

Cardiovascular System

Summary and MCQs

Pathology of rheumatic fever, endocarditis and heart valves



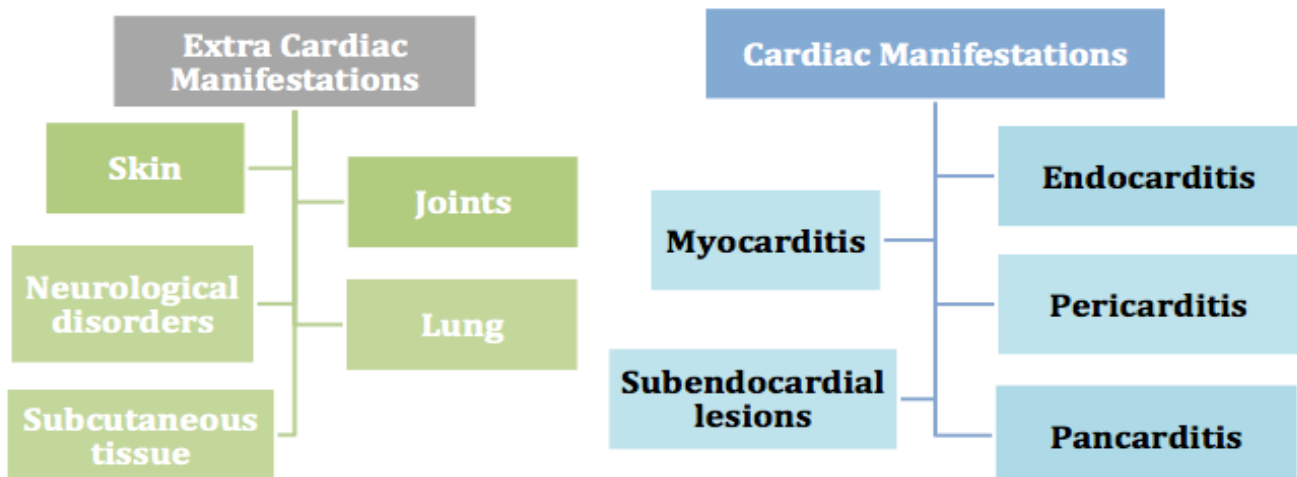
Summary:

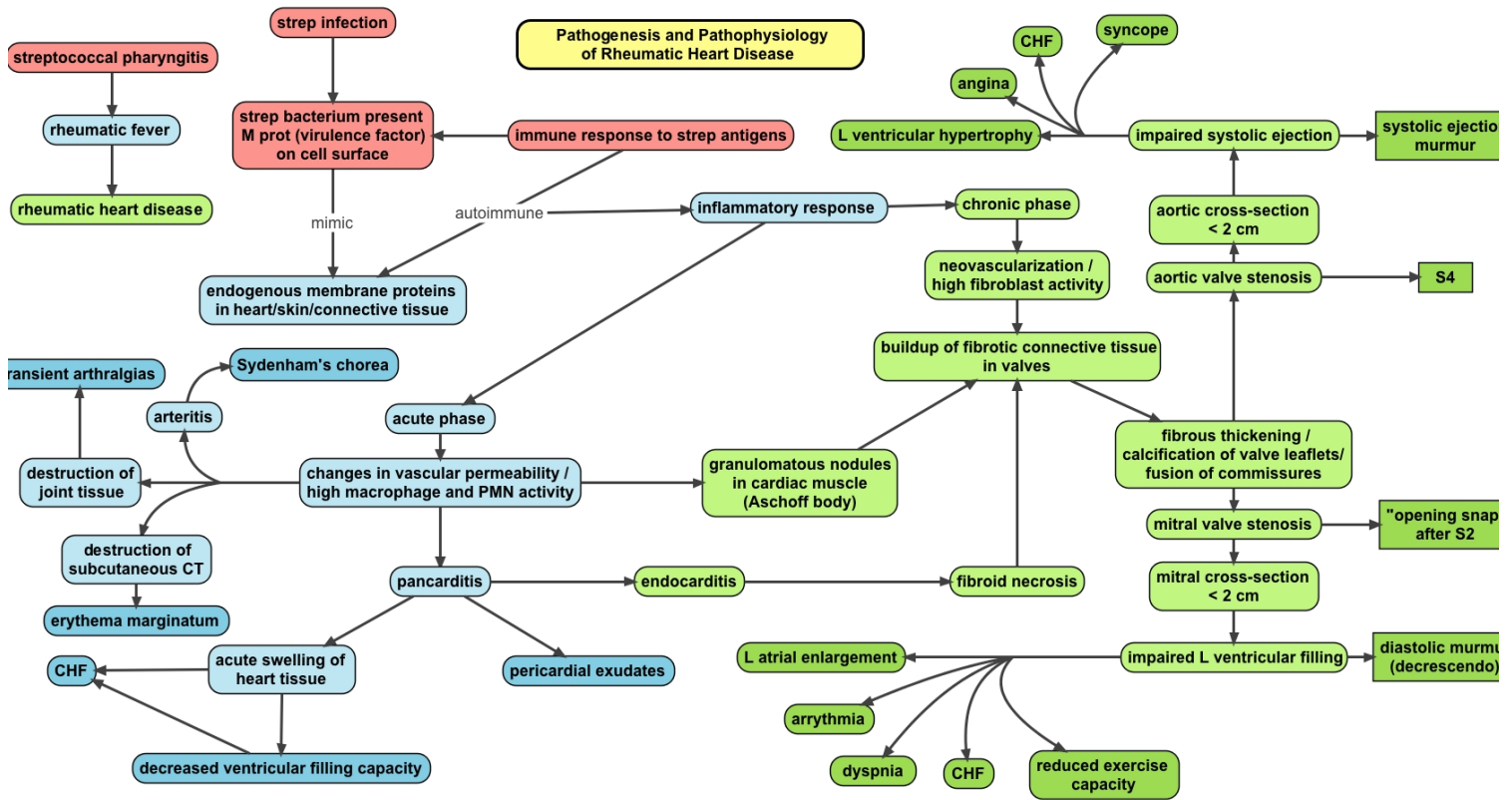
Acute Rheumatic fever:

Immune mediated, inflammatory disease, caused by group **A-beta hemolytic streptococcal** infection with cardiac and extracardiac manifestations. The inflammatory reaction mainly involves the heart, joints, central nervous system and skin.

Chronic rheumatic heart diseases:

- **Clinical features:**
 - Cardiac murmurs
 - Hypertrophy
 - Dilation
 - Congestive heart failure
 - Arrhythmia
 - Thromboembolism
 - Infective endocarditis.
- **Complications:**
 - Bacterial infective endocarditis
 - Mural thrombi
 - Congestive heart failure
 - Adhesive pericarditis
 - Atrial fibrillation.





Infective Endocarditis (IE):

What is it?

It's an infection of the cardiac valves or mural surface of the endocardium, resulting in the formation of an adherent mass of thrombotic debris and microorganisms.

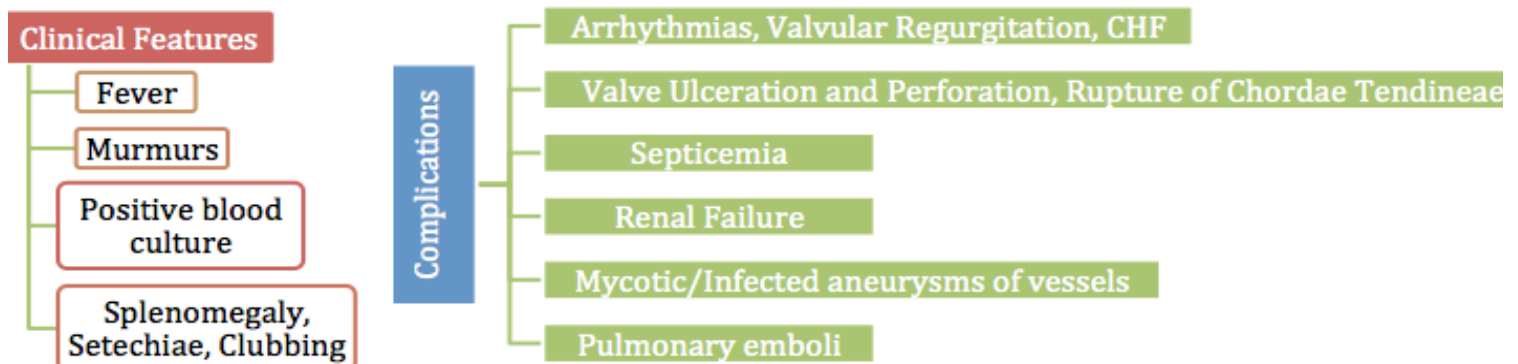
Infective endocarditis is a particularly difficult infection to eradicate because of the **avascular nature** of the heart valves.

Mitral valves are the most common sites of IE followed by aortic valve.

In IV drug users **right side valves** like the tricuspid are more commonly involved.

Acute IE: by highly virulent (staphylococcus aureus).

Sub acute IE: by low virulence (a-hemolytic streptococci viridans)



Important notes:

Rheumatic Fever:

- Recurrent infection usually in the throat leads to RF.
- Group A beta- hemolytic Streptococcus is called this way, why?
 - ✓ Because in culture (in a petri dish) it lyses the blood. However, it doesn't do that in humans.
 - ✓ It's **not** a cause of hemolytic anemia.
 - ✓ When we take a swab from a throat of the patient we will see a colony and the bacteria is growing, surrounded by blood and it lyses it
- Why does it affect those organs?

Its thought that there is some sort of cross reaction between the two antigens the proteinaceous material of the M proteins resembles the proteins we have in our valves, hearts, joints and skin and so on. Specially the heart and heart valves. (similarity in the structure of antigen)
- When we do culture of throat this child has fever, joint pain and heart beating fast. What to do next?

Now what I ask is did she have a sore throat? The culture will be negative because the patient is having an immune response so we look for serum antistreptolysin when that is high this is our evidence because it means patient had had a past infection
- Why do we worry when it subsides on its own?

Because in 10 years valve scarring will take place
- How do we diagnose RF?
 - ✓ Throat swab and culture. (Best)
 - ✓ Serological tests ASO (looking for the antibodies, when its high he is prone to have RF or he already has it)
 - ✓ Meeting Jones criteria.

- **How does patient present?**

- Throat infections, treated by antibiotics and may present with symptoms of RF a short while after the infection or many years later.
- The minimum period is between 1-4 or 2-6 weeks. (Period of t- cells to be activated and the pathological process to take place it needs time)
- Might present with Aortic or mitral stenosis
- Cardiac complications
- Jones criteria: 1 major and two minor or two major.

- **Major:**

- Pancarditis.
- Erythema marginatum (Redness with margin = Skin manifestation)
- Rheumatic nodule
- Sydenham chorea (St, Vitus dance) very rare (infection of basal ganglia in the brain) = involuntary movement.
- Polyarthrititis (migratory) common = swelling in knee and ankle joints.

- **Minor:**

- Fever.
- Sore throat (comes and goes)
- ESR elevated
- ECG abnormality
- Arthralgia
- Increased C-Reactive proteins
- Previous history of RF.

- **What is the difference between Arthritis and Arthralgia?**

Arthralgia	Arthritis
Pain in the joint does not necessarily relate to inflammation	All local manifestation of inflammation

- **Pathology?**

They develop these symptoms because of the immunity mentioned before because of activation of t-cells, which will promote the secretion of certain cytokines & will activate the complement then an inflammatory reaction takes place which at the end becomes chronic inflammation which will lead to fibrosis and dystrophic calcification.

- **What will we see in pathology?**

Aschoff nodules = necrotic collagen + a lot of histiocytes + abnormal myocytes (Anitschkow cells) + macrophages + t- cells + inflammatory cells

- In advanced cases Aschoff nodules are gone and they leave behind fibrosis and dystrophic calcification maybe little inflammation

- RF mostly causes Valvulitis (Aschoff nodules and fibrosis) or incompetence and stenosis (alone or both together) = mitral valve disease which is affecting the mitral valve characterized by stenosis and associated with incompetence,

- **What is incompetence?**

This valve is not closing and opening in a normal way there is disturbance in its physiology.

- **Chronic RHD:**

- o Occurs many years later cause of scarring.
- o When we have valvulitis (scarring in valves) that's problematic because healing with fibrosis is an irreversible damage.
- o Regurgitation- valve doesn't close properly.
- o That damaged scarred valve is a place for bacterial growth and when it does grow its called infective endocarditis.

Endocarditis:

- **Why do we worry?**

- Its treatment is complicated because it's avascular
- Because to distribute antibiotics to that part of the body is very difficult because usually we distribute antibiotics through capillaries.

- o Could be caused by RF
- o Inflammation of the endocardium, which can be caused by bacteria (most common) but also other organisms.
- o Two types:

- **Acute (not common) = S. Aureus**

- Drug addicts.
 - Very large vegetations
 - High fever
 - Sick and murmurs
 - Septicemia
 - Tricuspid valve is usually affected

- **Subacute (most common)= superimposed infection: S. viridans**

- Congenital
- Artificial valve
- RF

- **What are Vegetations?**

They are lesions on the valves on the cusps or the edges of the cusps.
When we have masses filled with bacterial growing its called vegetations

- **In vegetations what can we see?**

Fibrin + necrotic tissue and colonies of bacteria

- **What's the difference between vegetations in RF and endocarditis?**

Rheumatic Fever	Endocarditis
Fibrosis a lot Not friable	Hemorrhagic a lot Friable Very destructive

Marantic Endocarditis:

o Usually in elderly (Why? Because they are sick with many systemic illnesses) or cancer patients they also develop vegetation on the valves and may present with valvular disease

- **What do we see in culture?**

Culture is always free of bacteria we only see fibrin and clots & no bacteria here (difference between it and acute & sub-acute endocarditis)

- **How does this illness work?**

This illness activates the coagulation system = coagulopathy = fibrin thrombi adherent to the valves causing marantic endocarditis (terminally ill patient)

Floppy mitral valve:

o Most common cause of non-rheumatic heart disease that causes mitral valve incompetence

- **What is Marfan syndrome?**

- A connective tissue disease inherited, mutation in fibrillin 1 gene.
- Tall and thin with very flexible joints. (Arachnoid fingers)
- They are prone to develop heart diseases like floppy mitral valve dissecting aortic aneurism
- And some people don't have this disease and yet they have floppy mitral valve disease

- **How does the floppy mitral valve look like?**

Its looks like a parachute during contraction and if we took a section of the valve we can see increased myxoid tissue inside the structure of the valve (muroid).

- Doesn't open or close normally.
- Chordae tendineae elongated.
- Symptoms of mitral valve incompetence.
- Treatment is to replace the valve.

Calcific aortic stenosis:

- Thickened, firm nodules with adhesion with fish mouth opening (systolic murmur)
- Underlying cause is RF
- Advanced = treatment is to replace the valve
- Congenital bicuspid valve is one of the rare causes of aortic stenosis

CHECK YOUR UNDERSTANDING WITH MCQ:

1- Rheumatic.Fever usually follows an infection with:

- A. Streptococcus group A
- B. Staphylococcus aureus
- C. Streptococcus viridans
- D. H.influenza

2- One of the tests that is done to confirm diagnosis of R.F:

- A. Alpha 1 antitrypsin
- B. Rheumatoid factor
- C. Anti-streptolysin O
- D. Creatine kinase

3- To diagnose a patient with R.F, The patient should have at least:

- A. One major, two minor
- B. Two major , one minor
- C. One major , one minor
- D. Two major , two minor

4- Which valves are commonly affected by R.F:

- A. Tricuspid , mitral
- B. Mitral , Aortic
- C. Tricuspid , pulmonary
- D. Aortic , pulmonary

5- Sub Acute endocarditis usually follows an infection with:

- A. Streptococcus group A
- B. Staphylococcus aureus
- C. Streptococcus viridans
- D. H.influenza

6- A patient with R.F comes with dancing movement, how can you explain this movement:

- A. Myopathy
- B. Neuromuscular junction disease
- C. Sydenham's chorea
- D. Psychosis

1- A	2- C	3- A	4-B	5-C	6- C
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7- One of the complications of Endocarditis:

- A. Lung abscess
- B. Asthma
- C. Chronic bronchitis
- D. Cancer

8- Libman–Sacks endocarditis associated with?

- A. Carcinoid SYNDROME
- B. Drug abusers
- C. SLE
- D. Elderly

9- Most common sight for Aschoff bodies is?

- A. Myocardium
- B. Pericardium
- C. Endocardium

10- Where can we most commonly see McCallum plaques?

- A. Right Atrium
- B. Right Ventricle
- C. Left Atrium
- D. Left Ventricle

11- What's the most common bacteria in drug abusers?

- A. S. Epidermidis
- B. S. viridans
- C. S. Aureus
- D. S. pyogenes

12- Which of the following is one of Jone's major criteria?

- A. Pancarditis
- B. Fever
- C. Elevated ESR
- D. Previous RF

13- Which of the following are the Anitschkow cells?

- A. Lymphocytes
- B. Scattered plasma cells
- C. Eosinophils
- D. Activated Macrophages

7- A	8- C	9- A	10-C	11-C	12- A	13- D
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* Questions colored in red are important to know.

14- Which of the following valves is mostly affected in drug abusers?

- A. Aortic
- B. Mitral
- C. Tricuspid
- D. Bicuspid

15- Chordae tendineae rupture is a feature of which of the following?

- A. Endocarditis
- B. Rheumatic Fever
- C. Aortic valve disease
- D. Floppy mitral valve

16- What is incorrect regarding Mitral valve disease?

- A. Ballooning of mitral valves
- B. Shortening of chordae tendineae
- C. Mucoïd secretions inside the valves
- D. Thickened fibrotic leaflets

17- Which of the following is a complication of Floppy mitral valve disease?

- A. Shortening of chordae tendineae
- B. Elongation of Chordae tendineae
- C. Rupture of chordae tendineae
- D. Nothing happens to chordae tendineae

18- Acute and sub-acute endocarditis are caused by which bacteria respectively?

- A. S. Pyogenes, S. Aureus
- B. S. Viridans, S Aureus
- C. S. Aureus, S. viridans
- D. S. Pyogenes, S. viridans

19- Which of the following is a complication of RF?

- A. Valve regurgitation
- B. Damage to heart muscle
- C. Heart failure
- D. All the above

20- Which type of endocarditis has a relation to increased coagulability?

- A. All types of endocarditis
- B. Carcinoid syndrome
- C. Libman-Sacks endocarditis
- D. Marantic endocarditis

14- C	15- A	16- B	17- B	18- C	19- D	20- D
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