INTRAOPERATIVE ECHO: WHEN TO GO BACK ON PUMP

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No Disclosures
Cardiopulmonary bypass is an artificial heart-lung machine which allows blood to be oxygenated and pumped to the body while the heart is stopped. It takes blood from the superior and the inferior venae cavae, it oxygenates it and expels it to the aorta using a roller system.
INTRAOPERATIVE ECHO

- Diagnosis
- Guide the surgical procedure
- Assess immediate results
- Detect complications
- Monitor left ventricular function

- aortic surgery
- hypertrophic cardiomyopathy
- off-pump bypass
- Maze procedure
- congenital heart disease
- etc.
Major Indications of IOTEE

• Valve surgery: repair, reconstruction, prosthetic function, necessity for operation
• Aortic surgery: dissection, aneurysm
• Endocarditis
• HOCM
• Revascularization-LV function, adequacy of revascularization, need for MV surgery
• VSD * Congenital heart disease
• General: assess cannulation site, aortic atherosclerosis, difficulty coming off pump
## Expected hemodynamic variables in the immediate post-operative period

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Expected value</th>
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</thead>
<tbody>
<tr>
<td>Mean arterial pressure (MAP)</td>
<td>60 - 90 mmHg</td>
</tr>
<tr>
<td>Systolic blood pressure (SBP)</td>
<td>90 - 140 mmHg</td>
</tr>
<tr>
<td>Right atrial pressure (RAP)</td>
<td>5 - 15 mmHg</td>
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<tr>
<td>Pulmonary artery wedge pressure (PAWP)</td>
<td>10 - 15 mmHg</td>
</tr>
<tr>
<td>Cardiac index (CI)</td>
<td>2.2 - 4.4 L/min/M2</td>
</tr>
<tr>
<td>Systemic vascular resistance (SVR)</td>
<td>1400 - 2800 dyn-s-cm5</td>
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Mechanical Complications

- spasm or occlusion of a coronary artery graft
- prosthetic valve paravalvular regurgitation
- Significant regurgitation post valve repair
- systolic anterior motion of the mitral valve with left ventricular outflow tract obstruction
- PHYSICAL INJURY TO CANNULATION SITES – aorta, vena cava, coronary sinus
Physiologic Complication

• Hypotension due to poor inotropy despite inotropic agents, optimized preload and controlled afterload

• intraoperative event or hibernating myocardium
  • inadequate myocardial protection during cross-clamping of the aorta
  • ischemic myocardial injury during off-pump operations
  • uncorrected valvular lesions
  • reduced or inadequate intraoperative coronary blood flow
  • cardiac tamponade
  • ischemia or infarction due to coronary artery air embolus
  • coronary graft vasospasm
SURGICAL MYECTOMY FOR HOCM

• IOTEE:
  • location of the maximal septal thickness
  • point of mitral-septal contact and distance from this point to the aortic valve
  • LVOT gradients (epicardial echo - better alignment with the LVOT flow)
HOCM: Successful Myectomy

• no mitral-septal contact
• Provoked gradients <50mmHg
• No significant mitral regurgitation

SECOND PUMP RUN
• 18% need a second pump run for a more extensive myectomy
• ventricular septal defects in cases of a too generous myectomy.
SURGERY FOR ASCENDING AORTA ANEURYSM/DISSECTION

• IOTEE: significant aortic regurgitation, anatomy and mechanism

• Mechanism of AR
  • Leaflet abnormalities
    • Restriction – rheumatic, calcific
    • Prolapse – bicuspid
    • Perforation - endocarditis

• Aortic root abnormalities
  • Annular dilatation – annulo-aortic ectasia
  • Aortic dissection
AORTIC VALVE REPAIR

• Aortic regurgitation after repair
AORTIC VALVE REPLACEMENT

• Paravalvular leak

• Leaflet dysfunction- AR
MITRAL VALVE REPLACEMENT

Mid esophageal commissural view

Paravalvular Leak (10 o’clock, anterolateral)

LA perspective
MITRAL VALVE REPLACEMENT – bioprosthesis with preserved posterior leaflet

LVOT OBSTRUCTION: STRUT-SEPTUM

Niyazi Guler, Texas Heart Inst J 2006; 33:399-401
AORTIC CANNULATION SITE

AORTIC DISSECTION
Manipulation-Related Aortic Injuries After Cardiac Surgery

New intimal tear at the aortic clamp site

Coronary Sinus Rupture Following Cannula Insertion for Retrograde Cardioplegia

• 15 cases/1500

• retrograde cannula with a self-inflatable balloon

• 12 patients were woman with low body mass index

• Forceful insertion due to coronary sinus web, fragility of arteries in thin patients, or a small coronary sinus caused CSR in the hands of an inexperienced surgeon.