Cardiomyopathy, Alcoholic

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Risk

- Incidence in USA: 15–20 million chronic heavy ethanol users.
- As much as 50% of dilated cardiomyopathy may be ethanol-related.
- Population at risk: Unclear; likely includes chronic ethanol users with at least 90 g of daily ETOH for at least 5 y (1 standard drink =12 g ETOH).
- Gender: Male predominance.

Perioperative Risks

- Alcohol withdrawal
- CHF
- Dysrhythmias common: AFIB, PAC, PVC
- Hypomagnesemia and hypokalemia common

Worry About

- Myocardial ischemia: Supply < demand (CAD rare).
- Abnormal systolic and diastolic function.
- Chronic alcohol use alters myocardial response to inotropes, especially epinephrine.
- Alcohol withdrawal symptoms.

Overview

- Insidious onset; Sx uncommon unless severely stressed until late in course.
- Dilated cardiomyopathy: Ventricular hypertrophy early, chamber dilation later.
- Low-output cardiac failure (as compared with high-output failure in cirrhosis and beriberi).
- Malnutrition often coexists.

Etiology

- Direct myocardial damage by ethanol and its metabolites
- Progressive chamber dilation and ventricular hypertrophy; microscopic fibrinoid deposition
- Possible intracellular calcium dysregulation
- Possible muscle excitation-contraction impairment

Usual Treatment

- Abstinence: Ventricular function improves markedly after abstinence.
- Pharmacologic management: Digitalis, diuretics, beta-blockers, and ACE inhibitors.
- Address nutritional deficits, thiamine, folate, and multivitamins.

Assessment Points

System	Effect	Assessment by Hx	PE	Test
HEENT	Plethora, reflux, esophageal varices, friable mucosa	Reflux Sx Hematemesis	Spider angiomata	Endoscopy
CV	LV dysfunction CHF Myocardial ischemia Dysrhythmia	Fatigue, orthopnea PND Rare angina Palpitations	Narrow pulse pressure Cardiomegaly S_3, S_4, murmur JVD, peripheral edema	ECG ECHO Stress testing
RESP	Pulm edema	Dyspnea Cough	Rales	CXR
GI	Hepatic congestion	Poor appetite, distention	Hepatomegaly	PT, albumin, LFTs
HEME	Coagulopathy, Anemia	Abnormal bleeding	Pallor ecchymosis	CBC, PT/PTT, plt
RENAL	Decreased renal perfusion	Oliguria		Cr, FEN_a
CNS	Poor perfusion Cerebral atrophy	Confusion	Abn mental status	
MS	Proximal muscle weakness Peripheral neuropathy		Proximal limb weakness and muscle atrophy	

Key References: George A, Figueredo VM: Alcoholic cardiomyopathy: a review, *J Card Fail* 17(10):844–849, 2011; Fox CJ, Liu H, Kaye AD: The anesthetic implications of alcoholism, *Int Anesthesiol Clin* 49(1):49–65, 2011.

Perioperative Implications

Preoperative Preparation

- Pharmacologic management of CHF.
- Correct electrolytes.
- Consider neuraxial anesthesia, if appropriate, to reduce afterload.

Monitoring

- ECG with ST-segment analysis.
- Consider arterial pressure cath, pulm artery cath, TEE depending on surgery, and ventricular function.

Airway

- NG tube placement risky in presence of varices

Preinduction/Induction

- Pt may have intravascular volume depletion.

Maintenance

- Avoid tachycardia and increased sympathetic activity.
- Avoid depression of myocardial contractility.
- Prevent increases in afterload to maintain cardiac output.

Extubation

- Routine

Postoperative Period

- Consider monitoring in critical care unit.
- Observe for ethanol withdrawal.
- Effective pain management avoids increases in SVR and heart rate.

Adjuvants

- Multivitamins, thiamine, B_{12}, and folate.
- Consider benzodiazepines, α_2 agonists for prophylaxis against withdrawal symptoms.
- Volume of distribution may be increased; consider adjusting drug dosages.

Anticipated Problems/Concerns

- Postop ventricular dysfunction and CHF can occur.
- Alcohol withdrawal symptoms can develop.

Cardiomyopathy, Dilated

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Risk

- Accounts for approximately ~10,000 deaths and ~46,000 hospitalizations per year in USA; idiopathic DCM is one of the primary indications for cardiac transplantation.
- Often ages ~20–60 y old but can affect older and younger pts as well.
- African-Americans > Caucasians; males > females

Perioperative Risks

- CHF and dysrhythmias and hemodynamic instability.
- Morbidity and mortality directly related to severity of cardiomyopathy and complexity of surgery.

Worry About

- Compromised myocardial function and hemodynamic instability.
- Management strategies periop include pharmacologic and mechanical support options.
- Dysrhythmias and management of CRT/ICD devices..
- Meticulous assessment and management of periop volume status.

Overview

- DCM is characterized by myocyte death and fibrosis, leading to impaired myocardial contraction, chamber dilatation, and LV and/or RV failure.
- Dilation and diminished systolic function (EF <40%) lead to heart failure, often manifesting initially with dysrhythmias or sudden cardiac death.
- Presentation and clinical course varies tremendously, but pts are commonly found to have symptoms of heart failure with diminished exercise tolerance and dyspnea, orthopnea, and PND.

- Discovery of cardiomegaly on physical exam or CXR or ECHO may also lead to the diagnosis or may present with dysrhythmias, conduction delays, or sudden death.
- Sx are often gradual in onset and initially underappreciated until cardiac function is notably compromised, although it may present more acutely depending on etiology.
- The clinical course is variable from gradual deterioration to rapid decline.
- Diagnostic evaluation begins with a thorough history and physical exam and progresses to include lab testing and ECG, ECHO, coronary angiography, and endomyocardial biopsy.
- Assessment of myocardial function and reserve are important in guiding periop management.

Etiology

- 50% of cases are idiopathic, ~9% myocarditis, and ~7% ischemic; others include infiltrative, peripartum, Htn, HIV, connective tissue disease, toxins including substance abuse, ETOH, doxorubicin, endocrinopathies, genetic diseases, and multiple others, although in lesser frequency. Interestingly, genetic abnormalities are being increasingly recognized.

Usual Treatments

- The molecular complexity of DCM affords limited focused disease-modifying interventions or therapies.
- Nevertheless, attempt to identify and address remediable causes (e.g., ETOH and other toxins or exposures, ischemia).
- Treat any associated comorbidities that may be contributing to clinical decline (e.g., ischemia, Htn, anemia, toxins, DM, deconditioning, obesity).
- Standard appropriate therapies for heart failure should already be established and have been initiated and optimized preoperatively, including ACE inhibitors or ARBs, beta-blockers, diuretics, aldosterone antagonists, and so forth.

Assessment Points

System	Effect	Assessment by Hx	PE	Test
CV	Depressed myocardial function Dysrhythmias CHF	Fatigue, decreased exercise capacity DOE, PND Orthopnea	Cardiomegaly, elevated JVP, S_3, abdominojugular reflex, peripheral edema, pulsus alternans	ECHO, ECG, CXR Stress test, cardiac cath
RESP	Pulmonary congestion and edema	Dyspnea Cough	Rales and pulmonary congestion, diminished breath sounds, Cheyne-Stokes breathing	PFTs, CXR, ABGs
GI	Visceral engorgement Hepatic congestion Coagulopathy	Weight loss, bloating, fullness, easy bruisability	Ascites, hepatic congestion	Liver enzymes, liver synthetic function (albumin, PT/INR, LFTs)
RENAL	Decreased renal perfusion	Changes in urinary frequency, oliguria	Peripheral edema	BUN/Cr, Na+/K+
CNS/PNS	Diminished perfusion	Cool extremities and confusion	Mental status assessment	Consider carotid US, head CT

Key References: Jefferies JL, Towbin JA: Dilated cardiomyopathy, *Lancet* 375(9716):752–762, 2010; Mann, Zipes DP, Libby P, Bonow RO: DL: *Braunwald's heart disease: a textbook of cardiovascular medicine,* ed 10. Philadelphia, PA, 2015, Elsevier.

Perioperative Implications

Preoperative Preparation

- Determine stability of Sx and whether heart failure is appropriately optimized and compensated.
- NYHA classification and functional assessment helpful to assist in guiding periop management planning and strategy.
- Optimization of heart failure therapy and volume status; consider preop admission to facilitate.
- Continue pharmacologic regimen, especially maintenance therapies and inotropes.
- CRT/ICD devices should be interrogated, and perioperative management strategies understood and coordinated among services (i.e., cardiology, ICU, anesthesiology, and surgical teams).
- Considerations for invasive monitoring, inotropic support, possible postop ICU management, and ventilator support.

Monitoring

- Routine standard ASA monitors
- Considerations for invasive monitoring (arterial line, CVP and/or PA cath) and intraoperative TEE dictated by myocardial reserve
- Focus on early recognition and treatment of anticipated hemodynamic instability
- TEE and/or PAC for assessment of continuous volume and myocardial function

Airway

- Routine

Preinduction/Induction

- Anticipate diminished myocardial performance and reserve and hence intolerance of myocardial depressant effects and vasodilatory effects of medications/anesthetics at time of induction and anesthetic maintenance.
- Periop volume status and fluid management are paramount.
- Attempt to minimize myocardial depressants and maintain physiologic baseline filling pressures (i.e., afterload and preload status; assumes pt hemodynamically optimized preop).

Maintenance

- Minimize myocardial depressants and optimize fluid management with vigilant surveillance of volume status.
- Narcotic-based anesthetic to minimize myocardial depression of potent inhalational agents.
- Optimize myocardial contractility and afterload reduction, PVR, and preload.
- Caution regarding RV failure and precipitants of elevated PVR (e.g., hypoxia, hypercarbia, acidosis, catecholamines).

Adjuvants

- Consider neuraxial or regional anesthetic techniques.
- Immediate availability of therapeutic options for treatment of pulm Htn (e.g., consider iNO, prostacyclin, or nebulized iloprost).
- Inotropes for LV and RV support, vasoconstrictors, and vasodilators; often includes combinations of dobutamine, epinephrine, milrinone, amrinone, norepinephrine, and/or vasopressin, as indicated by hemodynamic status.
- Periop pharmacologic inotropic support often includes combinations of dobutamine, epinephrine, milrinone, amrinone, norepinephrine, and/or vasopressin, as indicated by hemodynamic status.
- Depending on the procedure and the clinical status and degree of myocardial decompensation, patient may require periop mechanical support (e.g., IABP, impella, VAD).

Extubation

- Routine with the caveat that potential for periop hemodynamic instability must be considered in decision making for timing of extubation.
- Cautiously manage emergence hemodynamics.
- May be delayed given cardiopulmonary insufficiency.

Postoperative Period

- Possible ICU management, including ongoing ventilator and hemodynamic support particularly for large volume shifts, complex procedures, and/or preop decompensation
- Meticulous ongoing volume assessment and management

Anticipated Problems/Concerns

- Diminished physiologic reserve, CHF, dysrhythmias, and hemodynamic instability; RV and LV failure and pulm Htn