PHC

432 Team

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Risk Assessment of Cardiovascular Diseases and Dyslipidemia

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COLOR GUID : Doctor's Notes Team Notes slides Not important Important **431 team work**

Objectives

1. Risk factors for CVD (Traditional and emerging ones)
2. How to reduce incidence of development of CVD
3. Primary prevention of CVD
4. Highlight on patient with chest pain “Angina” and how is presented
5. Highlight on management of post MI
6. Highlight on role of Dyslipidemia in CVD and its management (to achieve goals according to risk)
7. How to assess risk factors like Framingham risk score “Risk Assessment”
8. What are goals of LDL and HDL have to be achieved for CVD, DM,

Risk Assessment of cardiovascular diseases and Dyslipidemia

Risk factors of CVD:

1. C-reactive protein

- Blood protein that signifies inflammation.
- High levels maybe associated with an increased risk of developing (CAD).
- 2010 ACCF/AHA guidelines state that measuring CRP can be useful for selecting patients for statin therapy & maybe reasonable for C.V risk assessment.

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>
> *Cardiovascular Diseases includes Stroke, coronary heart disease, Aortic aneurysm and Peripheral artery disease*

2. Coronary artery calcification

- Coronary calcium scans use CT scan to check for calcium deposition in the coronary arteries.
- A calcium score of zero in a person over 40 years of age indicates a 90-95% absence of significant coronary artery disease. A score of 1 to 10 is in keeping with a minimum plaque burden. A score of 11 to 100 is in keeping with a mild plaque burden; 100- 400 moderate plaque burden and over 400 extensive plaque burden with a very high likelihood of at least one significant coronary stenosis. ATP IV the cut of point of calcium score Is 300.

3. Homocysteine

- Results from methionine breakdown.
- Elevated levels have been shown to cause:
- Atherosclerosis.
- Venous thrombosis.
- Test: Fasting homocysteine level.
    - Less than 13 µmol/L is considered normal.
    - Between 13 and 60 µmol/L is considered moderately elevated.
    - Greater than 60 to 100 µmol/L is severely elevated.
- Management: B6, B12 & folate supplementation decrease homocysteine.

Table .1/ Risk factors of CVD:

	Non-modifiable	Modifiable	Emerging risk Factors
	Age: Males > 45 Females > 55	Hyperlipidemia	Elevated high sensitivity Creactive protein
	Male, Postmenopausal Female	Hypertension	Coronary artery Calcification
	Family history	Diabetes	Elevated lipoprotein(a)
	1st Degree male < 55	Smoking	Homocysteine
	1st Degree female < 65	Obesity, Metabolic syndrome	Fibrinogen
		Sedentary lifestyle	
		Heavy alcohol intake	

Primary prevention:

1. Diet

- Advocate consumption of fruits, vegetables, low-fat dairy products, fiber, whole grains, and protein sources that are low in trans-fat, saturated fat and cholesterol.
- Reduced dietary sodium intake, increased consumption of fish that are high in omega-3 fatty acids decreases cardiovascular risk

2. Weight Reduction

- Goal: Achieve and maintain desirable weight (body mass index 18.5–24.9 kg/m2).

3. DM

- Goals: Normal fasting plasma glucose (<110 mg/dL) and near normal HbA1c (<7%).

4. Physical activity

- Goal: At least 30 min of moderate-intensity physical activity on most (and preferably all) days of the week.
- Increased physical activity begins with increasing lifestyle activities, such as walking
- c. A complete exercise program.
- d. More frequent exercise, provide more benefits.

5. Blood Pressure

- Goal:
  - BP <140/90 mm Hg; or
  - BP < 140/80 mm Hg if the patient has DM or CKD.
- Initiate or maintain lifestyle modification, weight control, increased physical activity, sodium reduction.
- C. For patients with BP ≥140/90 mm Hg (or 140/80 mm Hg for individuals with chronic kidney disease or diabetes):
- Add BP medication, initially with beta-blockers and/or ACE inhibitors, with addition of other drugs (ex, Diuretics).

6. Smoking cessation.

Chest pain:

Systems that can cause chest pain:

1- Musculoskeletal

2- Gastrointestinal

3- Cardiovascular

4- Pulmonary

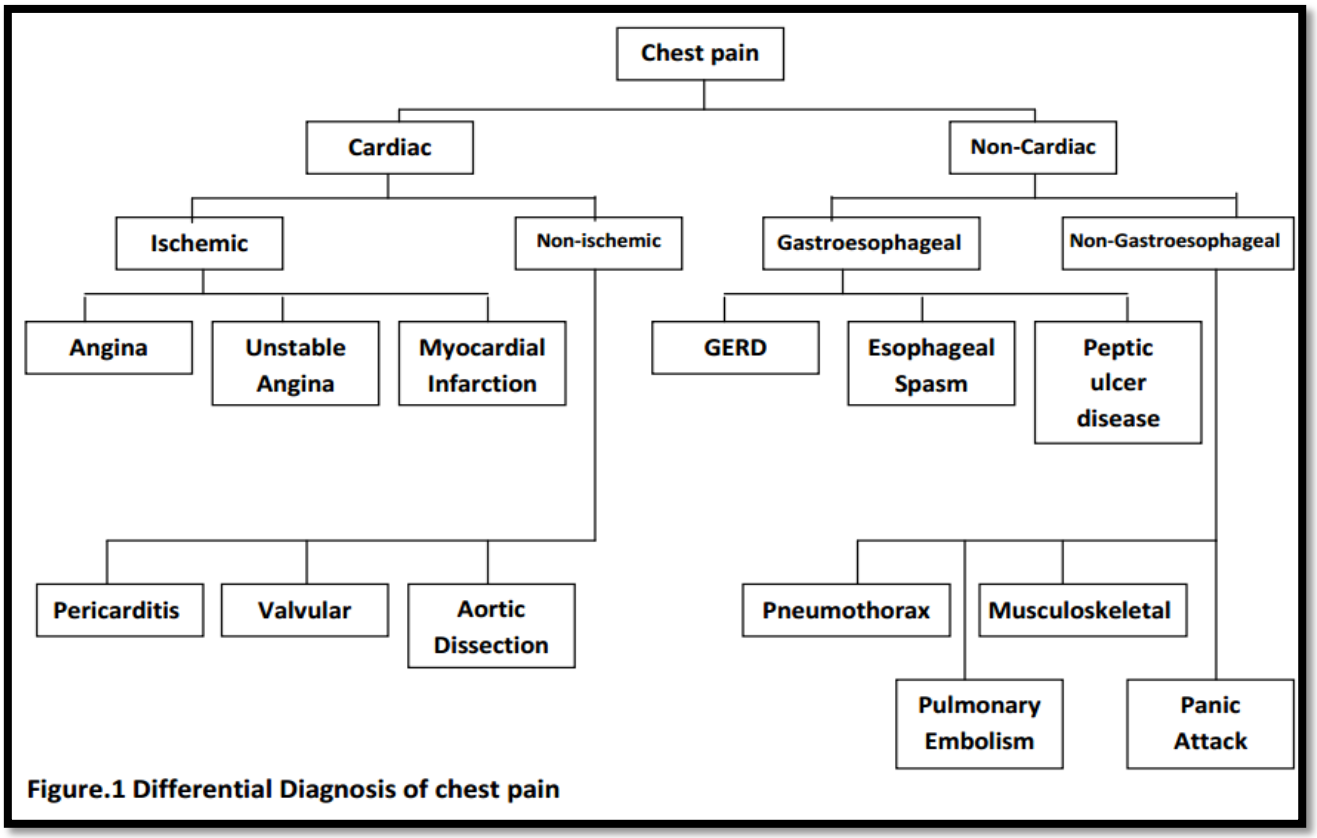

Figure.1 Differential Diagnosis of chest pain

Ischemic heart disease

Definition

1. An imbalance between the supply of oxygen and the myocardial demand resulting in myocardial ischemia.
2. Angina pectoris: Symptom not a disease Chest discomfort associated with abnormal myocardial function in the absence of myocardial necrosis.
3. Myocardial infarction: A clinical (or pathologic) event caused by myocardial ischemia in which there is evidence of myocardial injury or necrosis.

Presentation

1. Band like chest pain around the chest or central chest.
2. Pressure/dull ache with/without radiation to shoulders, arms (L>R), neck, and/or jaw.
3. Often associated with nausea, sweating, and/or shortness of breath.

4. REMEMBER (Patients may have no pain and may only complain of episodic shortness of breath, weakness, dizziness, collapse, sweating or nausea and vomiting).
5. Atypical symptoms do not necessarily rule out Acute Coronary Syndrome.

Post Myocardial Infarction management

1. Life style and risk factors modification:

- In DM and chronic kidney disease intensive interventions are recommended for patients with established CHD
- Smoking cessation
- Physical activity
- Weight management
- Blood pressure

2. Medications:

- Lipid management
- Antiplatelet and anticoagulation therapy
- Aspirin
- Clopidogrel
- Warfarin therapy
- Renin-angiotensin-aldosterone system inhibitors
- Angiotensin converting enzyme (ACE) inhibitors
- Angiotensin receptor blockers (ARBs)
- Aldosterone blockade
- Beta blockers

3. Family education

- Review with patients and families how to recognize symptoms and what should they do?
- cardiopulmonary resuscitation (CPR) training

4. Others:

- **Recommended:**
  - Give annual influenza vaccination
  - Screen for depression

- **Not recommended:**
  - Hormonal therapy
  - Vitamin E and/or vitamin C supplements
  - folic acid (with or without vitamins B6 and B12)

Dyslipidemia:

1. Types of cholesterol in the body

- High-density lipoprotein (HDL)
- Low-density lipoprotein (LDL)

2. **High LDL-C levels** are known to increase the risk of heart disease and stroke.

3. Other important lipid abnormalities include:

- Low HDL-C (at any given LDL or TC level, reduced HDL-C is associated with an increased CHD risk)
- Elevated Triglycerides (independent predictors of CV disease)

4. Fasting lipid profile:

- Total Cholesterol
- LDL
- HDL
- TGs

5. **While in non-fasting state you can measure only:**

- Total cholesterol
- HDL

6. **The ratio of total cholesterol/HDL-C** has been shown to be the optimal predictor of CVD risk.

7. **According to the American Heart Association (AHA)**, you should keep your cholesterol ratio at or below 5:1.
The ideal cholesterol ratio is about 3.5:1.

Causes of Hypercholesterolemia:

1. Primary Causes:

- Diet, Obesity, Sedentary life
- Genetic, heterozygous and homozygous familial hypercholesterolemia

2. Secondary Causes:

- Hypothyroidism
- Nephrotic Syndrome
- Obstructive jaundice
- Diabetes
- Drugs: Steroids, Oestrogens, Progestins, Retinoic A.

Management:

1. Primary goal is to achieve target LDL level (Table.3)
2. Non HDL level is secondary goal
3. Very high TGs >500,
    - aim is to prevent acute pancreatitis;Rx: low fat diet, weight reduction, Physical activity, Fibrate or Nicotinic acid
4. HDL is the tertiary target
5. **Pharmacological management:**
    - **LDL lowering drugs:**
        - Statins (Simvastatin, Atorvastatin)Ezetimibe (Zetia®) =decrease absorption of cholesterol.
    - **Non-HDL lowering drugs:**
        - Nicotinic acid
        - Fibrates [Gemfibrozil]
        - Omega-3- Fatty acids (reduce mortality in patients with CAD by approximate 20% and 40%).

Table.2/ATP III Classification of LDL, HDL and total cholesterol levels (mg/dL)

LDL Cholesterol	
Optimal	<100
Near optimal	100-129
Borderline high	130-159
high	160-189
Very high	≥ 190
Total Cholesterol	
Desirable	<200
Borderline high	200-239
high	≥240
HDL Cholesterol	
Low	<40
High	≥60

Table.3/ Risk Categories that can modify LDL goals.

Risk Category	LDL goal
CHD and CHD risk equivalents (Box.2)	<100
>2 risk factors (Box.3)	<130
0-1 risk factor	<160

Box .2

CHD equivalents

- Clinical CHD
- Symptomatic carotid artery disease
- Peripheral arterial disease
- Abdominal aortic aneurysm.
- DM

Box .3

Major risk factors (risk factors that modify LDL goals)

- Cigarette smoking
- Hypertension
- HDL <40 mg/dL
- Family history (1st degree) of premature CHD (<55 years in males, <65 years in females)
- Age (males >45 years; Females >55 years)

Box .4

Framingham Risk score (To calculate risk for 10 years u have to have these five categories):

- AGE
- TOTAL CHOLESTEROL LEVEL
- HDL-C LEVEL
- SMOKING
- Systolic Bp

Drugs Affecting Lipoprotein Metabolism

Drug Class	Agents and Daily Doses	Lipid/Lipoprotein Effects		Side Effects	Contraindications
HMG CoA reductase inhibitors (statins)	Lovastatin (20-80 mg) Pravastatin (20-40 mg) Simvastatin (20-80 mg) Fluvastatin (20-80 mg) Atorvastatin (10-80 mg) Cerivastatin (0.4-0.8 mg)	LDL HDL TG	↓18-55% ↑5-15% ↓7-30%	Myopathy Increased liver enzymes	Absolute: • Active or chronic liver disease Relative: • Concomitant use of certain drugs*
Bile acid sequestrants	Cholestyramine (4-16 g) Colestipol (5-20 g) Colesevelam (2.6-3.8 g)	LDL HDL TG	↓15-30% ↑3-5% No change or increase	Gastrointestinal distress Constipation Decreased absorption of other drugs	Absolute: • dysbeta-lipoproteinemia • TG >400 mg/dL Relative: • TG >200 mg/dL
Nicotinic acid	Immediate release (crystalline) nicotinic acid (1.5-3 gm), extended release nicotinic acid (Niaspan®) (1-2 g), sustained release nicotinic acid (1-2 g)	LDL HDL TG	↓5-25% ↑15-35% ↓20-50%	Flushing Hyperglycemia Hyperuricemia (or gout) Upper GI distress Hepatotoxicity	Absolute: • Chronic liver disease • Severe gout Relative: • Diabetes • Hyperuricemia • Peptic ulcer disease
Fibric acids	Gemfibrozil (600 mg BID) Fenofibrate (200 mg) Clofibrate (1000 mg BID)	LDL *(may be increased in patients with high TG)* HDL TG	↓5-20% ↑10-20% ↓20-50%	Dyspepsia Gallstones Myopathy	Absolute: • Severe renal disease • Severe hepatic disease

* *Cyclosporine, macrolide antibiotics, various anti-fungal agents, and cytochrome P-450 inhibitors (fibrates and niacin should be used with appropriate caution).*

Table 7. Drugs Affecting Lipoprotein Metabolism

Drug Class, Agents and Daily Doses	Lipid/Lipoprotein Effects		Side Effects	Contraindications	Clinical Trial Results
HMG CoA reductase inhibitors (statins)*	LDL HDL TG	↓18-55% ↑5-15% ↓7-30%	Myopathy Increased liver enzymes	Absolute: • Active or chronic liver disease Relative: • Concomitant use of certain drugs†	Reduced major coronary events, CHD deaths, need for coronary procedures, stroke, and total mortality
Bile acid Sequestrants‡	LDL HDL TG	↓15-30% ↑3-5% No change or increase	Gastrointestinal distress Constipation Decreased absorption of other drugs	Absolute: • dysbeta-lipoproteinemia • TG >400 mg/dL Relative: • TG >200 mg/dL	Reduced major coronary events and CHD deaths
Nicotinic acid¥	LDL HDL TG	↓ 5-25% ↑15-35% ↓20-50%	Flushing Hyperglycemia Hyperuricemia (or gout) Upper GI distress Hepatotoxicity	Absolute: • Chronic liver disease • Severe gout Relative: • Diabetes • Hyperuricemia • Peptic ulcer disease	Reduced major coronary events, and possibly total mortality
Fibric acids§	LDL *(may be increased in patients with high TG)* HDL TG	↓5-20% ↑10-20% ↓20-50%	Dyspepsia Gallstones Myopathy Unexplained non-CHD deaths in WHO study	Absolute: • Severe renal disease • Severe hepatic disease	Reduced major coronary events

* *Lovastatin (20-80 mg), pravastatin (20-40 mg), simvastatin (20-80 mg), fluvastatin (20-80 mg), atorvastatin (10-80 mg), cerivastatin (0.4-0.8 mg).*
† *Cyclosporine, macrolide antibiotics, various antifungal agents and cytochrome P-450 inhibitors (fibrates and niacin should be used with appropriate caution).*
‡ *Cholestyramine (4-16 g), colestipol (5-20 g), colesevelam (2.6-3.8 g).*
¥ *Immediate release (crystalline) nicotinic acid (1.5-3 g), extended release nicotinic acid (Niaspan ®) (1-2 g), sustained release nicotinic acid (1-2 g).*
§ *Gemfibrozil (600 mg BID), fenofibrate (200 mg), clofibrate (1000 mg BID).*

Summary

- **Emerging risk factors of CVD:**
  1) C-reactive protein
  2) Coronary artery calcification
  3) Homocysteine.

  Traditional risk factors in table 1

- **Primary prevention:**
  1) Diet
  2) Weight reduction
  3) Control DM
  4) Physical activity
  5) Control Bp
  6) Smoking cessation

- **Post Myocardial Infarction management:**
  1. Life style and risk factors modification
  2. Medications
  3. Family education

- **Management of hypercholesterolemia :**
  - 1. Primary goal is to achieve target LDL level (Table.3)
  - 2. Non HDL level is secondary goal

Questions

1) Which of the following is associated with increased risk of developing cardiovascular diseases?

a. alcohol
b. caffeinated coffee
c. red meat
d. dairy products

2) A 32 year old male attends clinic concerned about heart disease as his father died recently from heart attack at age of 52. BMI 31 -- Waist: 97 cm – BP: 150/90

Which of the following is the most important risk factor for this man?

a. Obesity
b. The blood pressure
c. The family history
d. The waist circumference

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Answers:

1st Questions: a

2nd Questions: c