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IMPLANTED PACEMAKER REGARDING TO COMPLETE ATRIOVENTRICULAR BLOCK : A CASE REPORT

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INTRODUCTION

- Complete atrioventricular (AV) block due to slowing or stopping the passing of the electric impulse between atriums and ventricles is life-threatening and leads to disorders of the heart rhythm and hemodynamic dysfunctions [1]
- Implantation of the pacemaker is widely used and has a positive clinical effect in patients with hemodynamically significant bradyarrhythmias and chronic heart failure (CHF), but it is the only method for treating complete AV block [2]

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[1] https://emedicine.medscape.com/article/151597-overview#showall

[2] https://emedicine.medscape.com/article/162007-treatment

RECOMENDAIONS FOR PACEMAKER IMPLANATION [3]

- Class I

1. Complete AV block at any anatomic level associated with any one of the following conditions:

a. Bradycardia with symptoms presumed to be due to AV block. *(Level of evidence: C)*

b. Arrhythmias and other medical conditions that require drugs that result in symptomatic conditions. *(Level of evidence: C)*

c. Documented periods of asystole ≥3.0 seconds or any escape rate <40 beats per minute (bpm) in awake, symptom-free patients. *(Level of evidence: B, C)*

d. After catheter ablation of the AV junction. *(Level of evidence: B, C)* There are no trials to assess outcome without pacing, and pacing is virtually always planned in this situation unless the operative procedure is AV junction modification.

e. Postoperative AV block that is not expected to resolve. *(Level of evidence: C)*

f. Neuromuscular diseases with AV block such as myotonic muscular dystrophy, Kearns-Sayre syndrome, Erb's dystrophy (limb-girdle), and peroneal muscular atrophy. *(Level of evidence: B)*

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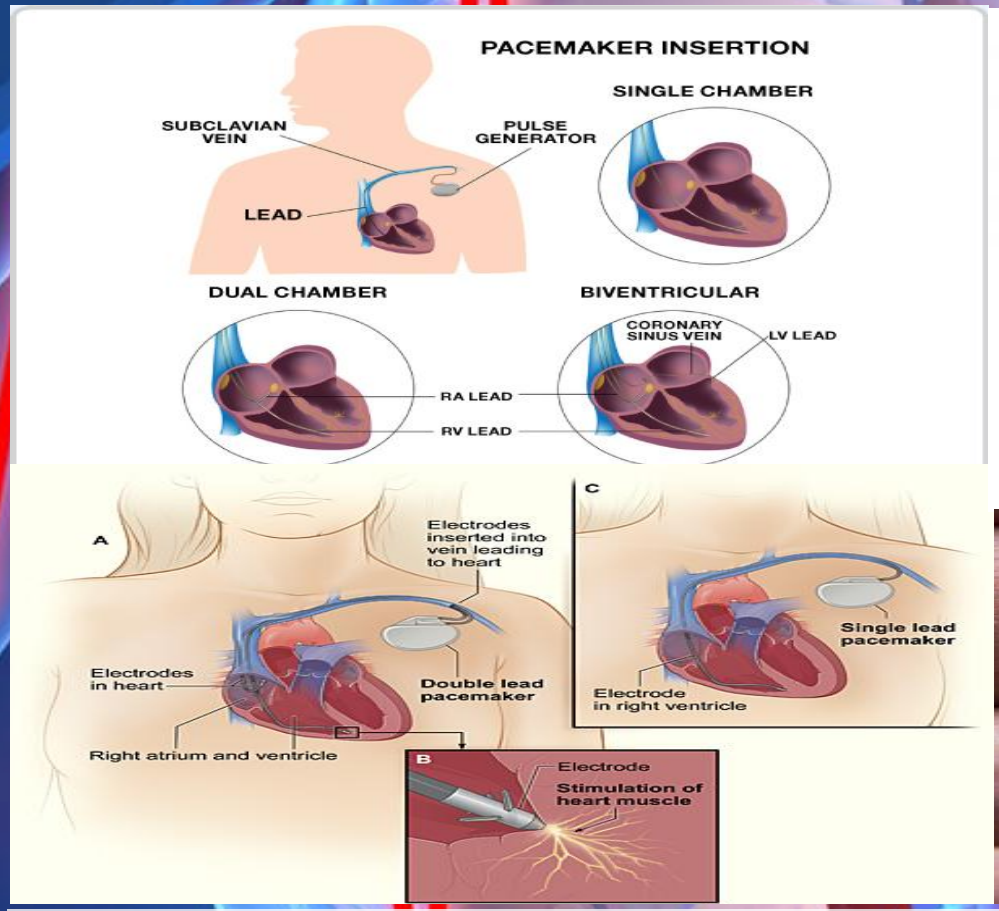
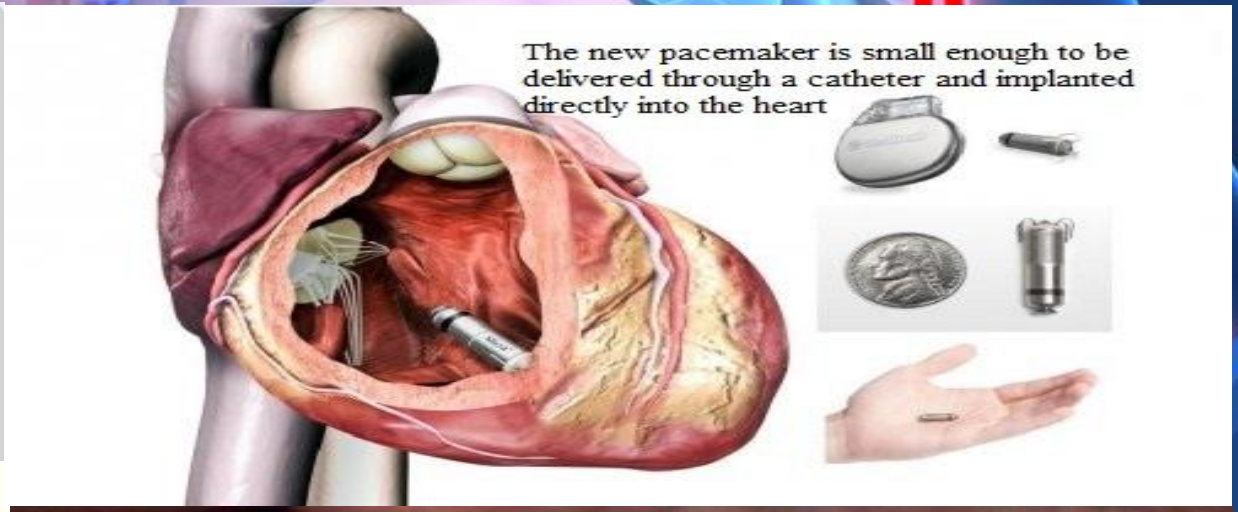
[3] 2013 ESC Guidelines on cardiac pacing and cardiac resynchronization therapy / [M. Brignole, A. Auricchio, B. Gonzalo et.al.]. // European Heart Journal. – 2013.

PACEMAKER INSERTION





https://www.nhlbi.nih.gov/health/health-topics/topics/pace/howdoes
https://steptohealth.ru/micra-samyj-malenkij-v-mire-kardiostimulyator-kotoryj-mozhno-ustanovit-bez-hirurgicheskogo-vmeshatelstva/

MAIN TYPES OF PACEMAKERS

- **Single chamber pacing mode**
  - **VVI (R) -** Atrial fibrillation
- **Dual chambers pacing mode**
  - DDD (R) - Sinus mode dysfunction, AV blocks, need for rate responsiveness
- **Three chambers pacing mode**
  - CRT (P/D) – Chronic heart failure with QRS > 150 mc, EF < 35%.


CLINICAL CASE
pptback.com

PASSPORT DATA

- Name: L
- Age: 46
- Female
- Marital Status: Married
- Address: Kharkov, Ukraine
- Occupation: Traffic Warder
- Date of admission to the hospital: 06/09/2017

MAIN COMPLAINTS

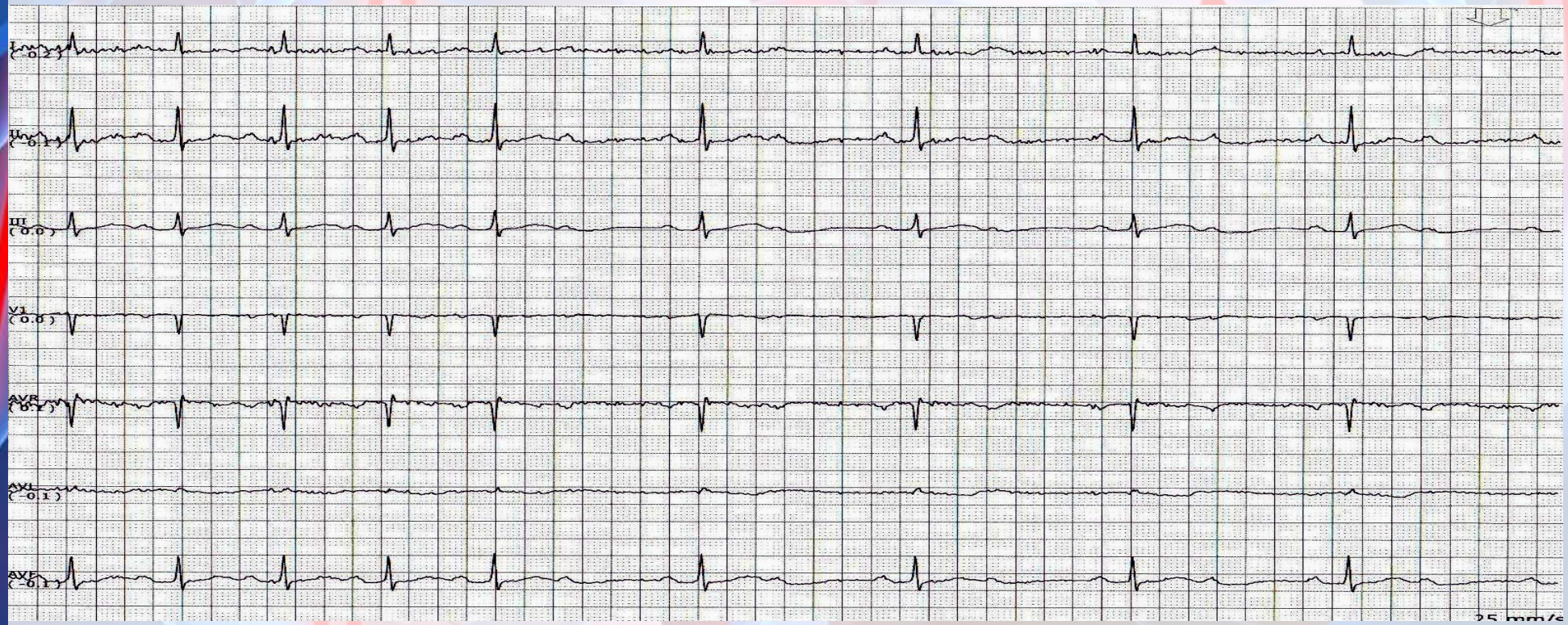
- General weakness, dizziness
- Presyncope
- Shortness of breath during physical activity (walking), disappearing after the rest
- Light palpitation
- Headaches in the occipital, parietal, frontal area, pressing character, periodic, arising during excitement, physical exertion

HISTORY OF PRESENT ILLNESS 1.1

- Main complaints were felt 1 month ago
- Last exacerbation was 1 day ago, she didn’t take any drugs
- After consulting with the physician and ECG monitoring complete AV block was founded ➡ patient was admitted to the hospital (07.09.2017) for further observation and tests

HISTORY OF PRESENT ILLNESS 1.2

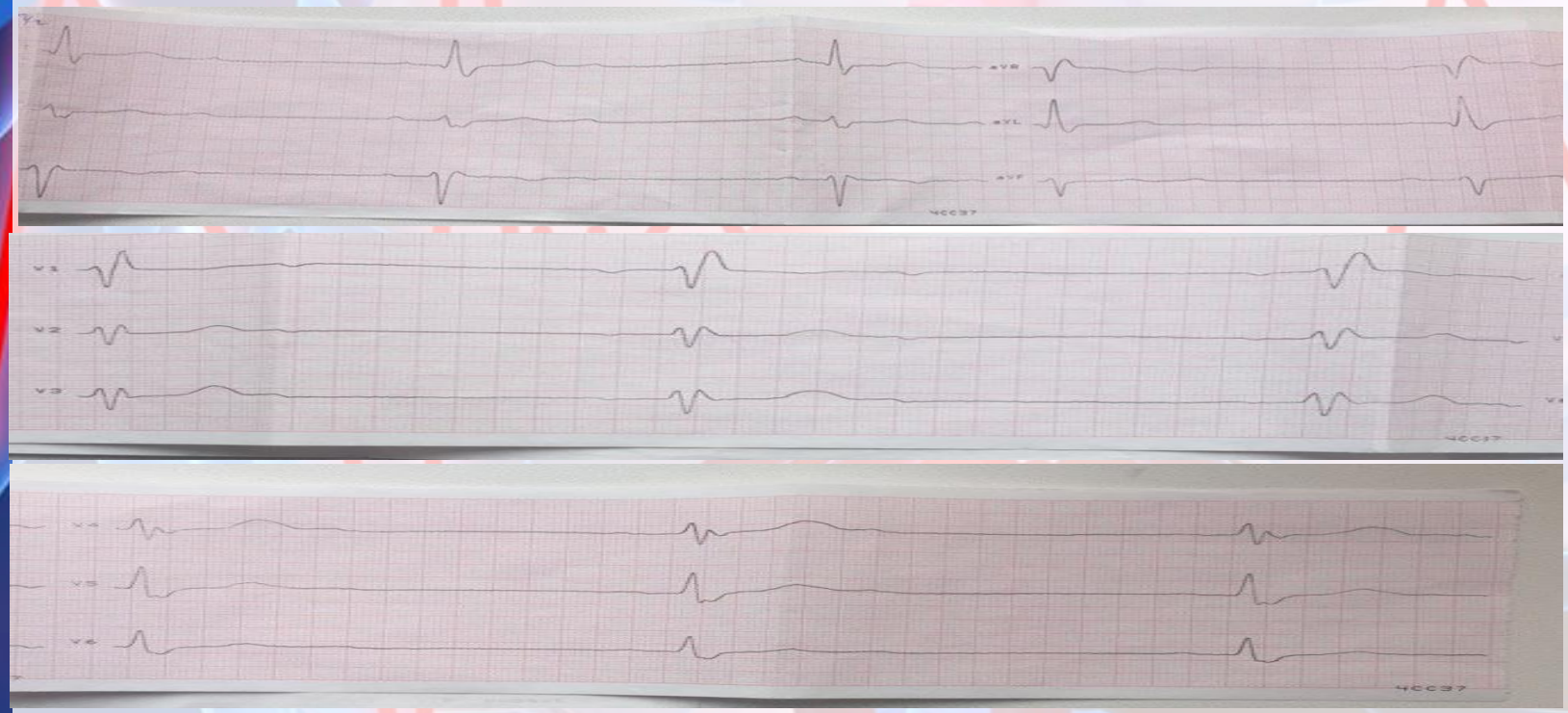
ECG X/X/2016



Conclusion: AV block second degree (Mobitz II) 2:1, heart rate 68 bpm, atrial rhythm regular, ventricular rhythm irregular, PR interval prolonged

HISTORY OF PRESENT ILLNESS 1.3

ECG 07/09/2017. Complains: dizziness, weakness, presyncope



Conclusion: complete AV block, heart rate 35 bpm, sinus atrial rhythm, PR interval irregular

MEDICAL HISTORY

- 2009 - Neurocirculatory dystonia
- 2015 - Arterial hypertension 2nd stage 1st grade (max BP - 147/97 mmHg)
- 2016 - AV block second degree (Mobitz II)
- 2017 - complete AV block

PATIENT'S PREVIOUS TREATMENT

- Ramipril 2.5 mg ones daily at evening

ANAMNESIS VITAE

- Married
- None smoker
- Denies alcohol consumption
- Denies DM, tuberculosis, malaria, viral hepatitis, sexual transmitted diseases and AIDS
- Allergic/Immunologic: denies urticaria, hay fever, persistent infections, HIV exposure
- No family history of any endocrine disorder or cardiac disorder

OBJECTIVE STATE 1.1

- The general condition is satisfactory, consciousness is clear
- Emotionally stable, optimistic mood
- Hyperstenic, height = 168 cm, body weight = 100 kg, BMI=37.3 kg/m^2 (obese)
- Temperature – 36,7 C
- Skin, visible mucous membranes are pale pink and clean
- Mucous membranes are pale and wet
- Tongue - clear and wet
- Peripheral lymph nodes are not palpable
- The thyroid is not palpable
- Signs of eyelid retraction, periorbital edema, proptosis are absent
- Joints are normal, active and passive movements are not painless

OBJECTIVE STATE 1.2
RESPIRATORY SYSTEM

- Inspection: normal respiratory effort with no use of accessory muscles
- Palpation: normal tactile fremitus
- Auscultation: vesicular breathing, no added sounds

OBJECTIVE STATE 1.3
CARDIOVASCULARY SYSTEM

- Palpation: no jugular vein distention, no carotid or abdominal bruits; no enlargement of abdominal aorta. Carotid, radial, posterior tibialis, and pedal pulses 2+ symmetric, no edema, HR=35 bpm
- Percussion: heart borders extended to the left on 1,5 cm of midclavicular line
- Auscultation: regular. S1, S2, normal rhythm, no murmur, rub, or gallop; no thrill or palpable murmurs.
- Blood Pressure left hand = 145/100 mmHg (on the background of antihypertensive therapy), Blood Pressure of right hand = 140/95mmHg

OBJECTIVE STATE 1.4
DIGESTIVE SYSTEM

Abdomen is soft, painless, symmetrical, no discrepancies of the abdominal muscles, no visible peristalsis

Liver edge is smooth, painless, palpated 0.5 cm below the costal arch

Spleen and pancreas are not palpable

OBJECTIVE STATE 1.5
UROGENITAL SYSTEM

- Pasternatsky sign: negative, no dysuria, no incontinence,
- No polyuria
- No nocturia, no urgency
- No hematuria, no reduced flow, dribbling

OBJECTIVE STATE 1.6
SEXYAL SYSTEM

- Menopause during 1 year

OBJECTIVE STATE 1.7
NERVOUS AND ENDOCRINE SYSTEM

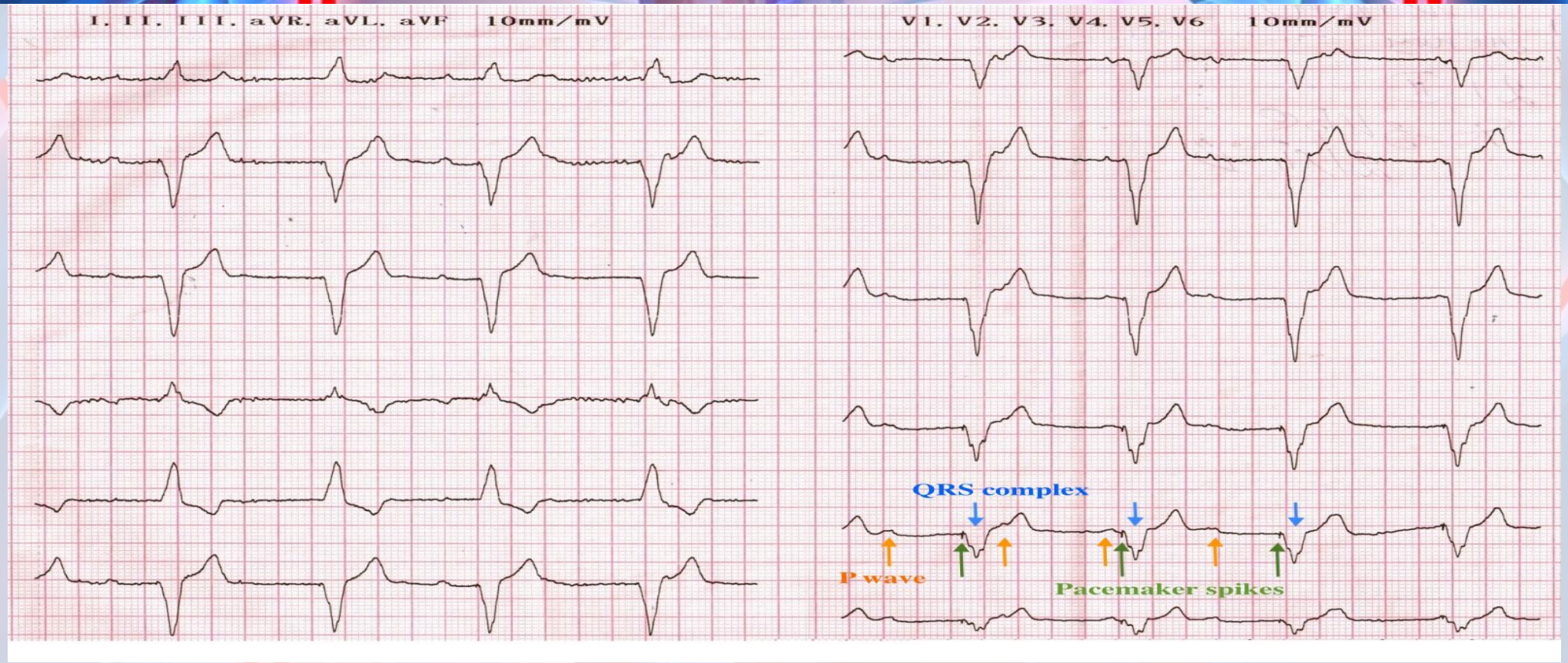
- Alert and oriented to person, place, and time. Able to communicate well. Cranial nerves 2-12 grossly intact. 5/5 strength in all extremities bilaterally. Sensation intact in all extremities. Normal gait.


INVESTIGATION

RESEARCH PLAN

- Instrumental investigations:
  - ECG
  - EchoCG
- Laboratory investigations:
  - Complete blood test
  - General urine test
  - Biochemical blood test (Liver and renal function tests)
  - Blood lipid spectrum
  - Blood glucose level (Hb A1c)

ECG: 2 DAYS AFTER PACING 09/09/17



Conclusion: complete AV block, sinus atrial rhythm, PR interval irregular, RR>PP. ESPRITE DDD pacemaker: There is 100% ventricular capture — a QRS complex follows each ventricular pacing spike; no atrial pacing spikes are seen; HR-65bpm, stimulation threshold-0,75V, impedance-350Om

ECHOCARDIOGRAPHY 06/09/17

Name	Result	Normal
Aorta	36.0	20-37 mm
Aortic Valve	20.0	17-26 mm
Left Atrium	37.0	To 38 mm
Mitral Valve	33.0	26-35 mm
End diastolic velocity	120	50-180 cm/s
End systolic volume	50	35-55 mm
Left ventricular	13.5	6-11 mm
Ejection fraction	65	55-78 %
Left ventricular amplitude	10 mm	7-13 mm
Intraventricular septum	12 mm	6-11 mm
Right atrial diameter	36.0	≤ 45 mm
Right Ventricle	D.: 20 mm	D.: 9-26 mm

Conclusion: Left ventricular hypertrophy. Signs of increasing diastolic stiffness of the left ventricular wall

COMPLETE BLOOD COUNT 07/09/17

INDEX	RESULT	NORMAL RANGE
HEMOGBLOBIN	136	F 120-140 g/l
ERYTHROCYTE S	4.6	F 3.9-4.7 T/L
COLOR INDEX	1.01	0.85-1.15
LEUKOCYTES	4,2	4-9 g/L
ESR	14	F 2-15 mm/H
THROMBOCYTES	310	180-320 g/L
BAND NEUTROPHILS	3	1.0-6.0 %
SEGMANTED NEUTROPHILS	51	47-72 %
EOSINOPHILS	2	0.5-5.0 %
BASOPHILS	1.0	0-1.0 %
LYMPHOCYTES	30	19.0-37%
MONOCYTE	13	3.0-11.0%
HEMATOCRIT	41.6	F 36-42%

CONCLUSION: Normal

GENERAL URINE TEST 07/09/17

MEASURE	RESULT	NORMAL RANGE
SPECIFIC GRAVITY	1.024	1,001-1,040
REACTION	6.0	5,0-7,0
PROTEIN	0.021	to 0.033 g / l
GLUCOSE	-	Absent
LEUCOCYTES	2-3	6-8
EPITHELIUM TRANSITION	Not detected	Not detected
BACTERIA	Not detected	Not detected

CONCLUSION: Normal

BIOCHEMICAL ANALYSIS 07/09/17

INDEX	RESULT	NORMAL RANGE
BILIRUBIN	10,3	1.7-21.0 µmol/L
ASAT	37	< 37 U/L
ALAT	22.3	< 41 U/L
CREATININE	82	80-115 µmol/L
FASTING GLUCOSE	5.62	4.2-6.1 µmol/L

CONCLUSION: Normal

LIPID PROFILE 07/09/17

INDEX	RESULT	NORMAL RANGE
TOTAL CHOLESTEROL	5.29	<5.2
VLDL	0.31	<1.0
LDL	3.75	<3.5
HDL	1.22	>0.9
TRIGLYCERIDE	0.70	<2.3
ATHROGENIC COEFFICIENT	3.33	< 3,O

CONCLUSION: IIa type of dyslipidemia

BASIC CLINICAL SYNDROMES

- Conduct disorder
- Arterial Hypertension
- Heart failure
- Dyslipidemia
- Obesity


THE CLINICAL DIAGNOSIS ACCORDING TO CURRENT CLASSIFICATIONS
pptback.com

DIFFERENCES BETWEEN AV HEART BLOCKS

Type of AV block	Rhythm	P waves	QRS complexes	PR intervals
1st degree	Underlying rhythm is usually regular	Present and normal; all the P waves are followed by a QRS complex	Normal	Longer than 0.20 seconds and is constant
2nd degree, type i	Patterned irregularity	Present and normal; not all the P waves are followed by a QRS complex	Normal	Progressively longer until a QRS complex is dropped; the cycle then begins again
2nd degree, type II	May be regular or irregular (depends on whether conduction ratio remains the same)	Present and normal; not all the P waves are followed by a QRS complex	Normal	Constant for all conducted beats
Comlete	Atrial rhythm and ventricular rhytms are regular but not related to one another	Present and normal; not related to the QRS complexes; appear to march through the QRS complexes	Normal if escape focus is junctional and widened if escape focus is ventricular	Not measurable

https://www.slideshare.net/shubhendu3386/av-block-ecg-analysis

CLASSIFICATION OF ARTERIAL HYPERTENSION 1.1 (clinical protocol Ministry of Health of Ukraine "Arterial hypertension "(Order No. 484), 2012)

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

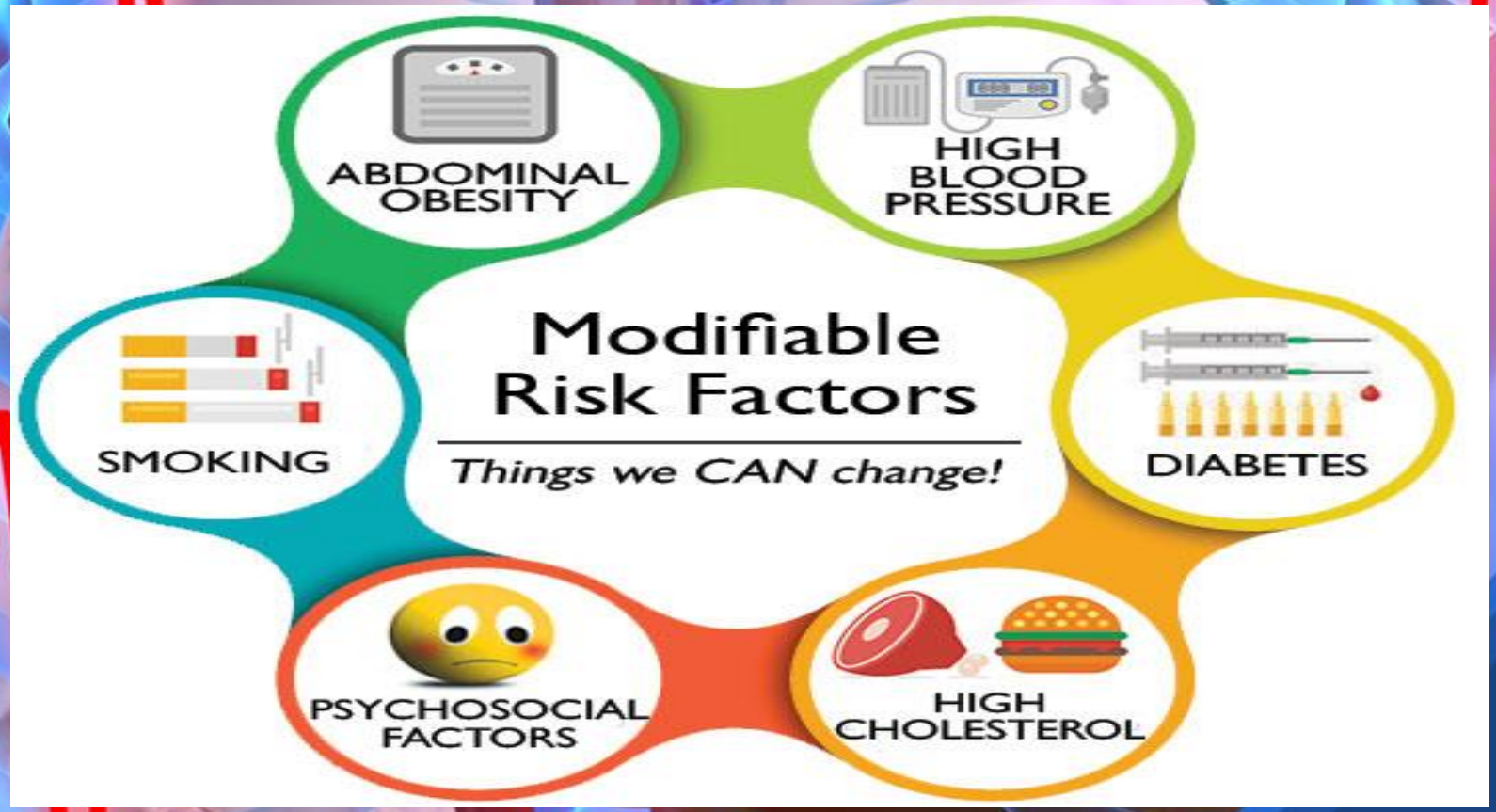
http://thepharmacystop.com/pharmacy/blood-pressure/

CLASSIFICATION OF ARTERIAL HYPERTENSION 1.2

STAGE	THE DEGREE OF TARGET ORGAN DAMAGE
I	Objective changes in the target organs are absent
II	There is objective evidence of target organ damage without symptoms with their hand or dysfunction: Left ventricular hypertrophy (on ECG, ultrasound, Ro) Generalized narrowing of retinal arteries Microalbuminuria and/or a small increase in serum creatinine (in m. - 115 - 133 mmol/L in f. - 107 - 124 mmol/l) Carotid artery disease - a thickening of the intima-media > 0.9 mm or the presence of atherosclerotic plaques
III	There is objective evidence of target organ damage with symptoms from their side and impaired heart - myocardial infarction, heart failure II A - III stage; brain - stroke, transient ischemic attack, acute hypertensive encephalopathy, vascular dementia; fundus - hemorrhage and retinal exudates with papilledema the optic nerve or without; kidney - concentration of plasma creatinine in m. > 133 umol/L, in f.. > 124; vessels - dissecting aortic aneurysm; peripheral arterial occlusion

http://cardiopractic.com.ua/osnovnoj-material/8_1_-arterialnaya-gipertenziya/8_2_-klassifikaciya-ag.html

RISK FACTORS OF ARTERIAL HYPERTENSION



http://praharajheart.com/acute-heart-attack-learn-about-heart-attack-treatments-in-kolkata/

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 factors	Average risk	Average risk	Low added risk	Moderate added risk	High added risk
1–2 risk factors	Low added risk	Low added risk	Moderate added risk	Moderate added risk	Very high added risk
3 or more risk factors, MS, OD or Diabetes	Moderate added risk	High added risk	High added risk	High added risk	Very high added risk
Established CV or renal disease	Very high added risk	Very high added risk	Very high added risk	Very high added risk	Very high added risk

http://care.diabetesjournals.org/content/32/suppl_2/S284

THE NEW YORK HEART ASSOCIATION (NYHA) CLASSIFICATION OF HEART FAILURE

CLASSES	OBJECTIVE ASSESSMENT
Class I	No limitation of physical activity
Class II	Slight limitation of physical activity in which ordinary physical activity leads to fatigue, palpitation, dyspnea, or anginal pain; the person is comfortable at rest
Class III	Marked limitation of physical activity in which less-than-ordinary activity results in fatigue, palpitation, dyspnea, or anginal pain; the person is comfortable at rest
Class IV	Inability to carry on any physical activity without discomfort but also symptoms of heart failure or the anginal syndrome even at rest, with increased discomfort if any physical activity is undertaken

https://emedicine.medscape.com/article/2500037-overview

AMERICAN COLLEGE OF CARDIOLOGY FOUNDATION/AMERICAN HEART ASSOCIATION (ACCF/AHA) HEART FAILURE STAGING SYSTEM

STAGE	DESCRIPTION	EXAMPLES
A	At high risk for heart failure but without structural heart disease or symptoms of heart failure	Patients with coronary artery disease, hypertension, or diabetes mellitus without impaired left ventricular (LV) function, LV hypertrophy (LVH), or geometric chamber distortion
B	Structural heart disease but without signs/symptoms of heart failure	Patients who are asymptomatic but who have LVH and/or impaired LV function
C	Structural heart disease with current or past symptoms of heart failure	Patients with known structural heart disease and shortness of breath and fatigue, reduced exercise tolerance
D	Refractory heart failure requiring specialized interventions	Patients who have marked symptoms at rest despite maximal medical therapy

https://emedicine.medscape.com/article/2500037-overview

DEFINITION OF HEART FAILURE WITH PRESERVED (HFpEF),MID-RANGE(HFPEF) AND REDUCED EJECTION FRACTION (HFrEF)

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).

https://archive.is/ICiuC

BMI CLASSIFICATION OF OVERWEIGHT AND OBESITY

CLASSIFICATION	BMI CATEGORY (kg/m2)	RISK OF DEVELOPING HEALH 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

http://www.marsden-weighing.co.uk/index.php/bmi-calculator/

LIPOPROTEIN PATTERNS (FREDRICKSON PHENOTYPES)

Phenotype	Elevated Lipoprotein	Elevated Lipids
I	Chylomicrons	TGs
IIa	LDL	Cholesterol
IIb	LDL,VLDL	TGs and Cholesterol
III	VLDL., Chylomicrons reminant	TGs and Cholesterol
IV	VLDL	TGs
V	Chylomicrons , VDL	TGs and cholesterol

http://www.merckmanuals.com/professional/endocrine-and-metabolic-disorder/lipid-disorder/dyslipidemia

COMPLETE DIAGNOSIS OF OUR PATIENT

Main:

- ✓Ischemic heart disease
- ✓Condition after cardiac pacemaker implantation (DDDR) due to complete AV block
- ✓Essential arterial hypertension IInd stage, 1st grade, hypertensive heart (LVH)
- ✓Heart failure II B, II FC with preserved ejection fraction (EF – 65%)
- ✓Dyslipidemia II a type (after Fredrickson)
- ✓Moderate added total CV risk

Co-morbidity:

- ✓Obesity II degree

TREATMENT

- Life style modification
- Medical intervention

TREATMENT OF AV BLOCKS

Block type	Treatment
1st degree	None
2nd degree (Mobitz type 1)	None
2nd degree (Mobitz type 2)	Pacemaker
Complete AV block	Pacemaker

https://emedicine.medscape.com/article/162007-treatment

LIFESTYLE CHANGES

PARAMETER	TREATMENT GOAL
Weight loss (for overweight and obese patients)	Reduce by 5% to 10%
Physical activity	150 min/week of moderate-intensity exercise (eg, brisk walking) plus flexibility and strength training
Diet	• Eat regular meals and snacks; avoid fasting to lose weight • Consume plant-based diet (high in fiber, low calories/glycemic index, and high in phytochemicals/antioxidants) • Understand Nutrition Facts Label information • Incorporate beliefs and culture into discussions • Use mild cooking techniques instead of high-heat cooking • Keep physician-patient discussions informal

https://www.aace.com/files/dm-guidelines-ccp.pdf

PHARMACOLOGICAL TREATMENT FOR STABLE FORMS OF IHD

Indication	Class	Level
General considerations		
Optimal medical treatment indicates at least one drug for angina/ischemia relief plus drug for event prevention	I	C
It is recommended to educate patients about the disease, risk factors and treatment strategy	I	C
It is indicated to review the patient's response soon after starting therapy	I	C
Angina/ischemia relief		
Short-acting nitrates are recommended	I	B
First-line treatment is indicated with β-blockers and/or calcium channel blockers to control heart rate and symptoms	I	A
For second-line treatment it is recommended to add long-acting nitrates or ivabradine or nicorandil or ranolazine, according to heart rate, blood pressure and tolerance	IIa	B
For second-line treatment, trimetazidine may be considered	IIb	B
According to comorbidities/tolerance it is indicated to use second-line therapies as first-line treatment in selected patients	I	C
In asymptomatic patients with large areas of ischemia (>10%) β-blockers should be considered	IIa	C
In patients with vasospastic angina, calcium channel blockers and nitrates should be considered and β-blockers avoided	IIa	B
Event prevention		
Low-dose aspirin daily is recommended in all SCAD patients	I	A
Clopidogrel is indicated as an alternative in case of aspirin intolerance	I	B
Statins are recommended in all SCAD patients	I	A
It is recommended to use ACE inhibitors (or ARBs) if presence of other conditions (e.g. heart failure, hypertension or diabetes)	I	A

https://www.cardiosmart.org/heart-conditions/guidelines/sihd

BLOOD PRESSURE GOALS IN HYPERTENSIVE PATIENTS

Recommendations	Class [a]	Level [b]
A SBP goal <140 mmHg:		
a) is recommended in patients at low–moderate CV risk;	I	B
b) is recommended in patients with diabetes;	I	A
c) should be considered in patients with previous stroke or TIA;	IIa	B
d) should be considered in patients with CHD;	IIa	B
e) should be considered in patients with diabetic or non-diabetic CKD.	IIa	B
In elderly hypertensives less than 80 years old with SBP ≥160 mmHg there is solid evidence to recommend reducing SBP to between 150 and 140 mmHg.	I	A
In fit elderly patients less than 80 years old SBP values <140 mmHg may be considered, whereas in the fragile elderly population SBP goals should be adapted to individual tolerability.	IIb	C
In individuals older than 80 years and with initial SBP ≥160 mmHg, it is recommended to reduce SBP to between 150 and 140 mmHg provided they are in good physical and mental conditions.	I	B
A DBP target of <90 mmHg is always recommended, except in patients with diabetes, in whom values <85 mmHg are recommended. It should nevertheless be considered that DBP values between 80 and 85 mmHg are safe and well tolerated.	I	A

2013 ESH/ESC Guidelines for the management of arterial hypertension

TREATMENT STRATEGIES AND CHOISE OF DGUGS IN HYPERTENSIVE PATIENTS

Recommendations	Class [a]	Level [b]
Diuretics (thiazides, chlorthalidone and indapamide), beta-blockers, calcium antagonists, ACE inhibitors, and angiotensin receptor blockers are all suitable and recommended for the initiation and maintenance of antihypertensive treatment, either as monotherapy or in some combinations with each other.	I	A
Some agents should be considered as the preferential choice in specific conditions because used in trials in those conditions or because of greater effectiveness in specific types of OD.	IIa	C
Initiation of antihypertensive therapy with a two-drug combination may be considered in patients with markedly high baseline BP or at high CV risk.	IIb	C
The combination of two antagonists of the RAS is not recommended and should be discouraged.	III	A
Other drug combinations should be considered and probably are beneficial in proportion to the extent of BP reduction. However, combinations that have been successfully used in trials may be preferable.	IIa	C
Combinations of two antihypertensive drugs at fixed doses in a single tablet may be recommended and favoured, because reducing the number of daily pills improves adherence, which is low in patients with hypertension.	IIb	B

ACE = angiotensin-converting enzyme; BP = blood pressure; CV = cardiovascular; OD = organ damage; RAS = renin-angiotensin system.
[a]Class of recommendation.
[b]Level of evidence.
[c]Reference(s) supporting recommendation(s).

2013 ESH/ESC Guidelines for the management of arterial hypertension

SUMMARY OF RECOMMENDATIONS ON THERAPEUTIC STRATEGIES IN HYPERTENSIVE PATIENTS WITH HEART DISEASE

Recommendations	Class	Level
In hypertensive patients with CHD, a SBP goal <140 mmHg should be considered	IIa	B
In hypertensive patients with a recent myocardial infarction β-blockers are recommended. In case of other CHD all antihypertensive agents can be used, but β-blockers and calcium antagonists are to be preferred, for symptomatic reason (angina)	I	A
Diuretics, β-blockers, ACE inhibitors, angiotensin receptor blockers, and/or mineralocorticoid receptor antagonists are recommended in patients with heart failure or severe LV dysfunction to reduce mortality and hospitalization	I	A
In patients with heart failure and preserved EF, there is no evidence that antihypertensive therapy per se or any particular drug, is beneficial. However, in these patients, as well as in patients with hypertension and systolic dysfunction, lowering SBP to around 140 mmHg should be considered. Treatment guided by relief of symptoms (congestion with diuretics, high heart rate with diuretics, high heart rate with β-blockers, etc.) should also be considered	IIa	C
ACE inhibitors and angiotensin receptor blockers (and β-blockers and mineralocorticoid receptor antagonists if heart failure coexists) should be considered as antihypertensive agents in patients at risk of new or recurrent atrial fibrillation	IIa	C
It is recommended that all patients with LVH receive antihypertensive agents	I	B
In patients with LVH, initiation of treatment with one of the agents that have shown a greater ability to regress LVH should be considered, i.e. ACE inhibitors, angiotensin receptor blockers and calcium antagonists	IIa	B

2013 ESH/ESC Guidelines for the management of arterial hypertension

2016 ESC GUIDELINES FOR THE DIAGNOSTIC AND TREATMENT OF ACUTE AND CHRONIC HEART FAILURE

Recommendations	Class	Level
Treatment of hypertension is recommended to prevent or delay the onset of HF and prolong life	I	A
Treatment with statins is recommended in patients with or at high-risk of CAD whether or not they have LV systolic dysfunction, in order to prevent or delay the onset of HF and prolong life	I	A
Counselling and treatment for smoking cessation and alcohol intake reduction is recommended for people who smoke or who consume excess alcohol in order to prevent or delay the onset of HF	I	C
Treating other risk factors of HF (e.g. obesity, dysglycaemia) should be considered in order to prevent or delay the onset of HF	II a	C
Empagliflozin should be considered in patients with type 2 diabetes in order to prevent or delay the onset of HF and prolong life	II a	B

HEART FAILURE TREATMENT

STAGE	MANAGEMENT STRATEGY
STAGE A: At risk for developing HF	• Urge lifestyle modification (e.g., diet, weight loss, exercise). • Treat comorbidities (e.g., hypertension, diabetes, hyperlipidemia, atrial fibrillation).
STAGE B: Asymptomatic *with structural heart disease**	• Continue to treat comorbidities and recommend lifestyle modification. • Monitor for development of HF symptoms. **Additional treatment for reduced EF patients only:** • Initiate beta blockers and ACE inhibitors or ARBs.† • Use implantable cardioverter-defibrillators (ICDs) in post-MI patients.
STAGE C: Symptomatic *Prior or current symptoms of HF*	• Continue to treat comorbidities and recommend lifestyle modification. • Educate patients on self-care (e.g., salt restriction and HF symptoms). **Additional treatment for reduced EF patients only:** • Initiate beta blockers and an ACE inhibitor or ARB w/diuretics. Escalate pharmacologic treatment based on symptoms. • Utilize ICDs or cardiac resynchronization therapy (CRT).
STAGE D: Refractory or advanced HF	• Refer to cardiology for advanced therapies, such as left ventricular assist device (LVAD) or heart transplant, when indicated. • Discuss end-of-life treatment goals, as appropriate.

Source: American College of Cardiology Foundation and American Heart Association

* **Structural heart disease:** left ventricular (LV) hypertrophy, LV dysfunction, prior myocardial infarction, or valvular disease

† **ACE:** Angiotensin-converting enzyme; **ARB:** Angiotensin receptor blocker

RECOMMENDATION FOR TREATMENT OF STAGE B HEART FAILURE

Recommendations	COR	LOE
In patients with a history of MI and reduced EF, ACE inhibitors or ARBs should be used to prevent HF.	I	A
In patients with MI and reduced EF, evidence-based beta blockers should be used to prevent HF.	I	B
In patients with **MI, statins should be used to prevent HF.**	I	A
Blood pressure should be controlled to prevent symptomatic HF.	I	A
ACE inhibitors should be used in all patients with a reduced EF to prevent HF.	I	A
Beta blockers should be used in all patients with a reduced EF to prevent HF.	I	C
An ICD is reasonable in patients with asymptomatic ischemic cardiomyopathy who are at least 40 d post-MI, have an LVEF ≤30%, and on GDMT.	IIa	B
Nondihydropyridine calcium channel blockers may be harmful in patients with low LVEF.	III: Harm	C

MONITORING LIPIDS AND ENZYMES IN PATIENTS ON LIPID-LOWERING THERAPY

Testing lipids
How often should lipids be tested? • Before starting lipid-lowering drug treatment, at least two measurements should be made, with an interval of 1–12 weeks, with the exception of conditions where concomitant drug treatment is suggested such as ACS and very high-risk patients.
How often should a patient's lipids be tested after starting lipid-lowering treatment? 8 (±4) weeks after starting treatment. • 8 (±4) weeks after adjustment of treatment until within the target range.
How often should lipids be tested once a patient has reached the target or optimal lipid level? Annually (unless there is adherence problems or other specific reasons for more frequent reviews).
Monitoring liver and muscle enzymes
How often should liver enzymes (ALT) be routinely measured in patients on lipid-lowering drugs? • Before treatment. • Once 8–12 weeks after starting a drug treatment or after dose increase. • Routine control of ALT thereafter is not recommended during lipid-lowering treatment.

www.escardio.org/guidelines

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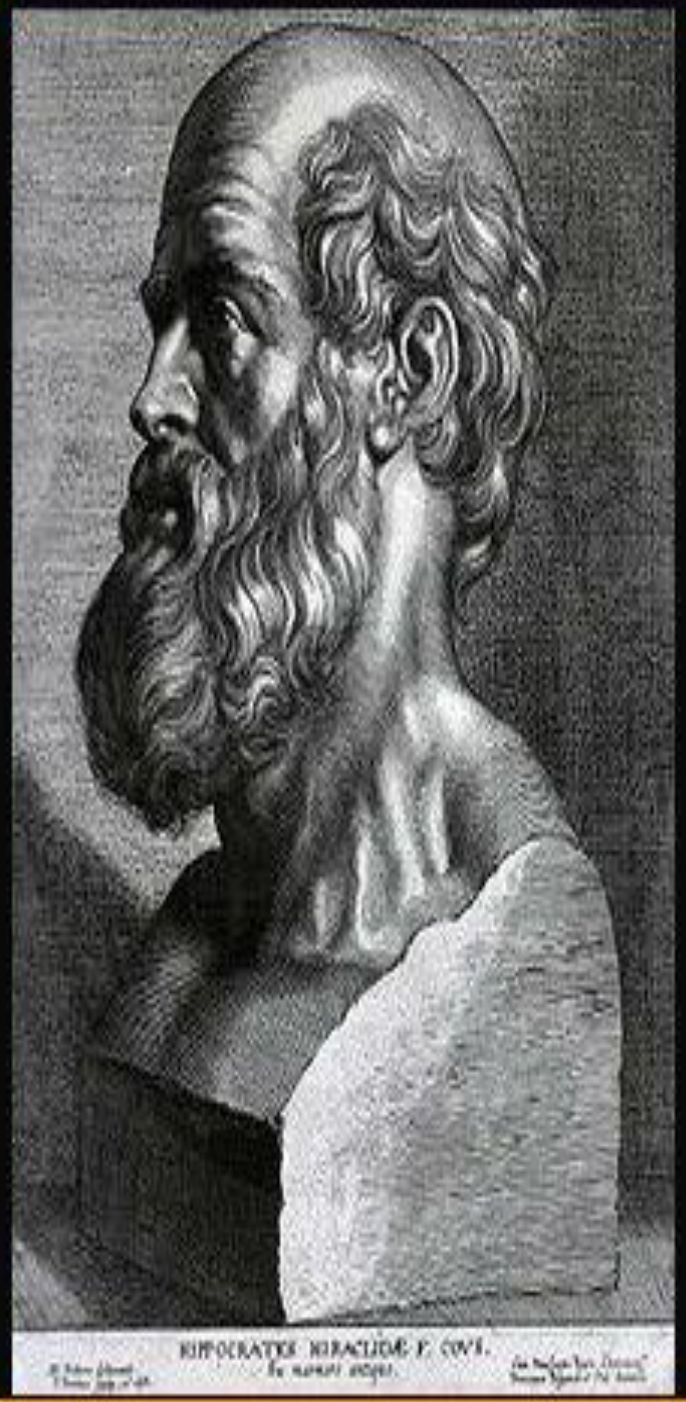
Atherosclerosis 253 (2016) 281-344-d oi:10.1016/j.atherosclerosis.2016.08.018

HEALTH CARE FACILITY TREATMENT

- Control pacemaker parameters after 1, 6 months and 1 year
- Therapeutic drugs:
  - ✓Cardiomagnyl: 75 mg once daily in the evening
  - ✓Telstartan: 40 mg once daily in the morning
  - ✓Artovastatin: 40 mg once daily in the evening
- Control of the lipid profile and liver function test after 3 months



It is more important to know what sort of person has a disease than to know what sort of disease a person has.

(Hippocrates)