Summary of Coronary Artery Bypass Graft Care Model

Indications for Surgery

Goal of Surgery: Improvement in survival and relief of anginal symptoms in appropriate patient

Indications for Surgery

-Anatomy for which CABG has improved survival benefit: (significant left main disease (≥50%) or multivessel disease (≥70%) [>3 v or LAD + ≥1 v] with decreased LVEF (35 - 50%), large amount myocardium at risk)

-Anatomy not amenable to revascularization by PCI

-Patient cannot comply with chronic antiplatelet therapy after PCI

-PCI has failed

-**Heart Team:** When patient could be served by either CABG or PCI, decision should be made by team of patient, CV surgeon and cardiologist, evaluating short and long term risks.

Delaying surgery to reduce complications may be appropriate in patient:

-With kidney disease who just received contrast material (angiography) (24-48 hr)

-Who has just received streptokinase / urokinase

- With STEMI ≤3-7 d prior and PCI failed (emergent with ongoing ischemia); may be longer depending on comorbidities

-**Emergency CABG** may be needed in patient with:

-With acute mechanical defect present (ventricular septal rupture, papillary muscle infarction, or free wall rupture

-Cardiogenic shock

-Life threatening ventricular arrhythmias which are ischemic in origin

Preoperative

Assessment and Optimization

-MRSA screening and treatment if positive

-Smoking cessation counseling and therapy should be discussed

-Inspiratory muscle training is reasonable to reduce incidence of pulmonary complications

-Carotid artery duplex scanning is reasonable in high-risk patients (> 65 YO, L main stenosis, PAD, prior stroke or TIA, HTN, DM, tobacco abuse). If significant stenosis found, timing of intervention and procedure (stent vs. endarterectomy) determined by surgeons and patient

-Preoperative use (at least 24 hr) of beta-blockers in patients without contraindications and EF > 30% can be effective to reduce in-hospital mortality (typically carvedilol if LVEF < 40% and metoprolol if LVEF > 40%)

-Aspirin should be administered preoperatively or within 6 hours postoperatively and then continued indefinitely

-Intra-aortic balloon pump may be used for shock, papillary muscle rupture, unrelieved angina, refractory left ventricular failure, refractory ventricular arrhythmia due to ischemia; approximately 10% patients at JCMC receive prior to CABG

-Obtain vein mapping if previous DVT or questionable leg veins

-Pulmonary consult if COPD, asthma, chemical exposure or OSA for PFT and ABG and ventilator management

Intraoperative (Procedural)

Surgical Risk Factors

-Emergency status, shock and repeat procedure increase risks associated with CABG

Other surgical risk factors include age, female gender, severity and acuity of heart disease, ≥moderate chronic lung disease, LV dysfunction, elevated creatinine, DM, smoking, ↓pre-op HgB, malignant arrhythmia,↑BMI, cerebrovascular or peripheral vascular disease, previous cardiac surgery, non-isolated CABG. STS risk assessment tool

Surgical Options

-On-pump

-Off-pump (may be beneficial in ascending aorta disease)

-Minimally Invasive Direct

-Hybrid (CABG + PCI)

-Combined with valve surgery

-Repeat procedure

-Endoscopic vs. open graft harvest (no long term difference)

Evaluation

-Epiaortic ultrasound is reasonable to evaluate presence, location and severity of plaque in the ascending aorta.

-Transesophogeal echo should be performed for significant hemodynamic disturbances not responsive to treatment.

Bypass Conduit

If possible, LIMA should be used to bypass LAD

Intraoperative (Medical)

Medication Management

-Use IV insulin drip to maintain blood glucose ≤ 180 mg/dl while avoiding hypoglycemia to reduce adverse events

-Appropriate preoperative antibiotics should be administered to all patients and discontinued in timely manner (<48 hr)

-Antifibrinolytics reduce bleeding complications

Coronary Artery Perfusion

-Optimizing coronary arterial perfusion through control of heart rate, mean arterial pressure and ventricular end-diastolic pressure is recommended to reduce the risk of perioperative ischemia and infarction

Transfusion

-Use of transfusion algorithms, point-of-care testing, and conservation strategies should be used

Postoperative Period

-Aspirin should be initiated within 6 hours post-operatively to reduce the risk of venous graft occlusion

-Beta-blockers should be initiated as soon as possible after CABG to reduce the sequela of AF; sotolol or amiodorone are alternatives

-Continuous cardiac monitoring for arrhythmia is reasonable for at least 48 hr post CABG

-Inspiratory spirometry is reasonable to reduce incidence of pulmonary complications

-DVT protocol initiated (TED hose)

-Continue use of DM management protocols (Glucommander)

-Typically, stable patient is extubated in ICU at 4 - 6 hr, in the ICU for 24 hrs and then transferred to step-down: mediastinal tubes and PA catheter often removed POD 1 and temporary pacing wires removed POD 3

Complications of CABG

-Mortality (US Average 2.2%)

-Perioperative MI (4 - 5%)

-Early graft occlusion - typically saphenous (3 - 6%)

-Low cardiac output from impaired LV function

- Vasodilatory shock

-Atrial fibrillation/atrial flutter (15 - 40%); typically resolves spontaneously; risk reduced with β-blocker (sotolol or amiodorone alternatives); increases risk of embolic events

-Ventricular tachyarrhythmia (3%)

-Bradyarrhythmia requiring pacemaker (0.8 - 4%)

-Pericarditis / pericardial effusion

- Aortic dissection - rare

- Stroke (1.6%)

-Neurocognitive dysfunction - usually transient

-Acute kidney injury (5%)

-Mediastinitis (1%)

-Sepsis (3.3%)

- Leg wound Complications

-Pleural effusion - left sided common, typically benign

- Pneumonia / atelectasis

-Bleeding / transfusion - wide variability in rates

-VTE [DVT and PE] (1%)

-Gastrointestinal

-Late graft failure - revascularization

Protamine reaction

Secondary Prevention

Guideline-Directed Medical Therapy (GDMT)

-GDMT with CABG may improve long-term outcomes as compared with GDMT alone

-Discharge medications, unless specific contraindications, should include:

*Aspirin (clopidogrel if allergic) - indefinitely

*Statin - indefinitely (regardless of initial LDL-C)

*Beta blockers - continue to first post-op visit unless indication for chronic use (MI, HF, HTN)

*ACEI or ARBs in patient with LVEF ≤ 40%, HTN, DM or CKD, unless contraindicated; ACEI or ARBS may be reasonable in other low risk patients

*Smoking cessation counseling and therapy

-COX-2 inhibitors not recommended due to increased risk sternal infection and adverse cardiac events

Goals of Medical Therapy

-Lipid: to lower LDL to < 100 mg/dl (or at least a 30% reduction); a goal of < 70 mg/dl may be reasonable for very high risk pts

-Glucose: to control blood glucose A1C ≤ 7 (≤8 may be acceptable if multiple comorbidities and increased risk of symptomatic hypoglycemia)

-Blood Pressure: to control HTN to < 140/90; reasonable to give 1 agent at bedtime

-Life style modification: to improve fitness (exercise, diet, tobacco non-use)

Discharge

Pt Education

-Self-management skills and patient and family education

Appointments

-Follow-up with CV surgeon within 14 days of discharge

-Follow-up with cardiology and PCP within 4 weeks of discharge, if needed

-Cardiac Rehabilitation is recommended for all eligible patients after CABG; goal is to achieve 40 minutes exercise 3 - 4 times per week

-Referral for cognitive behavioral therapy may be beneficial for patients with clinical depression

-Referral to "Mended Hearts" program for social support.

ABCDE

-Aspirin / ACEI or ARBs

-Beta blockade / Blood pressure

-Cholesterol control / Cigarette cessation

-Diet / DM

-Exercise

ED Evaluation or Readmission

-Common reasons to return: HF, atypical CP, arrhythmia, pleural effusion

Hillis LD, Smith PK, Anderson JL, et al. 2011 ACCF/AHA guideline for coronary artery bypass graft surgery. Circulation 2011; 124: e652-e735.
Wijns W, Kohl P, Danchin N, et al. Guidelines of myocardial revascularization, ESC and EACTS. Europ Heart J 2010; 31: 2501-2555.