Acute Myocardial Infarction (MI)

Clinical Features of acute MI

- Dyspnea (if pulmonary congestion and edema)
- Cardiogenic shock (in massive MI >40% of left ventricle)
- Sometimes no typical symptoms (silent infarcts)
  - Silent infract:
    * Asymtomatic pateints
    * Confirmed only on ECG and lab
    * Particularly in: DM and erderly
- Severe, crushing substernal chest pain that radiates to neck, jaw, epigastrium, or left arm
- Dizziness; sweating
- Rapid and weak pulse
- Nausea (in posterior MI)

Evaluation of MI

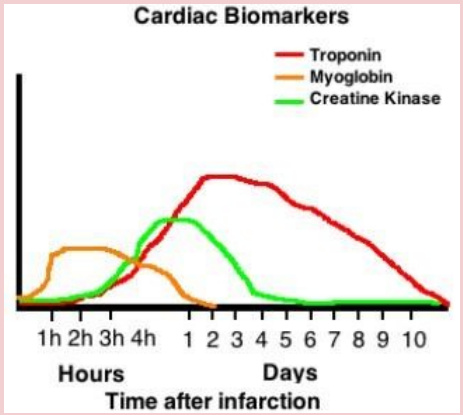
Clinical signs & symptoms

ECG abnormalities

Laboratory evaluation: blood levels of intracellular macromolecules that leak out of injured myocardial cells through damaged cell membranes

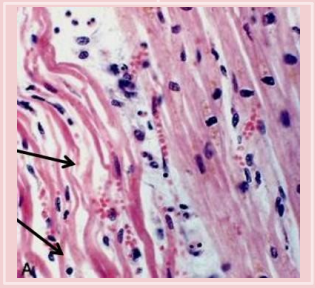
Such as search about cardiac enzyme in MI

1. Myoglobin
2. Cardiac Troponins T and I (TnT, TnI) --- the best marker
3. Creatine kinase (CK); specifically the myocardial-specific isoform (CK-MB) --- the second best marker
4. Lactate dehydrogenase

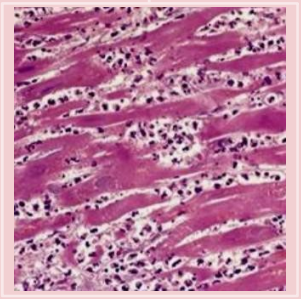


Microscopic features of myocardial infarction and its repair

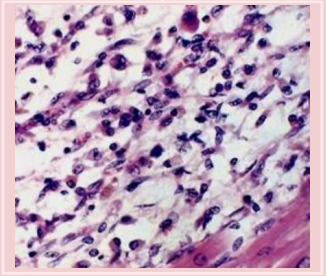
<24 hr:
coagulative necrosis and wavy fibers
Necrotic cells are separated by edema fluid.
Stain: H&E



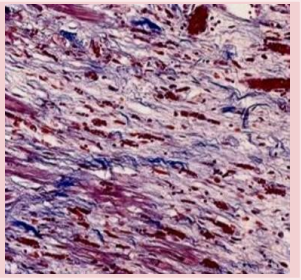
2 - 3 days:
Dense neutrophil infiltrate.
Stain: H&E



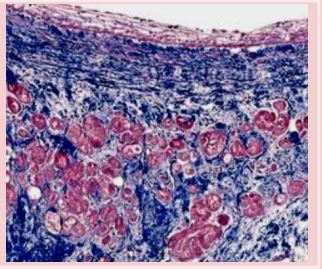
7 to 10 days:
complete removal of necrotic myocytes by macrophages.
Stain: H&E



up to 14 days:
Granulation tissue [loose connective tissue (blue) and abundant capillaries (red)].
Stain: Masson Trichrome (MT)



several weeks:
Healed infarct consisting of a dense collagenous scar (blue).
Stain: Masson Trichrome (MT)



Consequences & Complications of MI

Myocardial Rupture, it's complication:

- rupture of the ventricular free wall: Hemopericardium and cardiac tamponade (usually fatal)
- rupture of the ventricular septum: VSD and left-to-right shunt
- papillary muscle rupture: sever mitral regurgitation

Pericarditis
2-3 days after transmural MI, spontanous healing

Mural thrombus
loss of contractility (causing stasis) + endocardial damage =thromboembolism
It's complication:

- mural thrombus
- arrhythmias
- heart failure

Death
50% occur before reaching hospital (within 1 hour of symptom onset-usually as a result of lethal arrhythmias (Sudden Cardiac Death)

Cardiogenic shock:
-In large infarcts (>40% of Left ventricle)
-70% mortality rate (important cause of in hospital deaths).

Progressive late heart failure

Infarct expansion
disproportionate stretching, thinning, and dilation of the infarct region (especially with anteroseptal infarcts)

Ventricular aneurysm
- A late complication
- most commonly result from a large transmural anteroseptal infarct that
heals with the formation of thin scar tissue

Sudden cardiac death (SCD)

Unexpected death from cardiac causes either without symptoms or < 24 hours of symptom onset

CAD (atherosclerosis) is the most common underlying cause

Lethal arrythmias (v. fibrillation) is the most common direct mechanism of death

With younger victims, other non-atherosclerotic causes are more common

Non-atherosclerotic causes of SCD:

- Congenital coronary arterial abnormalities
- Aortic valve stenosis
- Mitral valve prolapse
- Myocarditis
- Dilated/ hypertrophic cardiomyopathy
- Pulmonary hypertension
- Hereditary/ acquired abnormalities of cardiac conduction system

NOTE:
Acute occlusion of the proximal left anterior descending (LAD) artery is the cause of 40% to 50% of all MI cases

Done by:
Shahed Atiyat