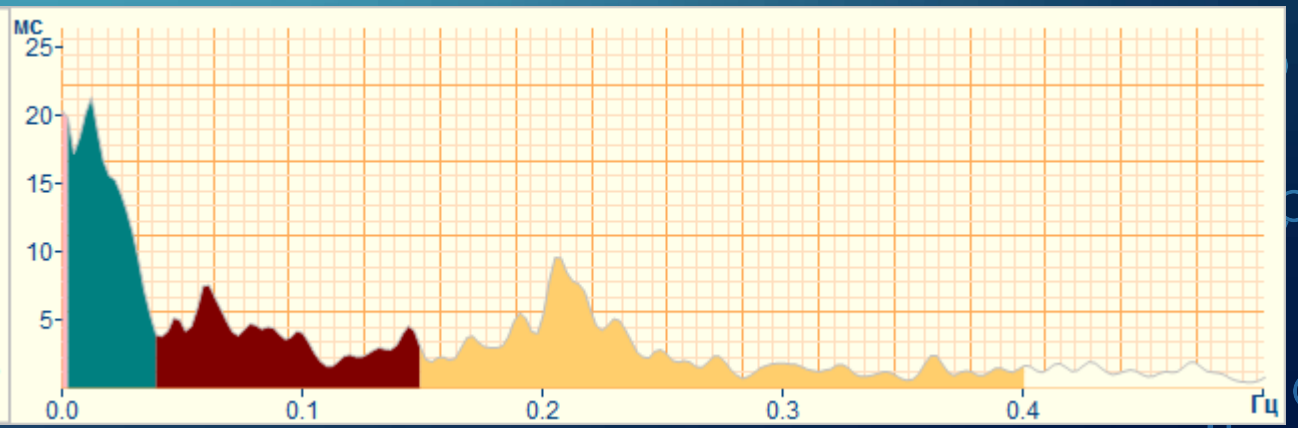


Conclusion:
The rhythmogram of HRV is characterized by weakly expressed fast and slow waves, as well as the presence of very slow waves. This character of the rhythmogram and the structure of HRV indicates the stabilization of the heart rhythm with the transition of its regulation from the reflex-vegetative level to a lower humoral - metabolic, unable to quickly provide homeostasis. Functional capabilities of the heart are reduced.

Rhythmogram of HRV



Range of HRV



OUR RECOMMENDED POST – RFCA TREATMENT

- VALSARTAN - 40 – 80 mg twice daily under BP control
- AMIODARONE – 200 mg daily one month under ECG control
- CARVEDILOL - 25 mg twice daily under BP and heart rate control with increasement to maximal tolerated dosage to improve the recovery (remission?) after myocarditis
- RIVAROXABAN – 20 mg daily
- ROSUVASTATIN - 10 mg daily under control of lipids level, ALT, AST

ADDITIONAL RECOMMENDED EXAMINATIONS

- Repeat 24h – ECG monitoring in a 12 month
- Blood electrolytes (K, Na)
- Contrast-enhanced cardiovascular magnetic resonance imaging
- HbA1C
- Glucose tolerance test

PROGNOSIS

- Prognosis for life - compliance to doctor's appointments – satisfactory
- The prognosis for recovery - satisfactory

CONCLUSION 1.2.

1. RFCA of the CTI is one of the most frequently performed procedures in electrophysiology and, as it was shown in current case, has a very good result in rhythm control strategy in early postoperative period
2. Performing common AFLt catheter ablation under oral anticoagulation is associated with low risk of complications that found a confirmation in our clinical case
3. AF inducibility in patients undergoing CTI AFL without history of AF is a strong predictor of AF occurrence in the future; appropriate cardiology follow-up must be encouraged in this high-risk population as stroke prevention strategies can be appropriately introduced in a timely matter especially in patients with elevated CHA_2DS_2-VASc scores (≥2); that is why our patient will undergo complete cardiology follow-up several times after RFCA

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4356719/
https://www.futuremedicine.com/doi/abs/10.2217/fca-2017-0007?rfr_dat=cr_pub%3Dpubmed&url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org&
https://www.ncbi.nlm.nih.gov/pubmed/28606678

CONCLUSION 2.2.

4. To improve effectiveness of intervention therapy, like RFCA, and prevent the recurrence of AFLt/AF in future patients need additional medical support by antiarrhythmic drugs

5. Patients should be informed and know about signs and symptoms of late complications to allow swift referral for treatment

6. Patients with fulminant myocarditis and hemodynamic compromise at presentation have better outcomes than those with acute nonfulminant myocarditis and this (fulminant) form we suspect in our patient's according history of disease and presume the same outcome

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https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2770911/#R50


To be continued...