



# ANESTHETIC MANAGEMENT OF PATIENT WITH HEART FAILURE

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## *INTRODUCTION*

- Globally >60 million people are estimated to have heart failure (HF), of which heart failure with preserved ejection fraction (HFpEF) accounts for 50% of cases.
- HF is a significant risk factor for peri op major adverse cardiac events & mortality independent of IHD.

# ***TYPES OF HEART FAILURE***

## **LEFT VENTRICLE FAILURE (LVF) :**

- Systolic dysfunction from impaired contractile or pump function : (HFrEF ).
- Diastolic dysfunction (DD) from impaired ventricular relaxation, compliance or filling (HFpEF)

## **RIGHT VENTRICLE FAILURE (RVF):** **most commonly from LHF** . Cor pulmonale : COPD

- **Acute heart failure** : develops suddenly , often triggered by : MI, Arrhythmias, myocarditis.
- **Chronic heart failure** : develops over time , chronic HTN, IHD. Relatively stable with no symptoms or manageable symptoms.

## *CAUSES OF HEART FAILURE*

- Coronary artery disease.
- • Cardiomyopathy.
- (congenital heart disease).
- • Diabetes.
- • (hypertension).
- • Arrhythmia
- • Kidney disease.
- • obesity.
- • Tobacco •
- Medications. (chemotherapy) can lead to heart failure

## ***RIGHT-SIDED HEART FAILURE***

- Right-sided heart failure is uncommon and is usually the result of left side of the heart.
- The right side of the heart receives oxygen-depleted blood after its completed trip throughout the body. The blood enters the right atrium and is pumped into the right ventricle, which pumps the blood to the lungs to pick up more oxygen. The newly oxygen-rich blood is then sent out to the body again by the left side of the heart.

### • ***Right-sided Heart Failure Symptoms***

- fatigue, shortness of breath and persistent swelling.
- Right-sided heart failure involves an inability to move along blood returning to the heart, so symptoms of fluid retention may be more prominent. **These include**
  - • Enlarged liver
  - • Fluid buildup in the abdomen
  - • Loss of appetite with abdominal pain

## ***LEFT-SIDED HEART FAILURE***

- **the most common type of heart failure**, happens when the left ventricle isn't moving enough blood out to the body. If the left ventricle is having trouble filling with blood between beats, it's called diastolic heart failure. When the left ventricle can't pump blood out as well as it should, it's called systolic heart failure.
- *The symptoms of left-sided heart failure are the generally the*
  - • Shortness of breath
  - • Difficulty breathing when lying down
  - • Weight gain with swelling in the feet, legs, ankles
  - • Fluid collection in the abdomen
  - • Fatigue or a general feeling of weakness

# ***HOW DO WE PROCEED WITH THE PRE OP EVALUATION ??***

- Hx stable or unstable HF, recent PCI / CABG, DM, HTN, smoking, obesity,
- Signs & symptoms of HF : dyspnea, palpitations, limb edema.
- Extent of medical management .
- Risk of Surgery (low, moderate, high RISK )
- Timing of surgery (elective vs urgent/emergent),
- Patients with asymptomatic LV dysfunction (HFpEF) may be at risk for HF at times during surgery.

## ***INVESTIGATIONS***

- **Routine Blood Investigations** : special focus on Renal function tests & Sr.Electrolytes, coagulation parameters.
- **ECG**– Arrhythmias , LVH, BBB, Ischemic changes.
- **Chest X RAY** : suspected pulmonary edema
- **Transthoracic echocardiogram (TTE)** :
  - LV /RV volumes & dimensions, LV / RV EF, Valve abnormalities, Cardiomyopathies , Pericardial effusion.
- **Stress ECHO / ECG** : pharmacologic - dobutamine .

## DECISION TO PROCEED WITH SURGERY ??

- The urgency of surgery (emergency/ urgent/ elective) vs PATIENT STABILITY vs Risks specific to the surgery
- **The ACC/AHA guidelines :**
  - Decompensated or Untreated heart failure: (major risk predictor) : Where possible, surgery should be postponed for ATLEAST 3 MONTHS - for optimization, modification of risk factors, and further investigations
  - Compensated heart failure: ( intermediate clinical risk predictor)
  - Low-risk surgical procedures can safely continue.
  - Emergency surgery :
    - In Symptomatic HF : Options for preop assessment & management are limited
    - Clinical risk assessment is closely followed by decision-making with the patient & family regarding whether to proceed with surgery
    - , use of invasive hemodynamic monitoring & intensive postop monitoring

# ***PERIOPERATIVE MANAGEMENT OF HF MEDICATIONS***

- ACEI / ARBs: skip the morning dose.
- Severe hypotension
- Hypotensive spells may resist first-line sympathomimetics drugs such as norepinephrine
- Acute renal failure: specially in hypovolemic patients . Regular monitoring of renal function is recommended.
- Beta-blockers: continue therapy.
- Diuretics : continue therapy
- Close attention to perioperative fluid and electrolyte balance is essential .
- Anticoagulants: stop according to standard recommendations.

# ***ANESTHETIC MANAGEMENT***

- Providing anesthesia to HF patients remains a challenge .
- Assess the severity of HF & functional status of Patient
- Multidisciplinary approach : between anaesthesiologist , cardiologist & surgeons to ensure optimal patient care .

## **ANESTHETIC GOALS :**

- Control of HR and rhythm
- Maintain preload , Avoid increase afterload
- Avoid myocardial depression
- Prevent hypotension
- Fluid replacement & diuretics

# ***CHOICE OF ANESTHESIA***

- **Peripheral nerve blocks / Plane blocks** : least hemodynamic changes . Consider wherever possible
- **Regional Anesthesia**: modified to avoid inducing hypotension
- **Slowly titrated epidural**, especially for patients susceptible to hypotension ( recently decompensated HF).
- One must be aware of hypotension caused by sympathetic blockade-induced vasodilation & decreased preload, exaggerated in patients on ACEI, and ARBs.
- Rx:
  - Always titrated volume administration in increments of 250 ml may help restore BP:
  - Avoid fluid overload as It can ppt. pulmonary oedema in borderline HF patients.
  - Administration of alpha 1 rec agonists ( pheylephrenin)

## IV INDUCTION AGENTS

- Intra venous agents are vaso dilators
- Etomidate provides hemodynamic stability
- Ketamine is induction agent of choice in pts with
  - decreased blood volume
  - cardiac tamponade
  - congenital cyanotic heart disease

- Induction with BZD provide cardiac stability
  - induction dose – 0.2-0.5mg/kg
  - has NTG like effect
  - preserve CBF & CI
- Opioids are induction agent of choice in pts with moderate LV dysfunction {75-100 µgms/kg}
  - lack of cardio vascular depression
  - prevent endocrine & metabolic changes{stress response}
  - reversibility with naloxone

# MUSCLE RELAXANTS

- **NON DEPOLARISING MUSCLE RELAXANTS**

- Atracurium causes histamine release → hypotension
- Pancuronium can be used along with opioid induction to prevent bradycardia
- Vecuronium is cardio-stable
- Rocuronium is suitable alternative for rapid sequence induction

- **DEPOLARISING MUSCLE RELAXANTS**

- May precipitate cardiac arrhythmias d/t generalised autonomic stimulation
- succinyl choline - 1 mg/kg → 0.5 meq/L rise in K<sup>+</sup>

# INHALATIONAL ANESTHETICS

- CAUSES GREATER DEPRESSANT EFFECT IN ABNORMAL THAN NORMAL MYOCARDIUM
  - Decreases myocardial contractility
  - Causes diastolic dysfunction
  - Attenuation of baro-reflex
  - arrhythmogenic
  - Decrease systemic vascular resistance
- INHALATIONAL AGENTS ARE CARDIO-PROTECTIVE
  - Coronary vasodilators
  - Reduce myocardial metabolic demands
  - Protective against reperfusion injury through activation of K-ATP channels
  - Enhance recovery of 'stunned myocardium'

## Postoperative care

- All patients should receive supplemental oxygen in the postoperative period.
- Careful fluid balance is also required. Patients with heart failure are susceptible to renal failure due to reduced glomerular filtration rates. If urine output falls, adequate volume status, perfusion pressure and cardiac output should be ensured before diuretics are used.
- NSAIDs should be avoided or used with great caution to avoid further renal insult.
- ACE inhibitors should be reintroduced as soon as possible. If omitted for more than 3 days they should be restarted at a lower dose to avoid hypotension.
- There should be a low threshold for admission to ICU or HDU.

Any questions?

*Thank  
You*