Etiology

- In developed countries, idiopathic or viral infections are the most common cause of CP, followed by cardiac surgery and mediastinal irradiation.
- Bacterial infectious causes (e.g., TB, staphylococci, group A and B streptococci, and gram-negative rods) are more common in underdeveloped countries.
- Less common causes are uremia, connective tissue disorders, and drug reactions.
- Idiopathic, neoplastic, postirradiation or uremic CP accounts for most cases of CP that require surgery.

Usual Treatment

- In advanced stages, the standard treatment is pericardiectomy. Both median sternotomy and left thoracotomy approaches are used.
- Pericardiectomy has been associated with relatively high early mortality/morbidity and low long-term survival. Predictors of poor prognosis include DM and high transmitral early diastolic velocity, which may reflect high left atrial pressure resulting from severe pericardial constriction.

Assessment Points

System	Effect	Assessment by Hx	PE	Test
HEENT	Lymphadenopathy if the CP is caused by viral or bacterial infection, cyanosis	Hx of fever, chills, upper resp tract infections	Enlarged cervical lymph nodes, jugular venous distention	Blood and sputum cultures, immunologic assays for viral infections
RESP	Pulm edema if heart failure develops	Dyspnea, dry cough	Tachypnea, rales on auscultation	CXR, ABG analysis
CV	Right and left heart failure, arrhythmia, hypotension	Dyspnea, orthopnea, chest pain, peripheral edema, fatigue, palpitations, and hepatomegaly	Tachycardia, muffled and distant heart sounds, friction rub, apical pulse not palpable	MRI and CT scans ECG, low voltage and ectopic AT. Increased CVP (W shape). Cath showing "square root sign," increased ratio of RV to LV systolic area on inspiration versus expiration Doppler ECHO: Restrictive LV diastolic filling, E/A >0.8, ventricular septal motion abnormality with respiration, mitral medial e′ > 8, annulus reversus, hepatic vein expiratory end-diastolic reversal velocity/forward flow velocity >0.8
MS	Muscle atrophy, myositis if there is an underlying connective tissue disorder	Significant weight loss and muscle wasting	Clinical evidence of weakness	CPK to rule out myositis; specific tests if connective tissue disorder is suspected

Key References: Schwefer M, Aschenbach R, Heidemann J, et al.: Constrictive pericarditis, still a diagnostic challenge: comprehensive review of clinical management, *Eur J Cardiothorac Surg* 36(3):502–510, 2009; Welch T, Oh J: Constrictive pericarditis: old disease, new approaches, *Curr Cardiol Rep* 17(20):1–7, 2015.

Perioperative Implications

Preoperative Preparation

- Cardiac medications including antidysrhythmics should be continued.
- Minimize bradycardia and myocardial depression and minimize decreases in afterload and preload.

Monitoring

- Have invasive monitoring available, including arterial line and monitoring for CVP. A PA cath is recommended because of occurrence of low CO syndrome after surgery.
- Intraop TEE is of significant help.

Maintenance

- Conducted under GA.
- Narcotic-based technique is preferred.
- Intraop hemodynamic goals are adequate preload, maintenance of sinus rhythm, and rate control if sinus rhythm cannot be maintained.

Adjuvants

- Inotropic support is indicated if there is evidence of ventricular dysfunction.
- Because of limited ventricular diastolic filling, CO is rate-dependent. Consider pacing to improve CO.
- Most pericardiectomies are done without the need for CPB, but CPB should be on standby.

Anticipated Problems/Concerns

- MI, major intraop hemorrhage due to myocardial perforation, atrial and ventricular arrhythmias, and worsening of heart failure.

Peripheral Vascular Disease

Elizabeth A. Valentine

Risk

- Prevalence of PVD is 3–20%; and increases with age.
- Risk factors: Nonwhite race, male gender, older age, smoking, DM, Htn, hyperlipidemia, and CRI.
- Risk of MACE approximately 5–7% per year; correlates with the severity of PVD.

Perioperative Risks

- Prevalence of concomitant CAD or CVD is in the range of 40–60%.
- Vascular surgery associated with greater cardiac morbidity (periop MI in 4–15%) and mortality (>50% of periop deaths) than other, noncardiac surgery.

Worry About

- Increase in afterload from cross-clamping on major vasculature may precipitate myocardial ischemia or ventricular failure.
- Release of cross-clamp and revascularization of ischemic extremity may result in profound hypotension.
- Risk for hemorrhage from major vasculature.
- Increased risk of MACE in the periop period.

Overview

- Imbalance between oxygen supply and demand results in tissue ischemia.
- Symptoms range from intermittent claudication to rest pain to tissue loss.
- Critical limb ischemia (CLI) manifests when arterial blood flow is insufficient to meet basal metabolic demands of resting tissue.

Etiology

- Atherosclerosis is the most common etiology of PVD.
- Less commonly: Arteritis (Takayasu, giant cell, thromboangiitis obliterans, or polyarteritis nodosa), thromboembolic disease, fibromuscular dysplasia, aneurysmal thrombosis, vascular tumor, prior trauma/irradiation, popliteal entrapment, popliteal artery cyst, pseudoxanthoma elasticum.

Usual Treatment

- Aggressive medical management of risk factors and lifestyle/exercise programs generally prevent progression of disease (remains stable in 70–80% of pts, worsens in 10–20%, and progresses to CLI in 1–2%).
- Decision for surgery for intermittent claudication is based on individualized assessment of risks/benefits of procedure, success of medical/lifestyle interventions, and overall impact on quality of life.
- CLI associated with a higher risk of limb loss without revascularization and nearly always warrants surgical intervention.
- Surgical options include open or endovascular repair.
- No differences in short- or long-term mortality between open and endovascular techniques.
- Lower perioperative morbidity with endovascular repair at the expense of a higher rate of reintervention in the long term.

Assessment Points

System	Effect	Assessment by Hx	PE	Test
CARDIO	Htn	Usually asymptomatic; may have signs of urgency/emergency	Normal if treated S_4 if longstanding Htn/ LVH	Baseline vital signs ECG TTE Exercise or pharmacologic stress test Radionuclide studies
	CAD	Angina or equivalent, may be asymptomatic	May detect new murmur or signs and Sx of heart failure	Coronary angiography
	CHF	Exercise intolerance Sx of heart failure	S_3, JVD, rales, hepatomegaly	
VASC	Occlusive lesions	Claudication	Cool, mottled extremities Ulcer or gangrene Decreased pulses	ABI Peripheral angiography Abdominal US/CTA/MRA
	May have concomitant AAA	Abd pain, may be asymptomatic	Pulsatile abdominal mass	
RESP	Concurrent tobacco abuse May have COPD	DOE Chronic cough Home O_2/inhaler requirement	Decreased breath sounds Prolonged expiration Wheezes Focal rales may indicate superinfection	CXR ABG PFTs
RENAL	CRI	Need for HD/PD	Edema	BUN/Cr Baseline lytes
ENDO	DM and assoc effects such as peripheral and autonomic neuropathy, nephropathy	Attention to CV, PNS for ANS and other evaluation	Obesity (in DM type II) Retinopathy Cardiomegaly Foot ulcers	Fasting blood sugar (acute control) HgbA1C (long-term control)
CNS	Cerebrovascular disease	Stroke/TIA symptoms Scotoma	CNS exam Search for carotid bruits	CT/MRI brain Doppler or angio (if indicated)

Key References: Norgren L, Hiatt WR, Dormandy JA, et al.: Inter-society consensus for the management of peripheral arterial disease (TASC II), *J Vasc Surg* 45(Suppl S):S5–S67, 2007; Anton JM, McHenry ML: Perioperative management of lower extremity revascularization, *Anesthesiol Clin* 32(3):661–676, 2014.

Perioperative Implications

Preoperative Preparation

- Aggressive management of medical comorbidities
- Continue ASA, beta-blocker, ACE-I, and statin periop. Maintain normoglycemia and encourage smoking cessation.
- Clinical symptomatology may make functional status difficult to ascertain. Consider preop stress test for pts with poor or unknown functional status.

Monitoring

- ST-segment analysis for myocardial ischemia.
- Consider invasive arterial pressure monitoring, particularly for open procedures.
- Central pressure monitoring rarely indicated.

Airway

- Open procedures successfully performed with GA (ETT vs. LMA), neuroaxial anesthesia, or RA.
- Endovascular procedures typically performed under MAC with a natural airway.

Preinduction/Induction

- Tachycardia increases myocardial oxygen demand and decreases myocardial oxygen supply (less time in diastole)
- Htn increases LV stress; hypotension risks decreased perfusion of likely hypertrophied LV.

Maintenance

- No significant outcomes or differences between anesthetic techniques, even for pts with more severe disease or CLI.
- Neuroaxial techniques may increase vascular blood flow, improve graft patency rates, and decrease need for reintervention.
- Endovascular repairs typically performed under light sedation to allow for pt cooperation.

Extubation

- Sympathetic stimulation and resultant hypertension/tachycardia are to be avoided.

Adjuvants

- Neuroaxial catheters can be used for adjuvant pain control and may have benefits for graft patency. Risk/benefit of neuroaxial anesthesia must be weighed against need for periop anticoagulation.

Anticipated Problems/Concerns

- Periop complications include graft occlusion, MACE, hemorrhage, postoperative delirium, and pulm, renal, and wound complications.

Pertussis (Whooping Cough)

Luiz Maracaja | Raj K. Modak

Risk

- Increasing prevalence 1976 (lowest) vs. 2012, 1010 vs. 41,880 cases (14 deaths in infants aged <12 mo).
- Substantial morbidity and mortality in USA children despite high childhood vaccination rates.
- Incidence highest for infants <1 y of age (23% of all cases).
- Adolescent group 10–19 y (33% of all cases).
- Incidence of death highest for infants <6 mo of age (91% of all deaths).
- Incidence greater among females than males (54%).
- Incidence greater among whites than minorities (90%).
- If unimmunized, 90% susceptibility following exposure to index case.
- Only 2% of adult population is protected against pertussis.
- Tdap vaccine coverage is 56% among adolescents and <6% among adults.

Perioperative Risks

- Most common complications occurring in those <6 mo of age: Hospitalization (69%), pneumonia (13%), seizures (2%), encephalopathy (<2%)
- Common complications in adults: Cough-related incontinence (28%), syncope (6%), pneumonia (5%), rib fractures (4%), hospitalization (3%)

Worry About

- Infectivity and contagion
- Secretions, pneumonia, altered mucociliary function, apnea, and decreased pulm reserves causing hypoxemia
- Postop complications related to coughing

Overview

- Pertussis is an acute respiratory infection caused by *Bordetella pertussis*.
- Transmission occurs by respiratory droplets with a 7-d to 10-d incubation period.
- Organism releases multiple toxins that damage the epithelial cells of the respiratory tract.
- Characterized by three phases: Catarrhal (cold symptoms), paroxysmal (cough symptoms), convalescence (persistent or episodic cough).
- Infectivity highest in catarrhal and early paroxysmal phases.
- Adolescents and adults display milder symptoms that may be indistinguishable from less serious causes of URI/LRI.
- Immunization in childhood has decreased but not eliminated incidence.
- Vaccine estimated 80–85% effective after three exposures, usually given as combination Tdap vaccine.
- Increased in incidence in adolescence (age 10–19), indicating a need for booster immunization.