Presentation and Management of Common Cardiac Surgical Diseases
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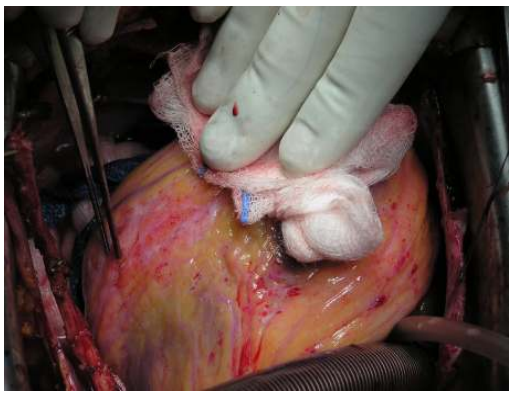
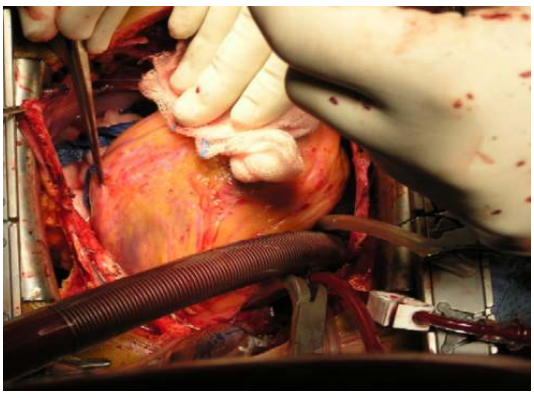
Objectives:
- Overview of cardiac diseases where surgery can play a role.
- Understanding the basic principles of cardiac surgery.
- Introduction of heart lung machine.
- Information regarding preoperative, operative and postoperative course in cardiac surgery.

Cardiac diseases:
- Coronary artery diseases (CAD).
- Valvular heart diseases.
- Congenital heart diseases.
- Miscellaneous:
  - Aortic diseases.
  - Pericardial diseases.
  - Trauma.

Coronary Artery Diseases (CAD)
- Chronic stable angina.
- Acute coronary syndrome.
  - Unstable angina
  - Myocardial infarction (MI).
- Congestive cardiac failure and ischemic cardiomyopathy.

Role of surgery in CAD:
- Coronary artery bypass grafting (CABG).
- Repair of VSD or mitral regurgitation resulting from an acute MI.
- Repair left ventricular aneurysm.
- Transmyocardial laser revascularization.
- Insertion of assist devices.
- Total artificial heart.
- Heart transplantation.





Valvular Heart Diseases

Etiology:

- Rheumatic fever, the most common cause.
- Congenital defects.
- Degenerative.
- Following an acute MI or trauma.
- Endocarditis.

Types:

- Regurgitation.
- Stenosis.
- Mixed
- Combination of more than one valve and type.

Role of surgery in valve diseases:

- Valve repair.
- Valve replacement.

Types of prosthetic valves and their merits and demerits:

- Tissue valves (bioprosthesis):
  - No need to use long term anticoagulation.
  - Limited and unpredictable durability.

- Mechanical valves:
  - Anticoagulation.
  - Prolonged durability.

Congenital Heart Diseases

- Cyanotic
  - Tetrology of Fallot, transposition of general arteries (TGA), single atrium, AV canal defects, truncus arteriosus, total anomalous pulmonary venous drainage (TAPVD), double outlet right ventricle (DORV), tricuspid atresia.
- Acynotic
  - ASD, VSD, coarctation of aorta, pulmonary stenosis, PDA, aortic stenosis, mitral stenosis.

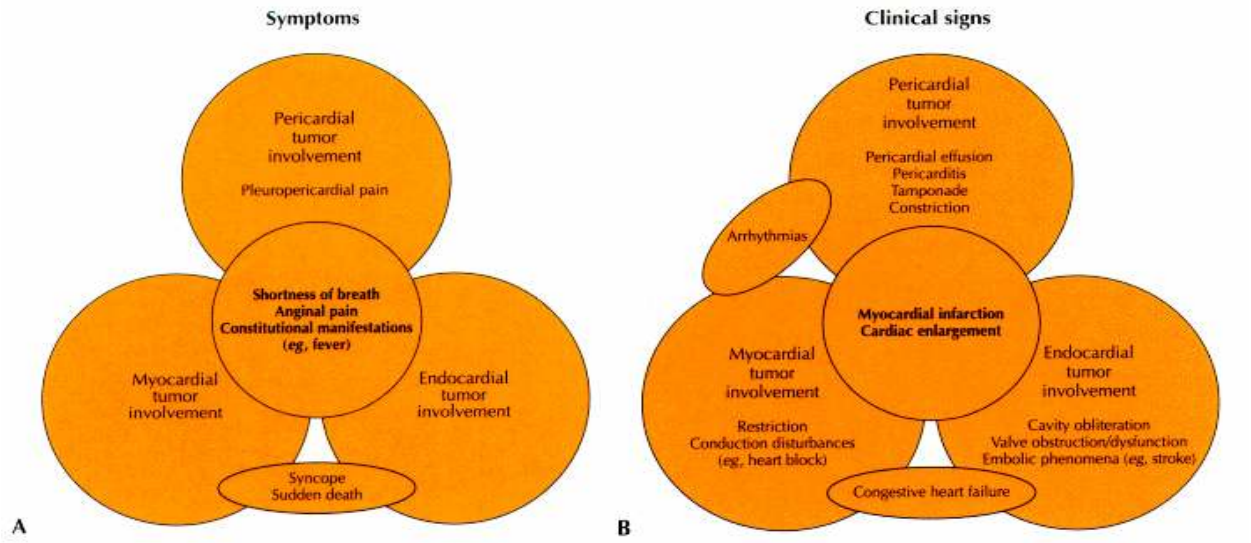
Role of surgery in congenital heart disease:

- Palliation to improve the general condition, e.g. shunt procedures.
- Curative repair, e.g. ASD or VSD repair, PDA closure, total correction of Fallot's tetrology, arterial switch operation.

Cardiac Tumors

- Myxoma, the most common, about 90% of tumors.
- Lipoma, 2%.
- Rhabdomyoma, 2%.
- Fibroma, 2%.
- Others, 4%.

Symptoms and signs:



Miscellaneous Operations for other Cardiac Problems

- Pericardiectomy for constrictive pericarditis.
- Surgery for aortic aneurysms and dissection.
- Surgery for cardiac trauma.
- Surgery for cardiac arrhythmias.

Basic Principles of Cardiac Surgery

A. Adequate exposure.
B. Bloodless operative field.
C. Static operative target.
D. Preservation of body perfusion.
E. Preservation of myocardium.

A. Exposure:

- Full or partial sternotomy.
- Thoracotmy:
  - Left or right.
  - Anterior, anterolateral, posterolateral or posterior.
- Robotic or endoscopic.

B. Bloodless field:

- Suction and retransfusion.
- Snaring of coronaries.
- Clamping.

C. Static target (we want to stop or limit the heart's movement to perform surgery):

- Cardiac arrest.
- Ventricular fibrillation.
- Mechanical stabilizers.

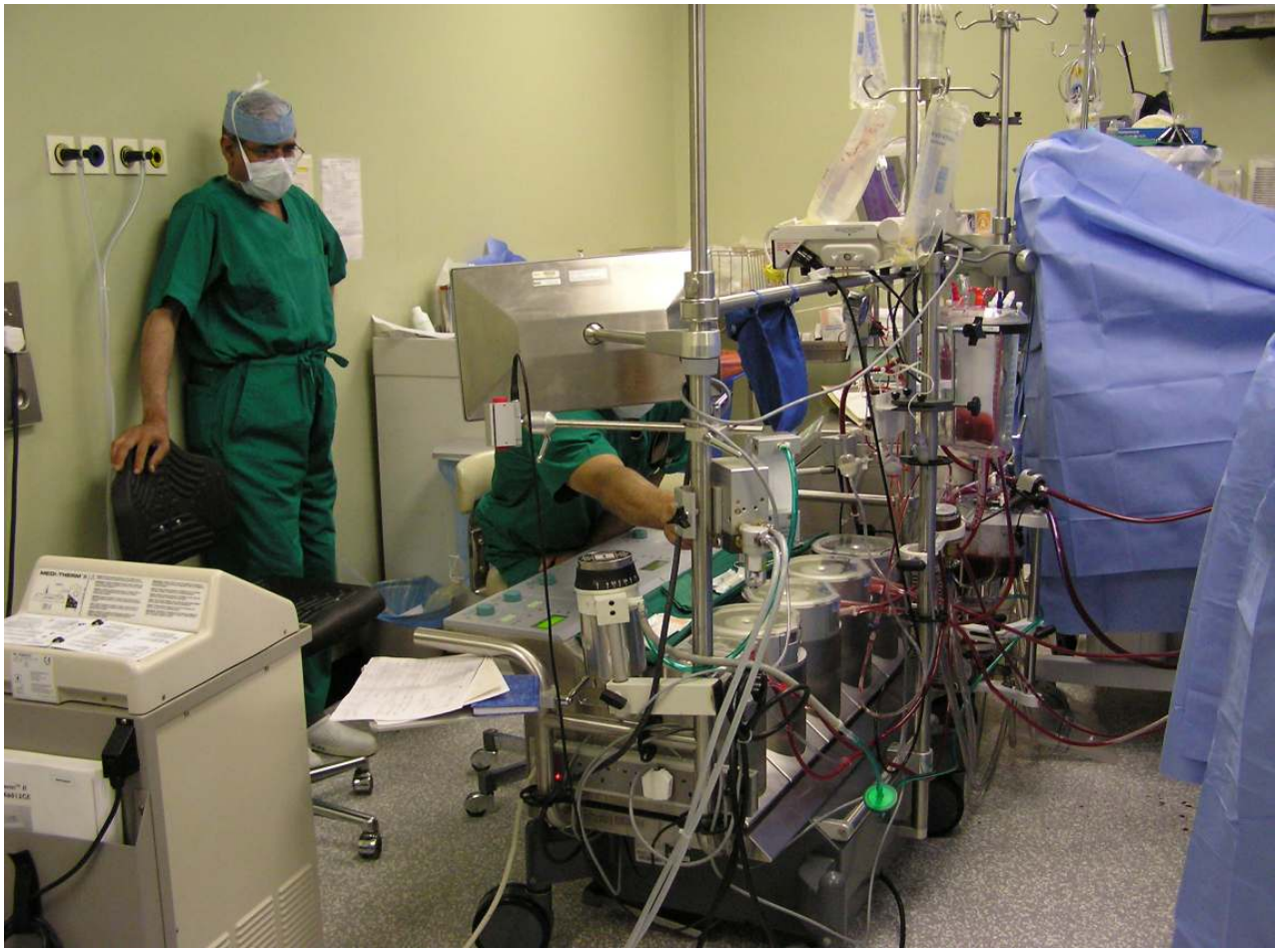
D. Body perfusion:

- Use of heart lung machine.
- Off-pump techniques.

E. Myocardial preservation:

- Off-pump techniques.
- Hypothermia.
- Cardiac arrest with cardioplegia.

Heart Lung Machine



Components:

- Roller pumps.
- Blood reservoir (cardiotomy reservoir).
- Oxygenator.
- Heater cooler unit.
- Tubing and monitoring console.

Limitations/problems:

- Requires full anticoagulation.
- Can cause microembolism
- May initiate systemic inflammatory response syndrome (SIRS).

Beating Heart Surgery (performing surgery while heart is beating)

- Less blood loss.
- Less incidence of stroke.
- Less incidence of pulmonary dysfunction.
- Shorter ICU and hospital stay.
- Comparable graft patency
- Less morbidity and mortality in elderly and high risk patients.

Preoperative Investigations for Cardiac Surgery

- Full blood count.
- Blood biochemistry.
- ECG.
- Chest x-ray.
- Echocardiography.
- Carotid duplex scan with or without peripheral duplex scan.
- Pulmonary function tests.
- Other tests according to systemic review of patient.

Usual Duration of Stay in the Hospital

- Total 5-7 days.
  - One day before surgery.
  - 3-6 hours OR time.
  - One day in the ICU.
  - 4-5 days in the ward.

Postoperative Complications

- Postoperative bleeding.
- Arrhythmia.
- Low cardiac output.
- Chest complications:
  - Atelectasis, very common.
  - Collapse.
  - Consolidation.
  - Effusion.
- Infections.
- Renal failure.
- Neuropsychiatric problems or stroke.
- Death.

Risk of Surgery

- Low risk, 0-3%:
  - Operations like CABG in a normal adult.
- Moderate risk, 3-10%:
  - Simple valve surgery or congenital surgery.
- High risk, 10-30%:
  - Redo operations or aortic surgery.
- Salvage procedure, more than 30%.

Example:

- **Results at KKUH:**
  - Total cases in 1426-1427 H 220
  - CABG 60%
  - Valve 10%
  - Miscellaneous 20%
  - Hospital stay 6 days
  - Total mortality 5.2 %
  - CABG mortality 2.7%

For extra reading
Lawrence's Essentials of Surgery Specialties
Chapter 6
251-271

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