Perioperative Management of the Mechanical Circulatory Support Patient

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Disclosures

• None
Objectives

• Review the perioperative process of MCS therapy.

• Articulate assessment findings specific to the MCS patient.

• Identify common postoperative complications of the MCS patient.

• Outline treatment strategies for these postoperative and outpatient issues.

• Analyze current research and data pertaining to MCS.
Perioperative Management

- Preoperative Evaluation
- Intraoperative Considerations
- Postoperative Management
- Transition to Outpatient Care
Preoperative Evaluation: Guidelines for Implantation

• Anticipated survival benefit
• NYHA Class IV heart failure symptoms
• CMS patient selection and coverage criteria:
  • Failure to respond to optimal medical management (45 of 60 days) or IABP dependent (7 days) or IV inotrope dependent (14 days)
  • Left ventricular ejection fraction of less than 25%
  • Peak oxygen consumption of <14 ml/kg/min
Preoperative Evaluation: Evaluation for Candidacy

- Review of comorbidities
  - Past medical and surgical history
  - Pre-existing conditions

- Extensive evaluation
  - Laboratory assessment
  - Imaging

- Multidisciplinary approach
  - Palliative Medicine and Chaplain services
  - Social Services
  - Physical Medicine and Rehabilitation
Optimization

• Assists with decreasing adverse events
• Hospitalization
• Optimization of:
  • Right heart function
  • Volume status
  • Organ function
  • Nutrition
Operative Considerations

• Medications
  • Antiplatelet agents
  • Beta blocker
  • PPI

• Antibiotics
  • Mupirocin
  • Broad spectrum
Postoperative Management: Patient Assessment

- Non-pulsatile, continuous flow
- Device has an oscillating sound
- Typically:
  - No palpable pulse
  - Blood pressure monitoring
  - Heart tones are distant, but can be heard
  - Hands and feet should be warm

- Hemodynamic Monitoring:
  - Heart rate manipulation through pacing
  - CI greater than 2.2
  - MAP 70-90 mmHg
  - CVP 10-15 mmHg
Postoperative Management: Pharmacologic Concerns

• Antibiotic regimen
  • Initiated preoperatively and continued for 48 hours
  • Endocarditis Prophylaxis

• Gastric Prophylaxis

• Diuresis

• Anemia management

• Heart Failure Regimen
Postoperative Management:
Anticoagulation

- Heparin
  - May use until INR is therapeutic
  - Initiate when chest tube output decreases
- Aspirin
- Warfarin
  - Initial INR goal 2-3
  - Adjustment based on clinical picture
Postoperative Management: Nonpharmacologic Therapy

- Nutrition
  - Tight glucose control
  - Early initiation of feeding

- Rehabilitation

- Site care
  - Stabilization of the driveline
  - Daily (for at least the first three months)
  - Showering
Case #1

• 67 yo M, ischemic cardiomyopathy
• HMII VAD as DT
• Medication regimen: diuretic therapy
• MAPs over last 24 hours 98-110 mmHg
• VAD: low flow, high PI
Postoperative Complication: Hypertension

- Monitor blood pressure using manual cuff with Doppler
  - Automatic cuff pressures are not as accurate due to continuous flow
  - Mean goal 70-90 mmHg
- Treatment:
  - Hydralazine
  - ACE
    - If creatinine and potassium stable
  - Beta-blocker
    - Watch if RV function is marginal
Case #2

- 56 yo F dilated cardiomyopathy
- HW VAD as BTT
- Symptoms: edema, JVD, MAPs 60s, poor kidney function
- VAD: low flow
Postoperative Complication: Right Ventricular Failure

• Optimize before surgery

• Findings:
  • CVP >20 mmHg
  • Adequate speed, low flow

• Treatment
  • Maintain adequate oxygenation
  • Inotropic support
  • Nitric oxide
  • Phosphodiesterase-5 inhibitors
  • RV support
Case #3

- 35 yo F, postpartum cardiomyopathy
- HMII VAD as DT
- Speed set at 9200 rpms, frequently drops to 8400 rpms
Postoperative Complication: Suction Event

- Device will sense a drop in flow or PI
  - Likely due to dehydration, speed increase, RV dysfunction
- Speed decreases to prevent suction
- Can cause VT
- Treatment:
  - Low CVP: volume repletion
  - High CVP: consider RV dysfunction
  - ECHO to rule out need for speed change
Case #4

- 62 yo M, ischemic cardiomyopathy
- HMII VAD as BTT
- Inpatient rehabilitation
- Symptoms: fatigue, weakness, unable to participate in therapy, nausea
Postoperative Complication: Arrhythmias

- Symptoms: fatigue, weakness, flu-like symptoms
  - AICD therapies are turned back on when stable
- Assessment:
  - Pump parameter changes: decrease in PI, low flow
  - EKG
  - ECHO
  - Standard labs (CBC, K, Mg)
  - Consider suction event
- Treatment:
  - Optimization of electrolytes
  - Amiodarone
  - Defibrillation/Cardioversion: equipment connected
  - Beta-Blocker Therapy
CPR

- CPR can occur, however, pump dislodgement may result, especially if less than 6 months post-implant.
- If no flow and unable to hear sound of pump, start CPR per ACLS guidelines.
- If able to hear pump, do not do chest compressions.
VAD Emergency Response

***Pulseless patient in VF or VT can still be alert and have good cardiac output with functioning VAD***

- Assess Responsiveness
  - Responsive
    - Support Patient
      - Pulseless patient can still be alert with VAD
        - Contact 24° VAD Service ASAP @ 127-13488
  - Unresponsive
    - Auscultate for whirr of VAD
      - VAD Running
        - Initiate ACLS except NO Compressions
      - VAD NOT Running
        - Initiate ACLS with Chest Compressions
Postoperative Management: Hospital Stay

- Average length of stay is 23 days
- All patients are referred to Rehab
  - 60% of patients will transfer to the Rehabilitation Unit prior to discharge
- Patient and family receives in depth education on the device care, maintenance, alarms, drive line care, and follow-up requirements prior to discharge
  - Complete two independent excursions
  - Community preparation
Outpatient Management: Follow-up

- Encouraged to have a follow-up visit with primary care in one week of return home
- Coumadin management is transitioned to a local Coumadin Clinic or the primary care provider
- Cardiac Rehabilitation
- Follow-up within one month of return home per outpatient visit protocol
  - Visits include:
    - Labs, Chest x-ray, EKG, ECHO, ICD interrogation, VAD interrogation, right heart catheterization, six minute walk or oxygen consumption treadmill test
    - Visit with Cardiology and VAD Coordinator
Activity and Lifestyle Restrictions

• Lifting restrictions:
  • No lifting over 10 pounds the first 8 weeks
  • No more than 20 pounds weeks 8-12
  • 50 pound limit for LIFE

• Cardiac Rehab is recommended, referral completed prior to Rehab Admission

• Driving: No driving for 6-8 weeks after surgery

• No laying on abdomen

• No contact sports or jumping

• No swimming or submersion

• No MRI or magnetic scanners at airport

• Sternal precautions
References


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