Rheumatic Fever & Rheumatic Heart Disease

- Rheumatic Fever is an acute, nonsuppurative, **immunologically mediated**, multi-system inflammatory disease
- Occurs a few weeks after an episode of group A Streptococcal pharyngitis.
- Affects: heart, joints, CNS, skin and subcutaneous tissues
- RHD- chronic stage

Epidemiology

- Age: 5-15 yrs, rare <3 yrs
- Girls>boys
- Common in 3rd world countries
- Incidence:

  - related to frequency and severity of Streptococcal pharyngeal infection

  - more during winter & early spring

  - environmental factors- poor sanitation, poverty, overcrowding : greater spread of infection, following epidemics of Strep pharyngitis

Etiopathogenesis

Delayed immune response to infection with group A beta hemolytic streptococci

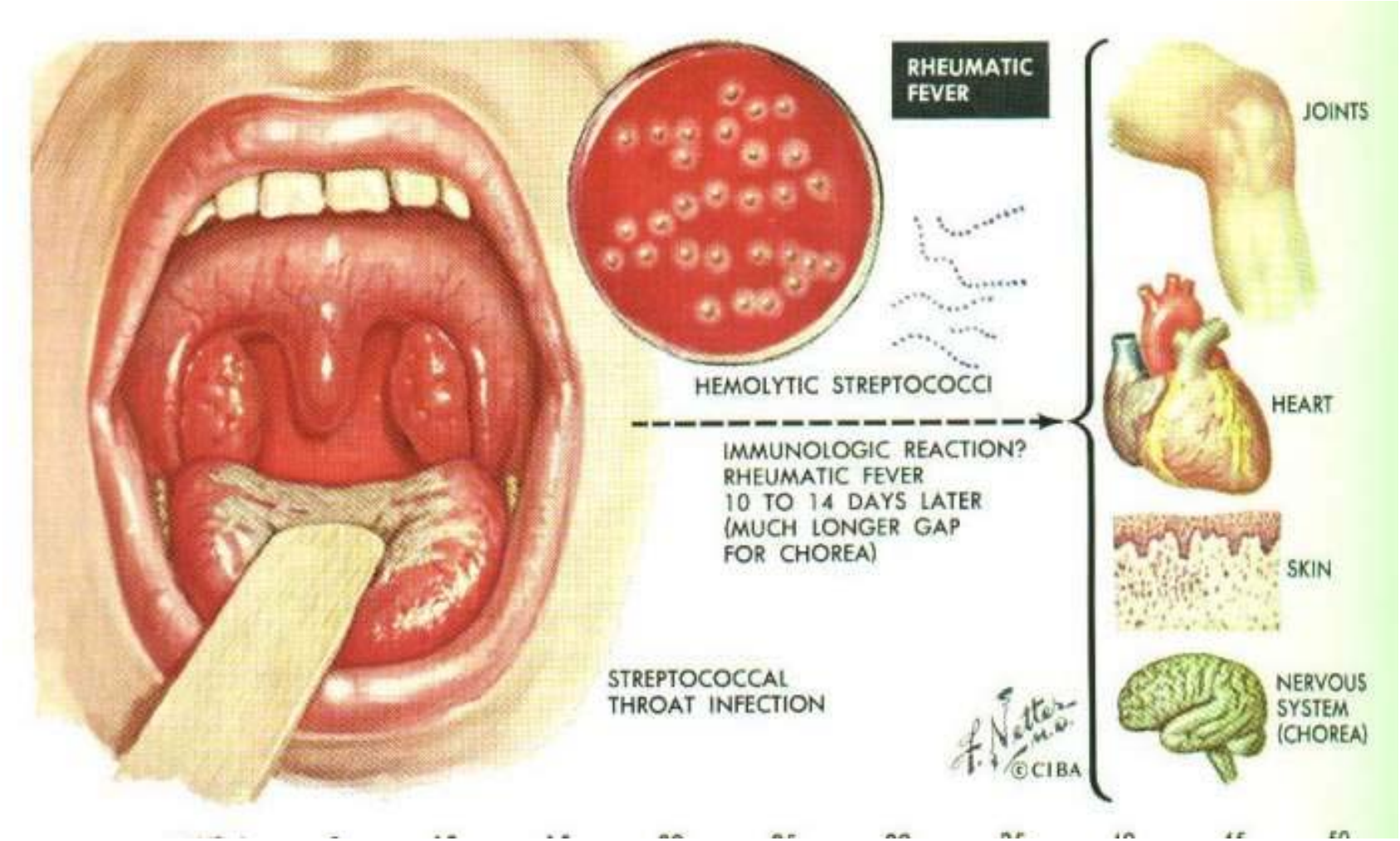
- H/o throat infection
- After a latent period of 1-3 weeks, antibody induced immunological damage occur to *heart valves, joints, s/c tissue & basal ganglia*
- Subsequent attacks are associated with exacerbations of RF
- Antibiotics lower incidence and severity of RF
- Elevated titres of antibodies to antigens of β hemolytic Streptococci

Etiopathogenesis- Immunological evidence

- Symtoms occur after 2-3 weeks of infection
- Organism cannot be isolated from the lesions in target tissues
- Antibodies against M-proteins of Strep cross react with glycoproteins in the heart, joints and other tissues
- Patients with RF have elevated titres of anti-streptolysin O and S, antistreptokinase, antistreptohyaluronidase and anti-DNAase B

- Antibodies against cell wall polysaccharide of group A streptococcus: cross reactive against cardiac valves and their levels are elevated in patients with cardiac valvular involvement
- Antibodies against Hyaluronate capsule: cross reactive against the human hyaluronate present in the joints
- Membrane antigens: cross react with smooth and cardiac muscle, dermal fiboblasts and neurons of caudate nucleus

Rheumatic fever-pathogenesis



Clinical features

Jones Criteria for Acute RF

Major manifestations

1. Migratory polyarthritis of major joints
2. Carditis
3. Sydenhams chorea
4. Subcutaneous nodules
5. Erythema marginatum of skin

Preceding evidence of streptococcal infection i.e + throat culture, elevated anti streptococcal Ab

Minor criteria

1. Nonspecific signs and symptoms:

fever, arthralgia

2. Elevated blood levels of acute phase reactants : ESR, CRP

3. Previous H/O RF

Jones Criteria (Revised) for Guidance in the Diagnosis of Rheumatic Fever*

Major Manifestation	Minor Manifestations		Supporting Evidence of Streptococal Infection
	Clinical	Laboratory	
Carditis Polyarthritis Chorea Erythema Marginatum Subcutaneous Nodules	Previous rheumatic fever or rheumatic heart disease Arthralgia Fever	Acute phase reactants: Erythrocyte sedimentation rate, C-reactive protein, leukocytosis Prolonged P-R interval	Increased Titer of Anti-Streptococcal Antibodies ASO (anti-streptolysin O), others Positive Throat Culture for Group A Streptococcus Recent Scarlet Fever

*The presence of two major criteria, or of one major and two minor criteria, indicates a high probability of acute rheumatic fever, if supported by evidence of Group A streptococcal nfection.

Recommendations of the American Heart Association

Clinical Features

1. Arthritis

- Flitting & fleeting migratory polyarthritis, involving major joints
- Commonly - knee, ankle, elbow & wrist
- Occurs in 80%
- Involved joints are exquisitely tender, swollen
- *In children below 5 yrs arthritis usually mild but carditis more prominent*
- *Arthritis does not progress to chronic disease*

2. Carditis

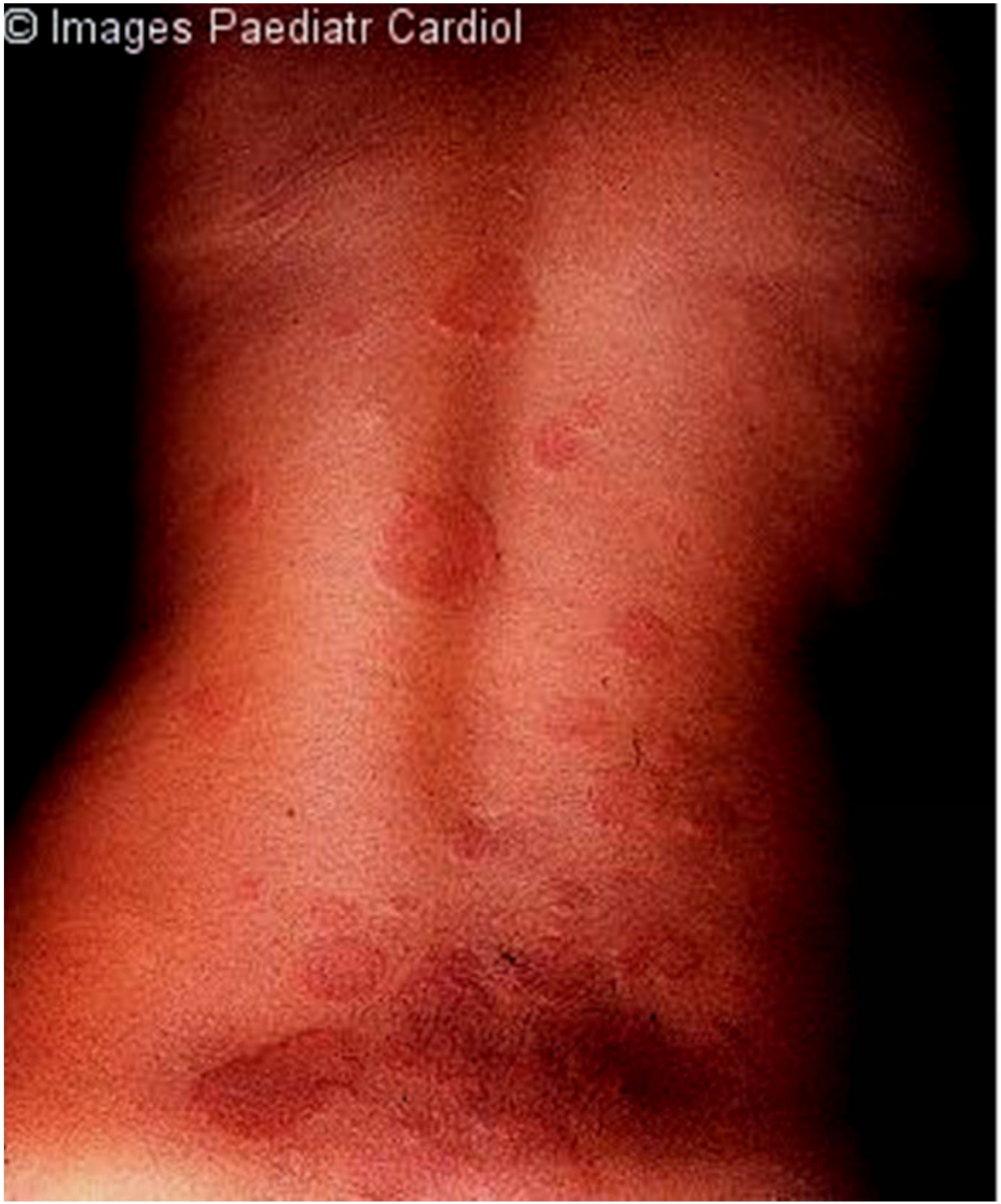
- Manifests as **pancarditis** (endocarditis, myocarditis and pericarditis),
- occusr in 40-50% of cases
- *Carditis is the only manifestation of rheumatic fever that leaves a sequelae & permanent damage to the organ*
- *Valvulitis occur in acute phase*
- *Chronic phase- fibrosis, calcification & stenosis of heart valves (fish mouth valves)*

3. Sydenham Chorea

- Occurs in 5-10% of cases
- Mainly in girls of 3-15 yrs age
- Late manifestation: 6 mo after the attack of RF
- Clumsiness, deterioration of handwriting, emotional lability or grimacing of face

4.Erythema Marginatum

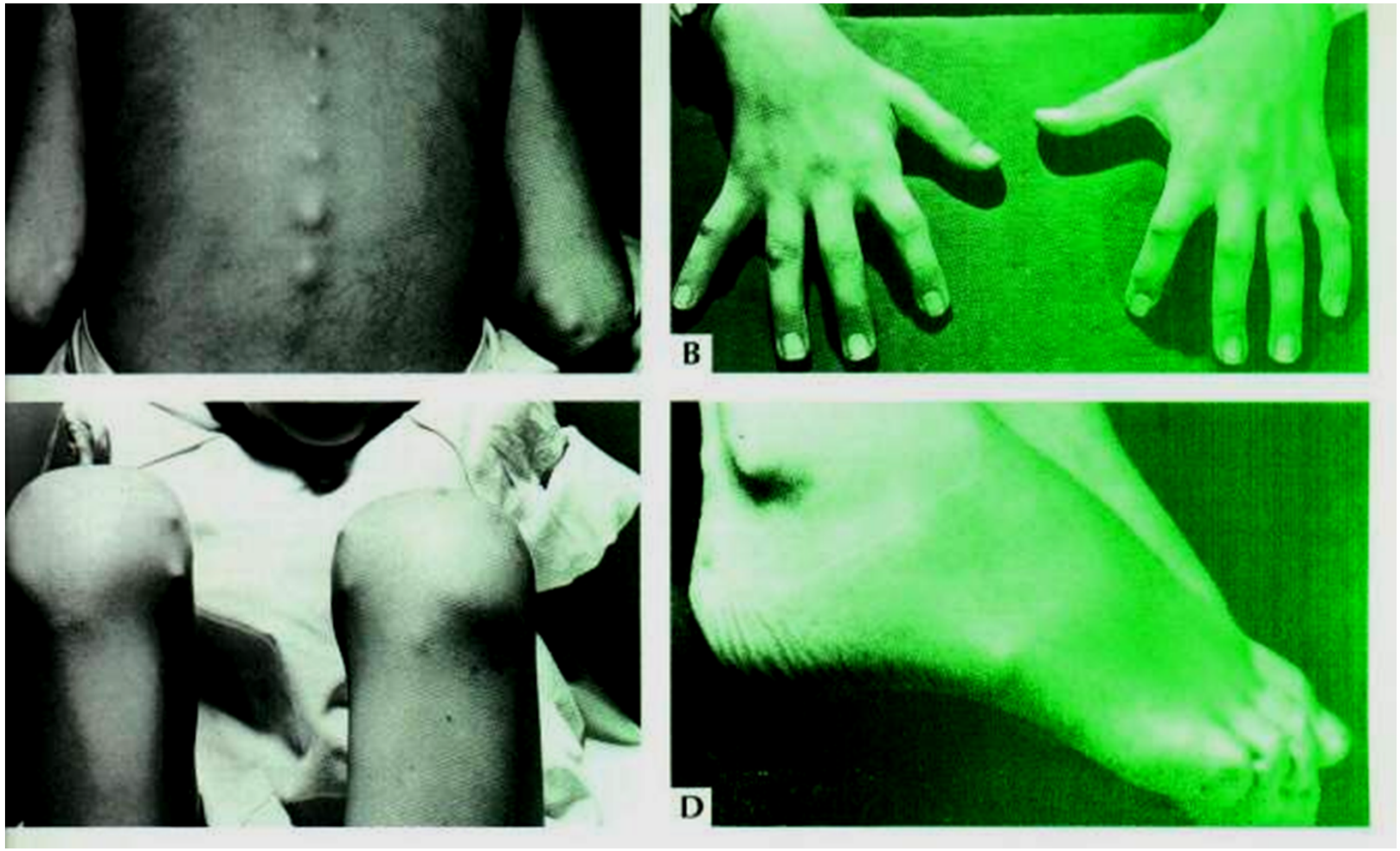
- Occur in <5%.
- Unique, transient, serpiginous-looking lesions of 1-2 inches in size
- Pale center with red irregular margin, non-itchy
- More on trunks & limbs
- *Often associated with chronic carditis*


© Images Paediatr Cardiol

5. Subcutaneous nodules

- Occurs in 10%
- Painless, pea-sized ,palpable nodules
- Mainly over extensor surfaces of joints, spine, scapulae & scalp
- Associated with strong seropositivity
- *Always associated with severe carditis*

Rheumatic fever-diagnosis



Subcutaneous nodules

(nodules of rheumatoid arthritis are larger)

Laboratory Findings

- High ESR
- Anemia, leucocytosis
- Elevated C-reactive protein
- ASO titre >200 Todd units. (Peak value attained at 3 weeks, comes down to normal by 6 weeks)
- Anti-DNAse B test
- Throat culture
- ECG- prolonged PR interval, 2nd or 3rd degree blocks, ST depression, T inversion
- 2D Echo cardiography- valve edema, mitral regurgitation, LA & LV dilatation, pericardial effusion

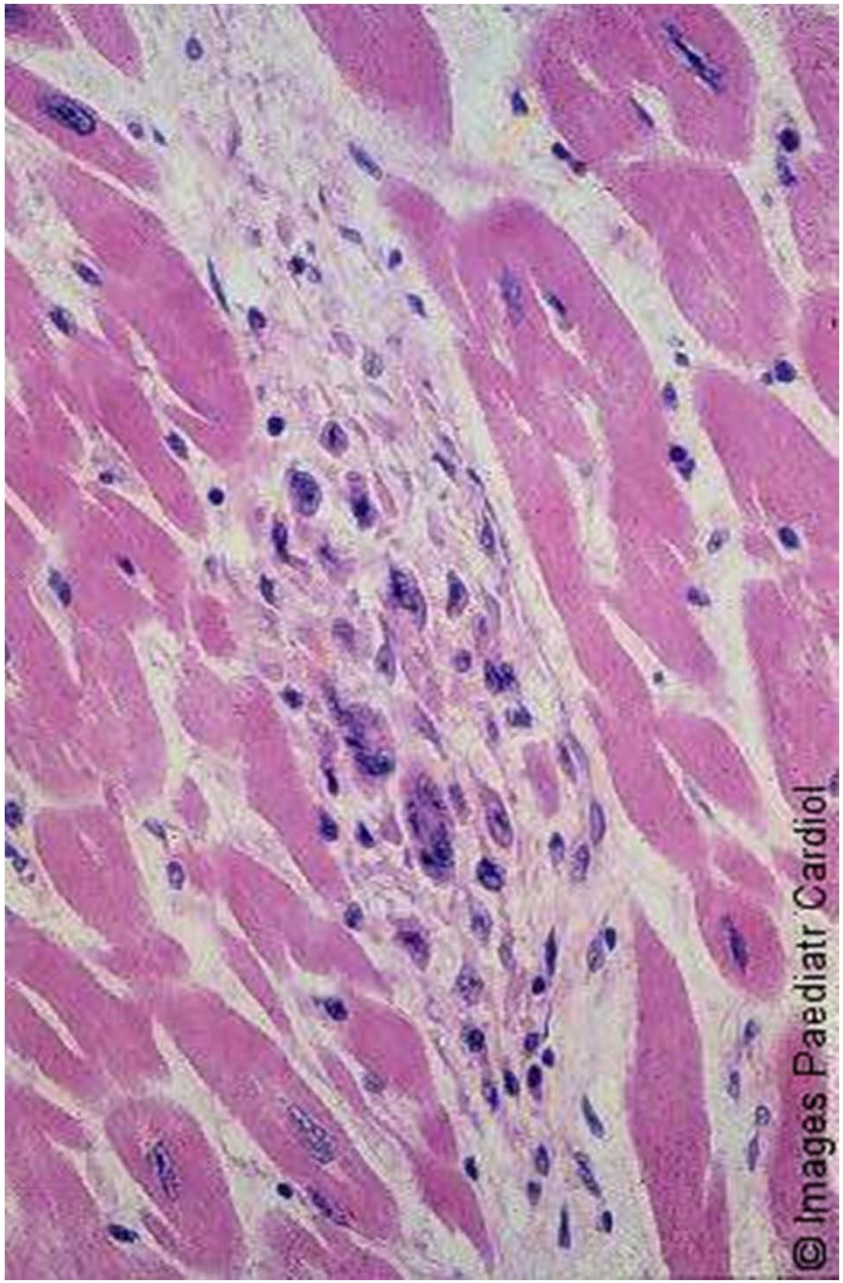
Morphologic changes

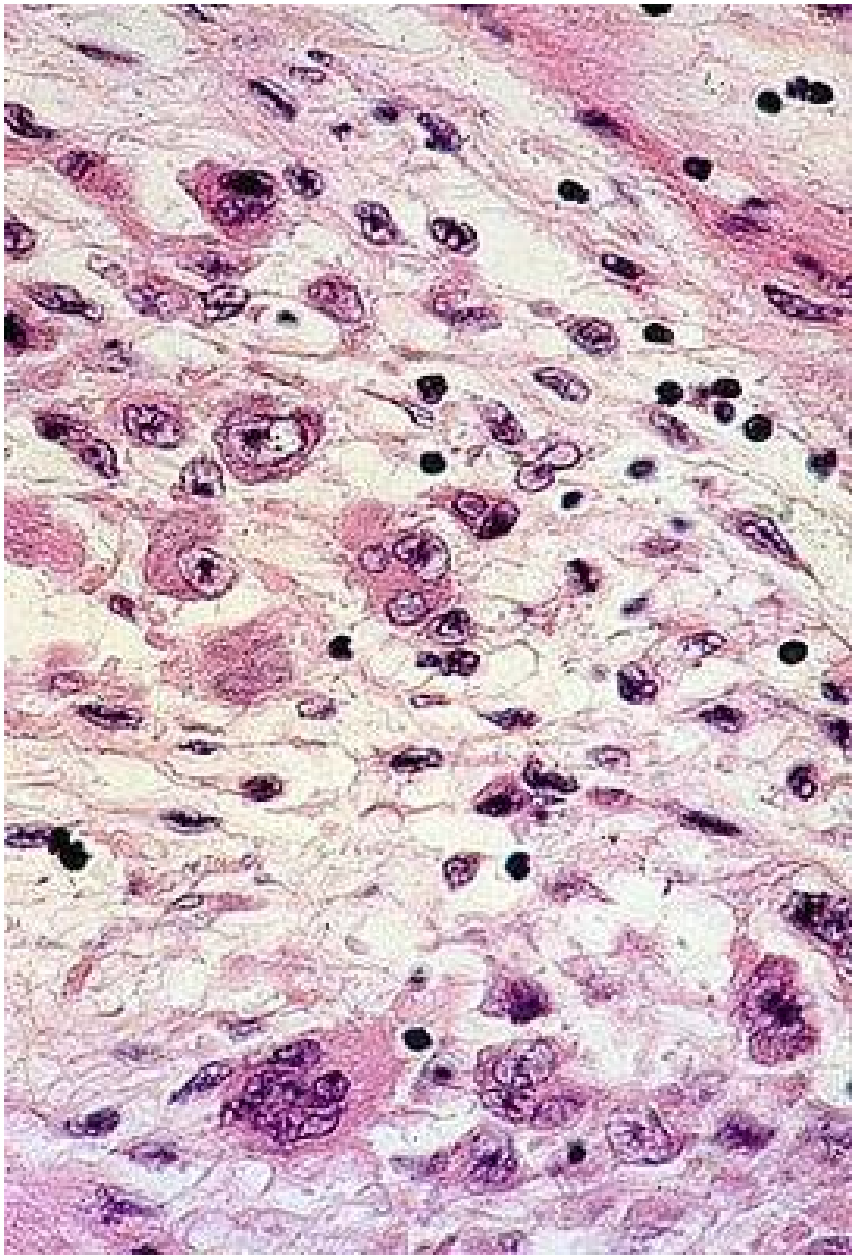
Cardiac Lesions

- Focal interstitial **involvement of all the three layers of heart : Pancarditis**
- Pathognomic feature is **Aschoff nodule/ body**
- 1-2 mm tiny structures found in the vicinity of small blood vs in the endo and myocardium

Aschoff Body

- Early exudative stage:
  - edema, ↑ in acid MPS
  - fibrinoid degeneration of connective tissue
- Intermediate proliferative or granulomatous stage:
  - inflammatory cell infiltration & proliferation of plump macrophages (**Anitschkow cells**) resulting in formation of **Ashcoff nodules**
  - macrophages have abundant cytoplasm, vesicular nucleus with **chromatin distributed in a slender wavy ribbon (Caterpillar cells) or owl eye appearance**
  - fuse to form multinucleate Aschoff giant cells
- Late healing or fibrous stage:
  - fibrocollagenic scar after 12 weeks


© Images Paediatr Cardiol



Rheumatic Endocarditis: valvulitis/ mural endocarditis

- Acute RF: valves are thick, loss of transparency
- 1-3 mm small warty (verrucous) vegetations along the line of closure
- free margins of cuff appears rough, irregular
- Attach firmly; do not embolise
- Mitral & aortic valves commonly involved- greater mechanical stress

- Mural endocarditis:

  MacCallum plaques: subendocardial thickening most frequently in post wall of lt atrium due to regurgitant jets

- Pericarditis: serofibrinous/ fibrinous pericarditis with exudates called Bread and butter pericarditis

  - chronic adhesive pericarditis in late stage
- Myocarditis: scattered Aschoff nodules in the interstitium seen as granulomas

Chronic RHD

- Organization of inflammation → heals by fibrosis
- Permanent deformity of valves:
  - leaf thickening, commisural fusion
  - shortening, thickening and fusion of chordae tendineae
- Most freq cause of Mitral stenosis (99%)- Fish mouth or button hole stenosis of Mitral valve in RHD
- MS in 65-70% cases, mitral + aortic in 25% cases

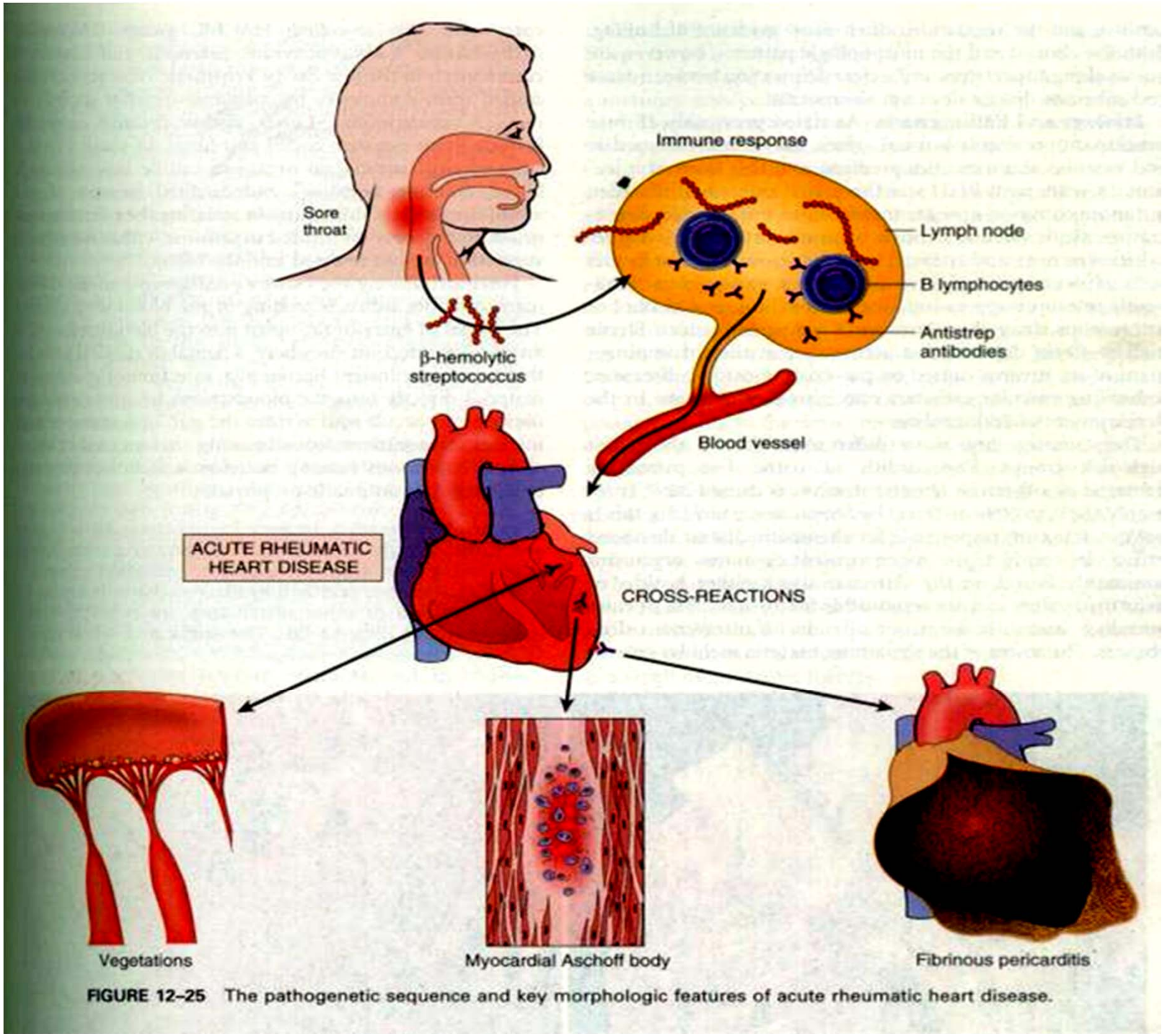
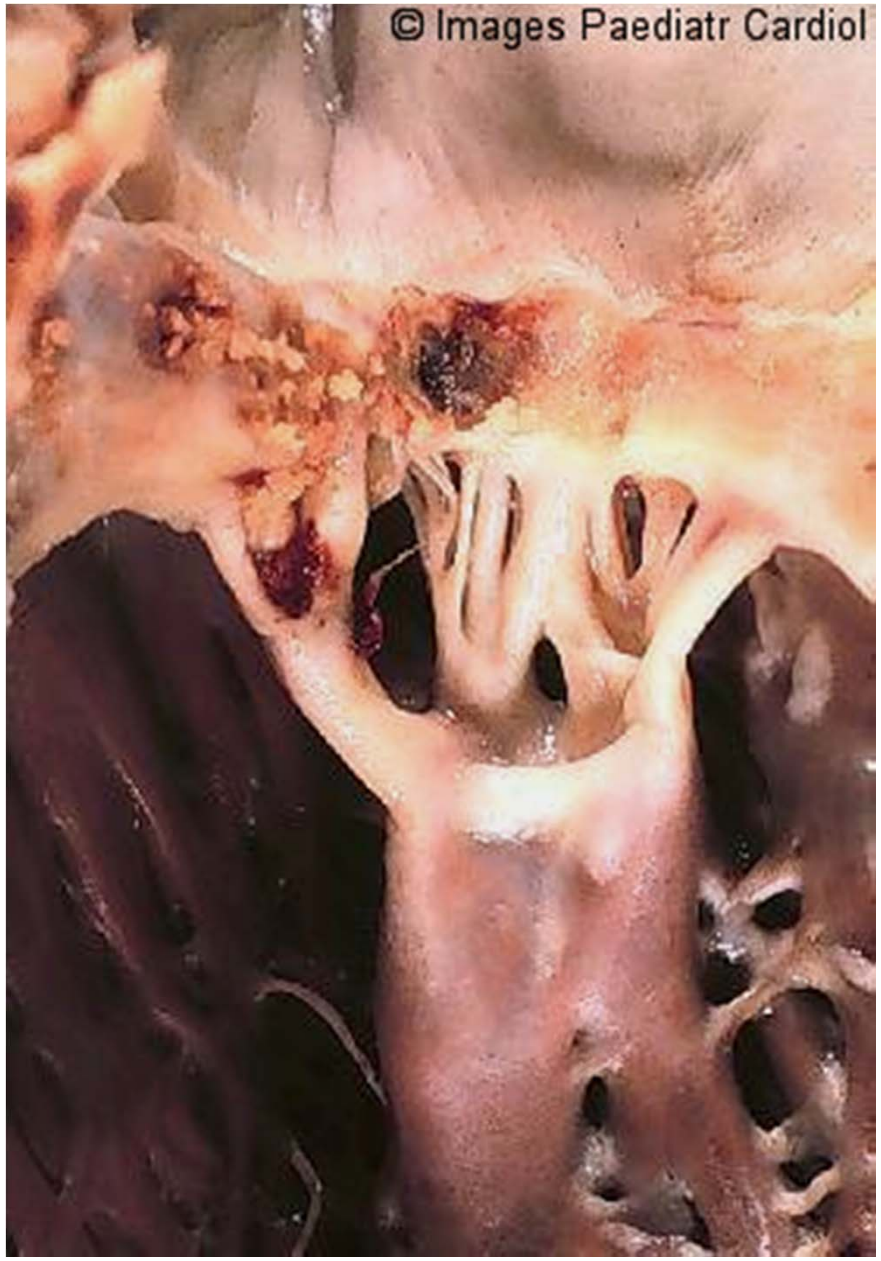
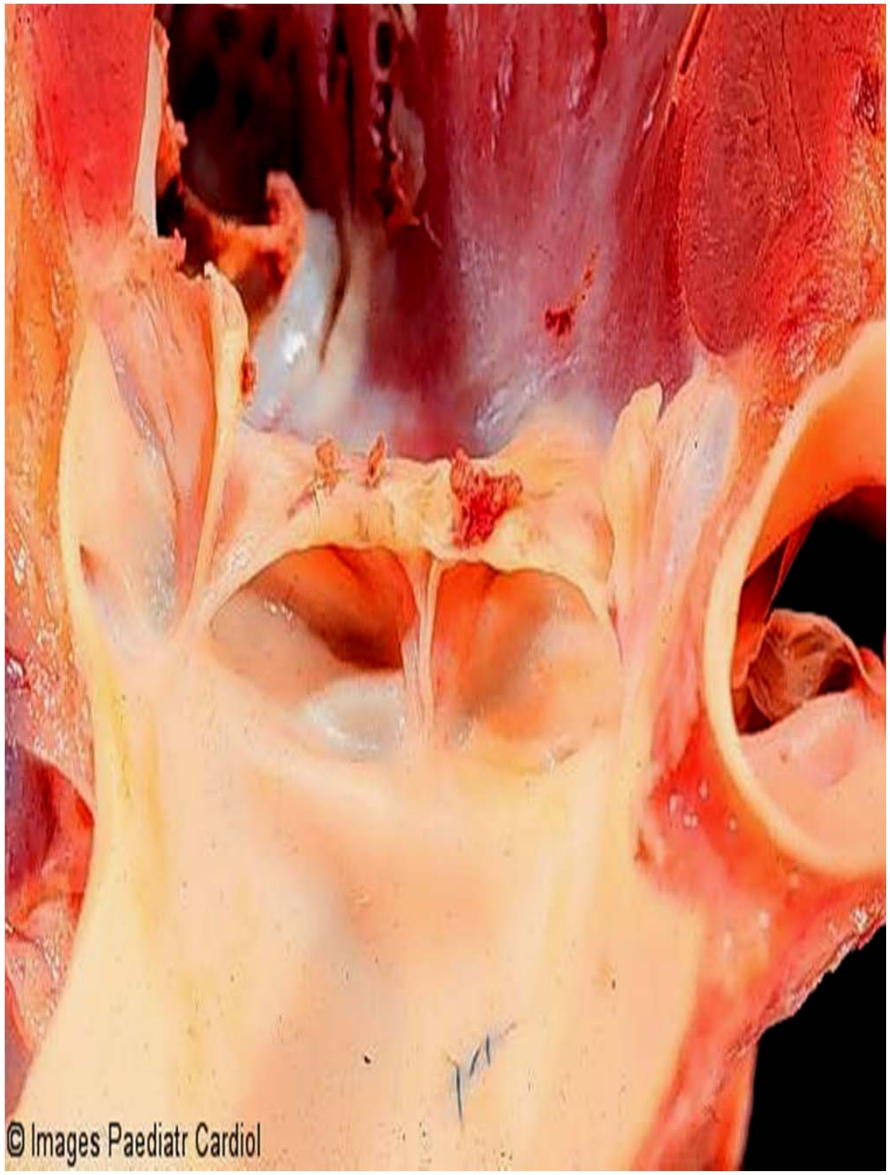
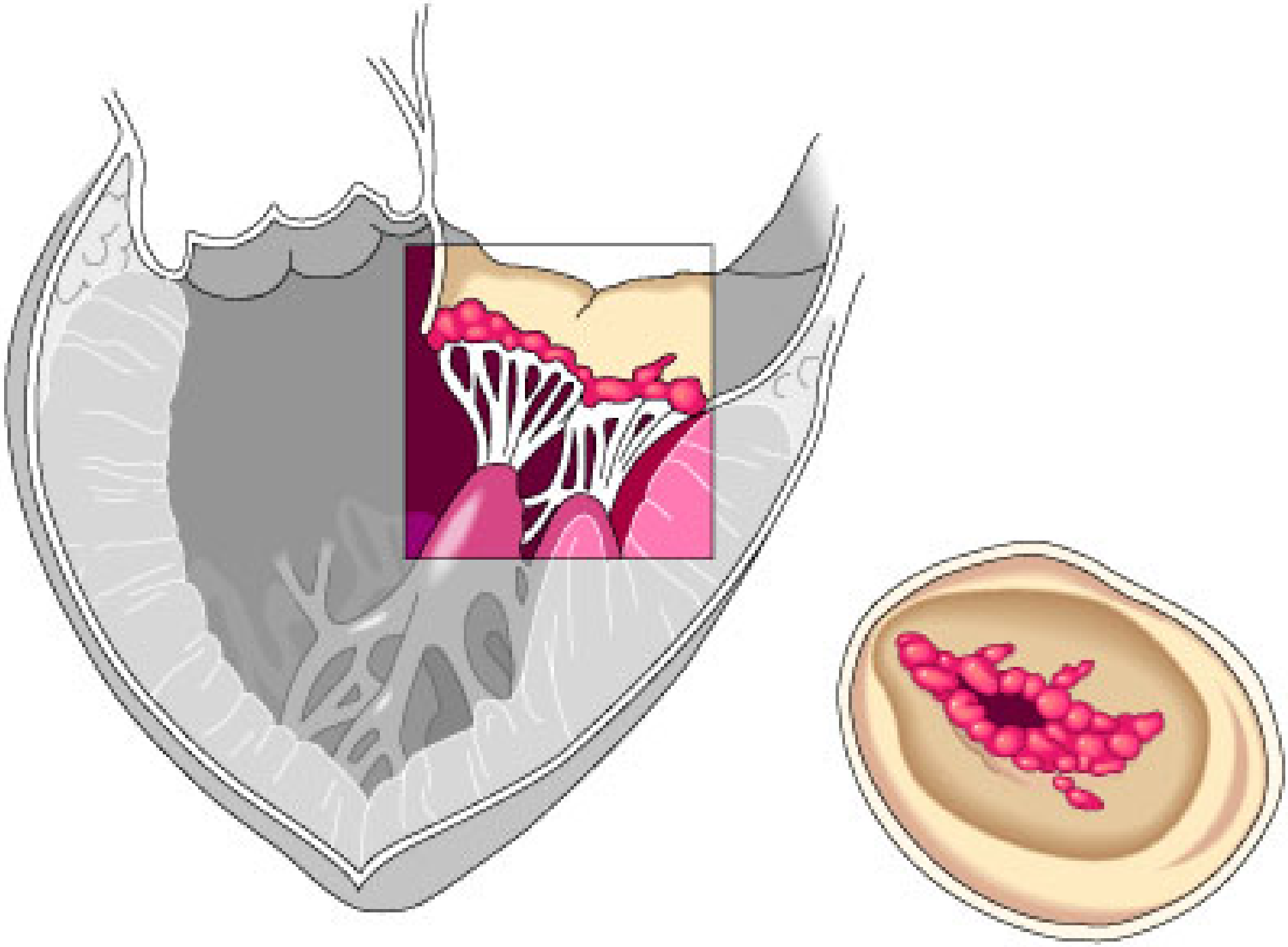


FIGURE 12–25 The pathogenetic sequence and key morphologic features of acute rheumatic heart disease.

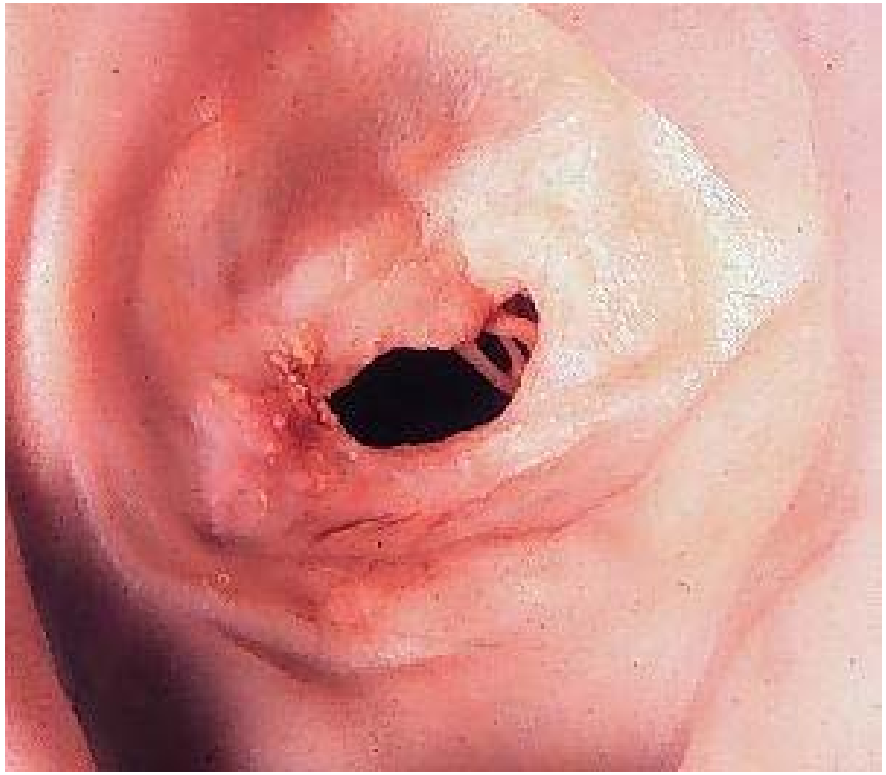

© Images Paediatr Cardiol

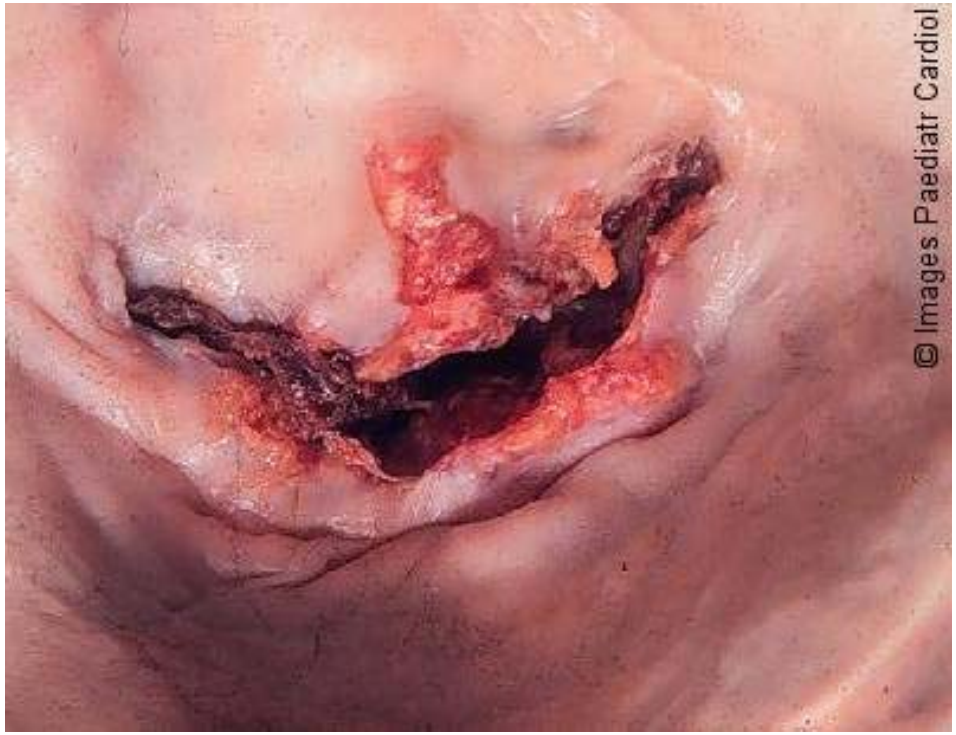

© Images Paediatr Cardiol



Mitral Stenosis

- Is a thickening by fibrosis or calcification
- Valve leaflets fuse and become stiff
- This narrows the opening and prevents blood flow from the LA to the LV
- LA pressure increases, left atrium dilates
- Pulm artey pressure increases, RV hypertrophies
- Pulmonary congestion and RHF occurs
- LV normal
- Mild – asymptomatic, with progression – dyspnea, orthopnea, cough, hemoptysis





Cause of death

- Cardiac failure
- Bacterial endocarditis
- Embolism from thrombus in LA
- Sudden death from AS or ball thrombus in LA