

Utilizing Care Planning Process

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Obstetric Careplanning

♦ What to review

- ♦ **Spinal**- technique, landmarks, drugs, doses, toxicity, possible complications/implications/interventions
- ♦ **Epidural**- technique, landmarks, drugs, doses, toxicity, possible complications/implications/interventions
- ♦ **Cases**
 - ♦ Non-emergent and emergent C-section
 - ♦ Cervical cerclage
- ♦ **Drugs**
 - ♦ Bupivacaine(Marcaine)/Lidocaine/2Chloroprocaine
 - ♦ Pitocin/Methergine/Cytotec/Hemobate
 - ♦ Ephedrine vs. Phenylephrine, Atropine vs. Robinul
 - ♦ Spinal/Epidural Narcotics (Fentanyl, Duramorph PF) Target=> opioid receptors in substantia gelatinosa
 - ♦ Propofol, Succs
 - ♦ Zofran, Bicitra, Pepcid, Reglan
- ♦ **Complications of Pregnancy/Disease Process/Complications of Labor**
 - ♦ Pre-eclampsia
 - ♦ Gestational Diabetes
 - ♦ Fetal Distress (ie. Late decels, meconium, FTP, fetal presentation)
 - ♦ Placenta Abruptio
 - ♦ Placenta Previa
 - ♦ Cord Prolapse

Scheduled C-Section

- ♦ 38 year old
- ♦ NKDA
- ♦ H/O previous C-section, breast augmentation
- ♦ G2P1, GA 38 weeks
- ♦ Gestational DM (risks AMA, Obesity)
- ♦ Obesity
- ♦ AMA
- ♦ GERD with pregnancy
- ♦ Macrosomia
- ♦ Polyhydramnios
- ♦ Meds
 - ♦ Glyburide
 - ♦ PNV

Physiologic Changes

TABLE 46-1

Summary of the Physiologic Changes in Pregnancy at Term

Parameter	Change	Amount
Heart rate	↑	20%-30%
Stroke volume	↑	20%-50%
Cardiac output	↑	40%
Systemic vascular resistance	↓	20%
Total blood volume	↑	25%-40%
Plasma volume	↑	40%-50%
Red blood cell volume	↑	20%
Coagulation factors	↑↑	
Platelets	No change or ↓	
Minute ventilation	↑	50%
Tidal volume	↑	40%
Respiratory rate	↑	
Functional residual capacity	↓	20%

Scheduled C-Section

- ♦ **Most stimulating part** of the case
 - ♦ After incision through the different layers, a lot of **external fundal pressure** is applied to upper abdominal area (top of uterus). After infant is delivered the **uterus** is brought out of the abdomen to be **sutured**. This causes the mother a lot of pressure & pain in the abdomen, chest, & shoulder (esp. right shoulder). Once baby is delivered, it is ok to give narcotics and benzo's if needed. Once abdomen is closed, **fundal massage** is performed to push out blood & clots.
- ♦ **Position**
 - ♦ Sitting for spinal placement then placed immediately **supine with LUD** after spinal placement

Scheduled C-Section

♦ Preoperative Meds & Doses

- ♦ *Bicitra* po 30 ml
- ♦ *Zofran* IV 4 mg
- ♦ *Reglan* IV 10 mg

♦ Induction Meds & Doses

♦ *Spinal*

- ♦ **Bupivacaine** 0.75% in Dextrose 8.25 mg
 - ♦ 1.6 ml => 12 mg
- ♦ **Duramorph PF** (0.5mg/ml) 0.2mg=> 0.4 ml

Scheduled C-Section

- ♦ **Estimated Blood Volume**
 - ♦ $6,060 \text{ ml} + 50\% = 9,090 \text{ ml}$
 - ♦ Increase in plasma volume by 40-50%
- ♦ **Allowable Blood Loss**
 - ♦ 1,818 ml
- ♦ **Labs**
 - ♦ Blood Glucose 112

Scheduled C-Section

Potential patient-specific or case-specific considerations/problems

Risk for difficult/failed neuraxial block placement

- ♦ Utilize landmarks
- ♦ Be prepared for GA/RSI just in case spinal fails
- ♦ Be prepared for a difficult intubation

Risk for intraop & postop pain

- ♦ Spinal
 - ♦ Verify spinal needle placement
- ♦ Supine position
- ♦ Verify level of block
- ♦ Educate mom on the sensations she will be feeling
- ♦ Administer narcotics and benzo's after the neonate is born prn

Scheduled C-Section

Risk for pulmonary aspiration

- ♦ All patients are considered full stomach
- ♦ Administer Bicitra
- ♦ Administer Reglan
- ♦ Administer Zofran

Risk for hypoglycemia/ hypoglycemia

- ♦ Monitor Blood Glucose
- ♦ Treat appropriately

Risk for infection with neuraxial placement

- ♦ Utilize sterile technique
- ♦ C-Section administered prophylactic antibiotics

Scheduled C-Section

Risk for fetal demise (decreased uteroplacental BF)

- ♦ 100% Oxygen
- ♦ Monitor
- ♦ Supine in LUD
- ♦ Preload with a minimum of 500-1000 ml
- ♦ Administer fluid based on 4-2-1 rule
- ♦ Administer appropriate medications for hypotension

Scheduled C-Section

Risk for hemodynamic instability (hypotension, bradycardia)

- ♦ Preload with a minimum of 500-1000 ml of fluid & 4-2-1 rule
- ♦ Check BP every minute after the spinal is placed until delivery.
- ♦ Emergency drugs drawn up & dated
 - ♦ Ephedrine
 - ♦ Phenylephrine
 - ♦ Robinul
 - ♦ Atropine
 - ♦ Epinephrine??
- ♦ Apply compression stockings

**** Keep in mind that all of these interventions reduce incidence and severity of hypotension but do not eliminate it.

Scheduled C-Section

Risk for Aortocaval/Vena Caval compression

- ♦ LUD

Risk for N/V

- ♦ Fluid Preload
- ♦ TREAT FOR BP!!!!
- ♦ Reglan
- ♦ Zofran

Risk for late respiratory depression up to 8-12 hours

- ♦ Ensure nurse is aware of administration of Duramorph

Risk for respiratory difficulty

- ♦ When patient complains of SOB or difficulty breathing ask the patient to blow air into your hand or squeeze your fingers as hard as possible

Scheduled C-Section

Risk for high sympathectomy/total spinal

- ♦ Decreased LA requirement
- ♦ Intubate and initiate mechanical ventilation
- ♦ Increased FIO₂
- ♦ Assess the level of dermatomal blockade
- ♦ Take out of Trendelenburg
- ♦ Aggressive treatment of hypotension and bradycardia
 - ♦ Fluids
 - ♦ Vasopressors
 - ♦ Atropine
- ♦ ACLS if cardiac arrest occurs

Scheduled C-Section

Risk of nerve injury with spinal placement

- ♦ Verify lab work
- ♦ Use 25 G Whitacre
- ♦ Careful placement, avoid multiple sticks

Risk for PDPH

- ♦ Use 25 G Whitacre or Sprotte

Risk for hemorrhage

- ♦ Administer Pitocin
- ♦ Other options if Pitocin is not effective
 - ♦ Methergine
 - ♦ Hemabate
 - ♦ Misoprostol

Risk for hypothermia in the first 30 minutes of surgery

- ♦ Warm blankets

Scheduled C-Section

Risk for LA Toxicity

- ♦ Halt injection of LA
- ♦ Assess ABC's/Prepare to secure airway
- ♦ Be prepared to initiate ACLS
- ♦ Administer 100% O₂
- ♦ Administer a benzo for seizures
- ♦ Administer 20% Intralipid
- ♦ Obtain a series of cardiac troponin levels

Scheduled C-Section

Risk for Embolism (Thrombus, Amniotic Fluid, Air)

- ♦ ***Increase FIO₂***
- ♦ Consider for ***ET intubation***
- ♦ ***Hemodynamic support***
 - ♦ Fluids
 - ♦ Inotropes or Vasopressors
- ♦ **Management of specific emboli**
 - ♦ ***Thrombus***
 - ♦ Anticoagulation with unfractionated heparin
 - ♦ Consider thrombolysis or surgery
 - ♦ ***Amniotic Fluid***
 - ♦ Consider placement of arterial catheter and central venous access
 - ♦ Correct coagulopathy
 - ♦ ***Air***
 - ♦ Inform obstetrician
 - ♦ Position patient
 - ♦ Consider placement of a multi-orifice central venous catheter
 - ♦ Hyperbaric oxygen after event in severe cases if available

Care Plan: CABG

BRIEF DESCRIPTION OF SURGICAL PROCEDURE:

- CPB
- Skin incision and sternal saw most stimulating
- I stat and ACT
- Back up pacing available

CABG: intubation set up



Missing from this picture:
2 tegaderms to place over ett tape on cheeks

CABG: CVP set up



CABG:PREOPERATIVE MEDS & DOSES

Versed 5 mg (titrated, 2mg prior to a-line, 3 mg on the way into OR)

- ♦ **Anxiolysis 1-2mg IV (up to 5 mg in Cardiac South)**
decreases risk of myocardial ischemia r/t stress response.
Admin prior to a-line in preop. Admin O2 after dosing.

Fentanyl 50-75 mcg (no more than 50 mcg at South d/t risk of hypoventilation) for analgesia during radial artery cannulation.

Scopolamine 0.2-0.4 mg IM or IV for amnestic effect (avoid in elderly d/t delirium) (the pre op fentanyl and scopolamine are not routinely practiced in South cardiac)

CABG: INDUCTION MEDS & DOSES

Fentanyl 250 Mcg

- ♦ Opioids- produce bradycardia (except meperidine) related to central vagal stimulation.
- ♦ Fentanyl group of opioids most reliable and effective anesthesia for pts with valvular disorders and CABG. Lacks cardiac depression.

Propofol 100 mg

- ♦ Modest negative inotropic in supra optimal dosing, reversible with Beta adrenergic stimulation. 15-40% ↓ in BP. ↓ SVR, CI, SV, LVSWI

Versed 5 mg

- ♦ 0.05-0.2mg/kg for induction. 20% ↓ MAP, 15% ↑ HR. CI is maintained. Does not attenuate the SNS response to DL. If given with fentanyl, significant ↓BP may occur. Rapid on, short duration, water soluble, no pain on injection.

Lidocaine 80 mg 1-2 mg/kg

Vecuronium 10 mg 0.08 mg/kg (risk for bradycardia esp if on b blockers)

CABG: MAINTENANCE MEDS & DOSES

Fentanyl 10- 15 ml (500-750mcg) prn prior to sternotomy and titrate with increases in BP.

Sevo 1% (per Hana) or Iso 0.5% If good LVEF, volatiles ↓ myocardial O₂ demand d/t ↓ contractility. Avoid N₂O.

Ntg gtt for coming off pump.

Precedex for coming off pump 0.4mcg/kg/h gtt.

Phenylephrine 100mcg or Ephedrine 2.5mg boluses for hypotension.

CABG: Emergence plan

- ♦ Keep intubated, to ICU. No reversal.
- ♦ Place and secure OGT after TEE out
- ♦ Don't remove eye tape prior to transfer (Hana)
- ♦ Gas off when vent off, transport full monitors.
- ♦ Careful with moving- lines also, this is a susceptible time for cardiac events!!
- ♦ ALWAYS know where push line is.

CABG: Equipment

Standard monitoring:

- ECG lead II and V5 or area more at risk for ischemia
- Pulse Ox- (If this is placed on the opposite side of the arterial line, it can be used in conjunction to assess adequate flow, un-impinged by retraction)
- NIBP- (compare to arterial line for accuracy, then reset timing to every 4 hours)
- Central core temperatures obtained with bladder, nasopharynx, rectal or thermistor probes
 - Mild hypothermia provides some cerebral protection during CPB.

CABG: Equipment

Standard monitoring:

A-line- if on the same side as mammary take down, can detect internal mammary artery dissection

Central line or PA

CVP- standard of practice for pressure measurement and for vasoactive gtts.

PA catheter may be indicated if:

- ♦ EF<40%, CHF, known \uparrow LVEDP, IABP, severe MR d/t ischemia, VSD after MI, high risk for intraoperative ischemia (large MI or unstable angina, poor revascularization targets), severe comorbidities (renal failures, severe COPD), Combined procedures that lengthen surgery (ex. CABG-carotid)

CABG: Equipment

Oral gastric tube (x2)- inserted before TEE to decompress stomach and placed at end of surgery, secured and left in for transfer to ICU

Pacemaker (with battery)- If the pacemaker will be used, the surgeon will place epicardial leads. They will hand these leads over the drape to be hooked up.

2-3 IV pumps and tubing

Flotrac- Directions for set up

<http://ht.edwards.com/resourcegallery/products/mininvasive/pdfs/ar02702.pdf>

ISTAT- If not on drug cart or perfusionist's area, it can be retrieved from the lab in the OR which is right next to the back elevator. Labs will be drawn from the arterial line after central line is placed for a baseline. There is a lab sheet to document on found in the top drawer of drug cart.

CABG: Equipment

ACT- Ensure the ACT is in the room and the machine test is done (this takes 5 minutes- get prepared before surgery)

TEE- Performed by the MDA, do not attempt to handle the TEE when it is inside of the patient unless under direct approval and supervision by the MDA..

Using the TEE, we are able to recognize the earliest signs of myocardial ischemia (systolic segmental wall motion abnormalities), assess volume status (best used if ECG monitoring cannot be used to diagnose ischemia – pts with LBBB, extensive Q waves, or ST-T abnormalities)

CABG: necessary medications

Versed, Opioids, Vecuronium

Propofol modest negative inotropic in supra optimal dosing, reversible with Beta adrenergic stimulation. 15-40% drop in blood pressure. Decreased SVR, CI, SV, LVSWI

Volatile anesthetic dose dependent depression of contractile function, decreases in systemic blood pressure, decrease SVR, lessened baroreceptor reflex, decreased arrhythmogenic property of EPI, mild direct coronary vasodilation, lessens effects of ischemia, anesthetic preconditioning- short periods of ischemia prior to prolonged ischemia shown to lessen infarct size

CABG: necessary medications

Amicar 100-150 mg/kg followed by 10-15 mg/kg/h can reduce bleeding after bypass

Heparin Loading dose for CPB 300-400 units/kg

- Exerts its anticoagulant activity via antithrombin III (ATIII- . the major inhibitor of thrombin, and factors IXa, and Xa). Increases ATIII effect by 100-2000 fold.
- If the patient is resistant to heparin, administration of FFP, which contains ATIII, should correct ATIII depletion and prolong ACT
- May decrease BP by 10-20%
- ACT measured 3-5 minutes after bolus, should be >400 seconds before it is safe to proceed with CPB For South Cardiac, goal is 450s
- Heparin rebound can occur
- Heparin is cleared through active tubular secretion in the kidneys.

CABG: necessary medications

Protamine: 1 - 1.3mg protamine per 100 Units of heparin,

- Neutralizes heparin's ATIII effect
- Anaphylactic reaction (rare)
 - ↑ airway pressure, ↓SVR with ↓BP and skin flushing
- Anaphylactoid responses can be immediate or delayed.
 - Those at risk: prior exposure to protamine from prior surgery or neutral protamine Hagedorn (NPH) insulin, Fish allergy, vasectomized men
 - Peripheral infusion site is advisable
- May cause thrombin inhibition in large doses or may inhibit platelet aggregation from the heparin-protamine complex.
- PLT count decreased by 10% within 10-15 minutes of administration

CABG: necessary medications

Nitroglycerin

at high doses reduces afterload and BP, reduction in cardiac dimension and pressure reduce myocardial oxygen consumption and improves ischemia.

Vasodilation of pulmonary arteries and veins, decreased RAP, PAP, PCWP. Potent epicardial coronary artery vasodilator. Stenotic lesions dilate with NTG, reversing or preventing coronary artery vasospasm. If hypotensive, phenylephrine can be used to augment coronary perfusion pressure so ntg can maximize subendocardial blood flow.

Antibiotics

Within one hour of incision and dosed every 4 hours during surgery.

CABG: anticipated medications

Phenylephrine 50-100 mcg bolus

pure α agonist. Reflex bradycardia secondary to baroreceptor stimulation. Immediate onset, duration 5-20 minutes.

Ephedrine- 5-10 mg doses for hypotension prn.

noncatecholamine sympathomimetic α 1 and β 1 & 2 direct and (predominately) indirect agonist.

Increases CO, Inotropy, HR.

Risk for tachyphylaxis.

Cardiac effects are nearly identical to Epinephrine, but less potent and 10 x longer acting.

Venoconstriction >Arteriolar constriction.

CABG: Anticipated Medications

Dexmedetomidine 0.2-0.7 mcg/kg/hr. Selective $\alpha 2$ agonist dose dependent sedation, analgesia, sympatholysis and anxiolysis without significant respiratory depression. Side effects: \downarrow BP, \downarrow HR, oversedation and delayed recovery.

Milrinone 0.375-0.75 mcg/kg/min loading dose 50 mcg/kg/min (not at South) enhanced myocardial contractility and peripheral vasodilation improve CO. Dose adjustment necessary for renal pt. Effective inotrope in pt. receiving β blockade. May \uparrow risk of arrhythmia and necessitate implantable defibrillator.

Blood

Type and Cross match with Blood available, place blood bank number on anesthesia record

CABG: Emergency meds

Levophed

α & β agonist, little β_2 activity at low doses, less β_1 than epi.

Mostly has unopposed α stimulation.

Increased diastolic pressure may increase coronary artery perfusion.

Generally used in pts with adequate CO but low SVR.

May cause problems with peripheral tissue perfusion and oxygenation d/t intense vasoconstriction.

Decreases insulin production.

CABG: Emergency meds

Epinephrine

- alpha and β agonist.
- β_1 effects: \uparrow in O₂ consumption \rightarrow arrhythmia.
- β_2 effects: \downarrow airway resistance with improved oxygenation.
- Low doses, β_2 stimulus promotes redistribution of blood flow to skeletal muscles and a \downarrow in SVR.
- \uparrow doses, alpha effect predominates causing vasoconstriction as well as renal and splanchnic VC and \uparrow systemic pressure.
- Potassium derangements can occur from beta stimulation.
- \downarrow insulin production, \uparrow gluconeogenesis and glycogenolysis

CABG: Emergency meds

Dobutamine

- Synthetic catecholamine.
- Direct β_1 agonist, weaker β_2 agonist effect, and weak alpha 1 agonist (may be unmasked by β blockade as a prompt and dramatic increase in BP).
- Increases HR.
- May decrease diastolic coronary filling pressure d/t vasodilation.
- Produces coronary vasodilation.
- Half-life 2 minutes

CABG: Emergency meds

Vasopressin 0.04 units/min

- Potent nonadrenergic vasoconstrictor.
- It is exogenous ADH.
- May produce larger \uparrow SVR, CPP, and coronary perfusion pressure than EPI. More effective vasoconstrictor than EPI in presence of hypoxia and acidosis.
- Does not seem to increase myocardial oxygen consumption or lactate production.

CABG: Emergency meds

Dopamine

- Less than 2 mcg/kg/min = dopamine receptors.
- 2-5 mcg/kg/min = beta effects.
- >10 mcg/kg/min = α effects.
- Also inhibits aldosterone resulting in an increase in sodium excretion and urine output.
- Metabolized by monoamine oxidase enzymes, careful administering to pt. on mao inhibitor

CABG: Emergency meds

Calcium 2-4 mg/kg

↑ myocardial contractility and enhances ventricular automaticity.

Bicarbonate

Treatment for metabolic acidosis. Dosage calculation:

$$\frac{\text{wt in kg} \times 0.3(24 \text{ mEq/L} - \text{actual HCO}_3^-)}{2}$$

Potassium- Replete if $K < 3.5$

CABG: Emergency meds

Decadron, Pepcid, Benadryl

At South, this is used if any reaction to protamine may be suspected

Glucagon IV dose 1-5 mg

- ↑ CI, MAP and contractility, enhanced AV nodal conduction.
- Positive inotrope and chronotrope not inhibited by beta blockade or by catecholamine depletion.
- Rarely causes dysrhythmia. Action dissipates in 30 minutes. Common S/E nausea and vomiting.
- Hypokalemia, hypoglycemia and hyperglycemia also seen. This is an underutilized resource.(p356)

CABG: Preop planning

HTN - Lisinopril

Continue antihypertensive meds.

Evaluate for evidence of end organ damage.

Induction and maintenance, anticipate exaggerated BP responses. Limit duration of DL, it can cause severe elevation of BP. Suppress tracheal reflexes and blunt ANS with deep inhalational anesthesia, opioids, Lidocaine, beta blocker or vasodilator before laryngoscopy.

Monitor for myocardial ischemia.

Pt is likely volume contracted, profound hypotension can occur with induction agents.

Inhalational agents are helpful to tx intraop HTN. Hypotension can be tx with volume, ephedrine, phenylephrine or vasopressin.

CABG: Preop planning

Beta Blocker: continue carvedilol as β blockers have been shown to \downarrow myocardial ischemia. However, if EF < 30%, a trend toward increased mortality has been observed

EF

>50%= low risk

< 50 % =intermediate risk

<25%=high risk

Consider LV function- If strong, pt may require \uparrow dose of induction plus addition of β block with or without vasodilators to control SNS response. IF poor LV function, may not tolerate normal doses leading to a drop in CO.

CABG: Preop planning

DM- metformin

Am glucose covered, check glu prior to surgery. Treat as indicated.

DC metformin preop d/t association with severe lactic acidosis during episodes of hypotension, poor perfusion or hypoxia

However... in patients having cardiac surgery who did not stop metformin, a recent study did not show an increase in morbidity and mortality.

CABG: Preop planning

Plavix

When to stop antiplatelet drugs prior to surgery

Ticlid (ticlopidine) – 14 days

Plavix (clopidogrel)- 7 days

Reopro (Abciximab)- 72 hours

Integrilin (eptifibatide)- 24 hours

Aggrastat (tirofiban)- 24 hours

CABG: Preop planning

ETOH

consider risk for withdrawal manifestations as early as 6 hours after a substantial decrease in blood alcohol concentration, most pronounced between 24-36 hours.

If acute, will decrease mac, if chronic will increase mac

Risk for elevated liver enzymes and altered drug metabolism. These patients are often started on an alcohol gtt in ICU as well as B12 and Thiamine.

Propofol, benzodiazepines, alpha 2 agonists, beta blockers and IV alcohol (10% IV ethanol at initial infusion rates of 50–100 mL/h) are all considered effective treatment for alcohol withdrawal syndrome

CABG: Position

Supine:

Head in neutral position.

Heels elevated without hyperextending the knees.

Arms are tucked.

If the elbow hangs over the edge of the bed, ulnar damage can occur.

Avoid pronation of arms as that also can cause ulnar damage.

CABG: Cardio Pulmonary Bypass

End organ effects

- **Cardiac injury** from ischemia (see ischemia treatment options below), aortic cross clamping, hyperthermia
- **Brain injury**
- **Renal dysfunction**
- Rare **GI complications** associated with ↑ morbidity and mortality
- **Endocrine Stress Response**: - elevated Catecholamines, hormones, vasopressin, glucose
- **Immunologic inflammatory response** by activation of complement- activated but not completed d/t heparinization. It may also be activated by the heparin protamine complex. Corticosteroids may limit inflammatory response

CABG: Cardio Pulmonary Bypass

Anticoagulation is required prior to cannulation.

Aortic cannulation is first

- Keep SBP <110 to prevent aortic dissection
- Can be used to transfuse if hypovolemic

Drainage of venous blood

- by cannula in RA.
- From suction scavenge off surgical field
- From vents in LV, left superior pulmonary vein or LV apex to de-air or the aortic root via the antegrade cardioplegia
- Blood enters venous reservoir, then oxygenator/heat exchanger, then is returned to arterial circulation via large arterial cannula place in ascending aorta, femoral or axillary artery

CABG: Detecting ischemia

ECG

PA catheter (elevated PCWP or new V wave on PCWP tracing)

TEE (most sensitive indicator)

CABG: Ischemia

It's all about supply and demand.

Factors to control:

- Coronary blood flow:
 - Perfusion pressure (DBP-LVEDP), diastolic filling time (HR), blood viscosity (optimal is hct 30)
- Coronary vasoconstriction: spasm, PaCO₂ (hypocapnia leads to constriction), alpha-sympathetic activity
- O₂ delivery: O₂ sat, HCT, Oxyhgb dissociation curve
- O₂ consumption: BP (afterload), ventricular volume (preload), Wall thickness (decreased subendocardial perfusion), HR, contractility

CABG: Treating ischemia

(Think about the causes)

Tachycardia:

- esmolol 100-500 mcg/kg, ↑ ane depth, verapamil 2.5-10 mg IV
β blockers ↓ HR and myocardial metabolism. HR goal pre bypass ≤ 80 bpm. Metoprolol 1mg titrations (at South)

HTN:

- NTG 0.5-4mcg/kg/min, ↑ ane depth.
- (Cardene 5-15 mg/h : excellent choice for AVR to prevent valve inversion with HTN.)

Hypotension:

- Phenylephrine (0.2-0.75 mcg/kg/min) maintains CPP during hypotensive period on initiation of CPB

Severe bradycardia: AV pace

CABG: Clinical pearls

Pre-incision

- **Art line placed preop. Verify surgeon's side preference- be sure surgeon is not harvesting radial)**
- **Place pt trendelenberg / prep right neck in preparation for Central Line placement after intubation**
- **Use large bore for Blood tubing, CVP to distal port of slic, Amicar gtt with 4- gang stopcock to proximal lumen of the slic**
- **Suction stomach prior to TEE**
- **Obtain Baseline ACT & ABG, lytes, h/h**
- **Ask the nurse when to give antibiotics: Ancef 2g IV**
- **Amicar slow push depends on provider you are with when to admin. Some like with heparin, some say prior to heparin for better clot stabilization.**

CABG: Clinical pearls

STERNOTOMY

Lungs down, vent off before sternotomy, pay attention.

When you hear the trial saw say, **“LUNGS DOWN”** & switch vent off.

Change the ventilator : ↓TV and ↑RR (provides better visualization for mammary takedown)

When sternotomy is complete and the saw is off the field, say, **“LUNGS UP”**. and then, put the **vent back on.**

CABG: Clinical pearls

PREPARING FOR BYPASS-----HEPARINIZE

- Heparin via central line, aspirate first to verify patency
- Tell perfusionist how much you are giving and when
- Check ACT 3 min after administration
- Announce when ACT crosses 250, 400, and final ACT. Goal = > 450 sec
- Give ACT and I-stat machines to perfusionist

CABG: Clinical pearls

CANNULATION

- Pay close attention to BP & heart rhythm
- For cannulation of the **aorta** keep the **SBP 95-105** AVOID HTN to avoid dissection while working on aorta
- For Cannulation of the **IVC**, maintain **SBP 105-120**.
- **VF or VT** is common when the right heart is being manipulated
- If **retrograde cannula** is placed (coronary sinus), the scrub will hand you the tubing during their prep. Hook this **tubing to the transducer for the PA/CVP** line. She will ask you to **flush** at this time. When surgeon places the retrograde catheter he will ask you to “purge the line.” Then, you can flush through the line again while he connects. Open **transducer to monitor the retrograde catheter pressure**

CABG: Clinical pearls

ON PUMP

- **Redose** sedatives/narcotics/muscle relaxants for on-pump run (not all providers)
- **Withdraw PA cath** if in place 3-5 cm to prevent wedging in collapsed pulmonary artery (PA rupture can occur with cooling of the body if not pulled back)
- Document time on pump at the top left hand corner of the anesthesia chart
- Turn off vent and alarms, turn off all vasopressors, turn off Inhalational Agent (IA). The perfusionist will administer the IA while on pump.
- Only Amicar gtt continues on Pump

CABG: Clinical pearls

REWARMING

- Listen for “rewarm” cue
- Give perfusionist narcotics/sedatives/and possibly muscle relaxants to give
- Notes should have aortic cross clamp on/off times along with CPB on/off times
- Protamine: 1 mg per every 100 units of heparin is prepared and set aside until patient is off pump. Put this in a place where you will not accidentally infuse while pt is on pump (=death).
- Given when coming off pump. Dose IV through peripheral line.

Pediatric Careplanning

- ♦ **What to review**

- ♦ Peds airway, doses for peds drugs, proper airway equipment sizes (how to calculate), hemodynamic perimeters, caudal block or penile block, how to calculate fluid using 4-2-1 rule.

- ♦ **Cases-** T and A, Myringotomy, circumcision

- ♦ **Drugs**

- emergency meds: succs dart(atropine + succ), Epi
- pain meds: fentanyl (nasal, IV) , morphine (IV), tylenol(IV, PR)
- antiemetic: Zofran, Decadron
- preop meds: versed(PO,IV)
- Reversal agents: glycopyrrolate, neostigmine (IV)

- ♦ **Complications of Peds cases**

- laryngospasm(how to recognize and tx)
- barotrauma (appropriate tube/ reservoir bag with adequate TV)
- anxiety/fear of surgery (need for preop benzo)
- hypothermia (significant heat loss)
- air embolism(buretrol, no air bubbles)
- postop hypoxemia(positioning)

T & A
20kg 2 years old female

♦ **BRIEF DESCRIPTION OF SURGICAL PROCEDURE:**

- ♦ **Patho: T & A** entails excision of the palatine tonsils and or nasopharyngeal tonsils (adenoids). **Tonsillar hypertrophy** affects the child's ability to swallow due to pain or tonsillar enlargement whereas **adenoid hypertrophy** affects the child's ability to breathe through the nose with the mouth closed.
- ♦ **Clinical indications:** upper airway obstruction, OSA with snoring, massive hypertrophy, and chronic URI.
- ♦ **Procedure:** A tonsil is grasped, and the mucosa is dissected free, preserving the posterior tonsil pillar. The capsule of the tonsil is separated from its bed. A snare loop is passed over the free portion of the tonsil, and the tonsil is amputated and removed. The fossa may be packed with a tonsil sponge and should be removed before extubation. Bleeding may be controlled with cautery, ties, and or suture.
- ♦ **Special:** MR may not needed (In south, rarely uses MR) and spontaneous respirations during GA with ETT acceptable. The surgeon may place a throat pack at the end (In south, no throat pack in most case).

♦ **TODAY'S ANESTHETIC PLAN**

- ♦ GETA microcuff tubing size 4

- ♦ preop with oral versed.

- ♦ Induction via IA with N20/O2 70/30., After obtaining IV, Propofol 4mg/kg for DL.

- ♦ Maintain with Sevo. Consider Antiemetic/ Pain meds.

- ♦ Extubate fully awake or deep (physician preference).

♦ **PREOPERATIVE MEDS & DOSES**

- ♦ versed 0.5mg/kg PO or 1-2mg IV

- ♦ Have appropriate equipments

♦ **ANTICIPATED PATIENT POSITION**

- ♦ Supine, shoulder roll, head extended, table turned 90 degree. Surgeon at Head of table.

Patient age/Size	LMA	Largest ET (ID)	Largest FOB (OD)
Neonate (< 5 kg)	1	3.0	2.8
Infant (< 10 kg)	1.5	3.5	2.8
Child (10–20 kg)	2	4.5	3.6
Child (20–30 kg)	2.5	5.5	3.6
Small adult (\geq 30 kg)	3	6.0 cuffed	5.0
Adult	4	6.5 cuffed	5.0

♦ **INDUCTION MEDS & DOSES:**

♦ N₂O/ O₂ 70/30

♦ Obtain IV

♦ Propofol 3-4mg/kg IV

♦ Intubate with 4.0 microtubing ETT. choose ETT based on wt and age (You can also use Nasal Rae/ oral RAE)

♦ Check the ETT placement by auscultation of breath sounds bilaterally.

♦ Check the air leak @ 20- 30. Positive airway pressure 20-30cmH₂O is appropriate.

♦ **MAINTENANCE MEDS & DOSES**

- ♦ Sevo(peds require high MAC 3-4%)
- ♦ Reduce Fio2 to 30% to reduce a risk of airway fire.
- ♦ **Antiemetics:** Decadron 0.25mg/kg right after induction.
Zofran 0.15mg/kg 30 min before emergence
- ♦ **Pain meds:** Acetaminophen 30-40mg/kg PR or 15mg/kg IV right after induction. Consider Precedex 0.5 mcg/kg IV starting right after intubation as an adjunctive agent for sedation/ analgesia. Fentanyl 1-2mcg/kg PRN or Morphine 01.mg/kg PRN (titrate to RR)
- ♦ Gylcopyrrolate 0.01mg/kg, which will decrease secretion and decrease the chance of aspiration upon emergence

- ♦ **EMERGENCE PLAN, INCLUDING ANY “REVERSAL” MEDS & DOSES**
- ♦ Turn off Sevo and increase O2 fresh gas flow
- ♦ Extubate fully awake with lateral position/ head down.
Verify removal of throat packs(in south, most surgeons do not put throat packs).
- ♦ Sx – blood and secretions should be suctioned from oropharynx and stomach (surgeons will ask you for sx catheter at the end of surgery)
- ♦ Apply Blow by O2
- ♦ Take pt. to PACU and give report to PACU RN.

POTENTIAL PATIENT-SPECIFIC OR CASE- SPECIFIC CONSIDERATIONS/ PROBLEMS

1. Airway leak

- ♦ Positive pressure leak between 20-30cm H₂O is desirable.
- ♦ Microcuff tubing ETT.

2. Traumatic intubation with Nasal Rae

- ♦ oral RAE or nasal RAE based on surgeon's preference
- ♦ Use red rubber tip catheter to guide ETT. Make sure to lubricate the tip of catheter. Use Afrin spray to prevent bleeding of nose.

3. ETT dislodgement/kinking

- ♦ Check the ETT placement by auscultation of breath sounds bilaterally.
- ♦ rule of thumb: depth of ETT insertion: ETT size x 3
- ♦ $\text{ETT depth (cm)} = \text{Age(yrs)}/2 + 12$

4. Bleeding

- ♦ Give adequate fluid replacement intra op using 4-2-1 rule
- ♦ Bleeding may occur in the immediate postop period or several days later-> emergency

TOTAL BLOOD VOLUME

Age	Approximate Total Blood Volume (mL/kg) ¹
Premature infant	89-105
Term newborn	78-86
1-12 months	73-78
1-3 years	74-82
4-6 years	80-86
7-18 years	83-90

5. Aspiration

- ♦ Upon emergence, blood and secretions should be suctioned from the oropharynx and stomach following the completion of surgery.
- ♦ fully awake before extubation, which may be performed supine or in the lateral position with the head down.
- ♦ Do not extubate during stage 2.
- ♦ Gentle Suction.
- ♦ Glycopyrrolate 0.01mg/kg
- ♦ Know NPO guideline

Table 10.2 Preprocedure fasting guidelines

Ingested material	Minimum fasting period (h)
Clear liquids	2
Breast milk	4
Infant formula	6
Non-human milk	6
Light meal	6

Adapted from American Society of Anesthesiologists task force on sedation and analgesia by non-anesthesiologists. Practice guidelines for sedation and analgesia by non-anesthesiologists.

Anesthesiology 2002; 96: 1004–17.[Ref 20]

6. Laryngospasm

- ♦ “succs dart syringe IV”
- ♦ treat laryngospasm with 100% O₂, jaw thrust, positive pressure, Propofol IV, and Succs IV/IM

7. Risk of airway fire

- ♦ Reduce Fio₂ to 30% to reduce a risk of airway fire.
- ♦ Communicate with circulating RN to find out what the surgeon uses like snare, bovie, coblator..etc.

8. Barotraumas

- ♦ pediatric size tubing/reservoir bag.
- ♦ Ventilation setting for appropriate age.

9. Anxiety

- ♦ Versed 0.5mg/kg PO or 1-2mg IV works for peds in preop

10. Risk of air embolism

- ♦ Get rid of air bubbles out of IV catheter or any IVP. It is really important because of possible PFO with peds patient.

11. Risk of N/V

- ♦ Decadron 0.25mg/kg right after induction.
- ♦ Zofran 0.15mg/kg 30 min before emergence

15. Hemodynamic stability

- ♦ Know the emergency medication dose.
- ♦ Most often, cardiac events in the child are attributed to respiratory events.

Age Group	<u>Resp</u>	Heart Rate	SBP	Weight (kg)	Weight (lb)
Newborn	30 - 60	100 - 180	50 - 70	2 - 3	4.5 - 7
Infant 1-12 months	20 - 50	80 - 160	70 - 100	4 - 10	9 - 22
Toddler 1-3 yrs.	20 - 35	70 - 150	80 - 110	10 - 14	22 - 31
Preschooler 3-5 yrs.	20 - 30	60 - 120	80 - 110	14 - 18	31 - 40
School Age 6-12 yrs.	15 - 30	60 - 110	80 - 120	20 - 42	41 - 92
Adolescent 13+ yrs.	12 - 20	55 - 110	110 - 120	>50	>110

16. Postop hypoxemia

- ♦ supplemental oxygen (face mask or blow- by O₂)
- ♦ positioned on their sides with the HOB lifted slightly

17.Recent cold / flu

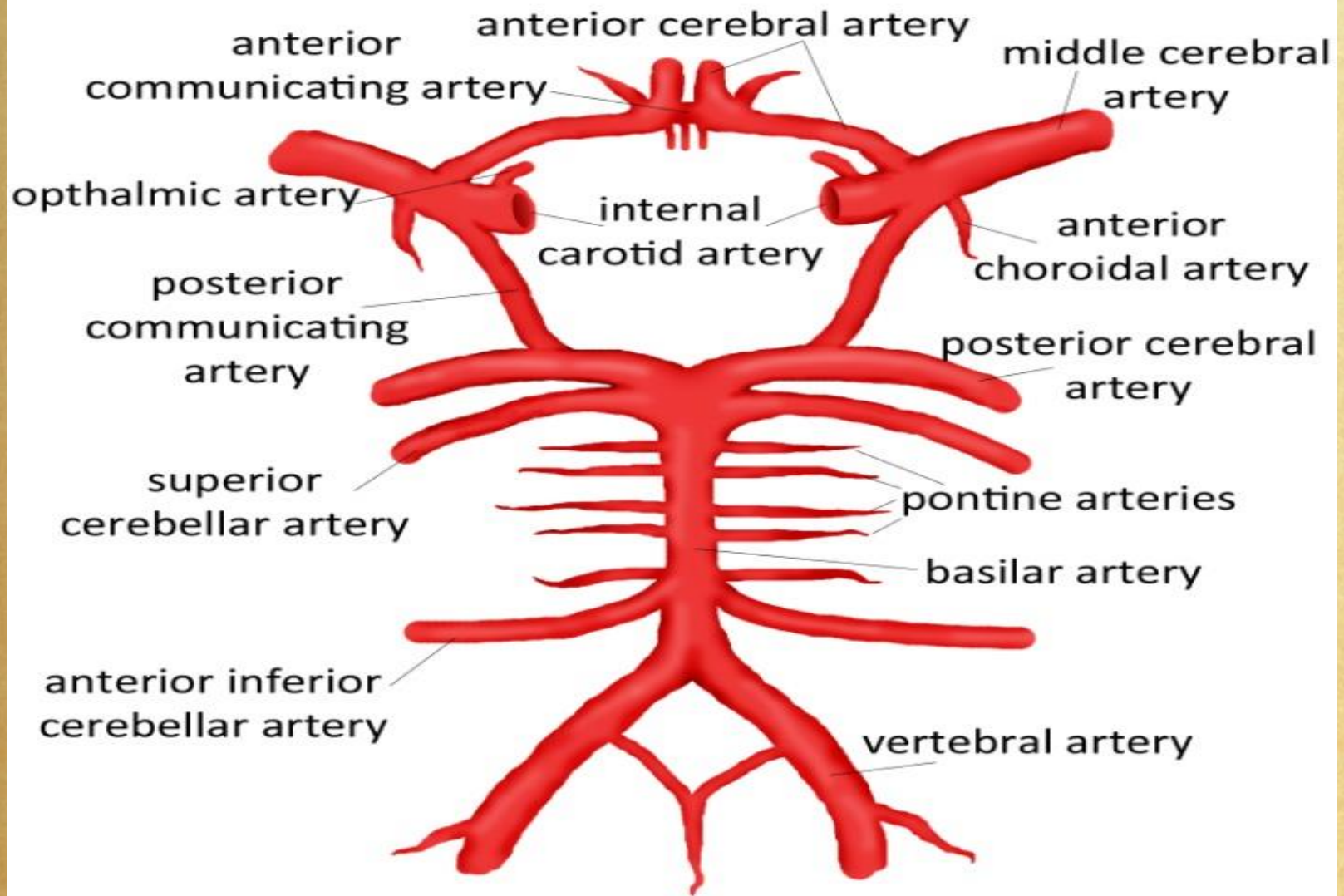
- ♦ Fever accompanied by productive cough and wheezing are symptoms of lower respiratory tract involvement and should prompt rescheduling of the procedure 2-3 wks after these symptoms have abated.

Neuro Careplanning

- ♦ **What to review-** EP(SSEP, MEP), TIVA techniques, how to do preop neuro exam, 12 cranial nerves, circle of Willis, normal ICP and CPP (how to calculate), cushing's triad, benefit of hyperventilation,
- ♦ **Cases-**anterior cervical fusion, posterior lumbar fusion, craniotomy
- ♦ **Drugs**
 - ♦ -TIVA- Remi gtt, Propofol gtt with Neo gtt
 - ♦ -Sz prophylactic meds- phenytoin
 - ♦ -tx for cerebral edema- steroid, mannitol
- ♦ **Complications of neuro cases**
 - ♦ -difficult airway with limited ROM(Glide scope)
 - ♦ -Cerebral ischemia- disturbance of cerebral auto regulation
 - ♦ -increased ICP with HTN(pain meds/ Beta blocker/propofol bolus during pinning, intubation)
 - ♦ -neurologic deficits(preop and postop neuro assessment)
 - ♦ -interference with neuro monitor during cases(use TIVA, MAC 0.5)
 - ♦ -ETT displacement(positioning)/ IV extension tubing
 - ♦ -ION and corneal abrasion(especially with prone)
 - ♦ - Air embolism (recognize s/s, how to tx)

The Cranial Nerves

Nerve Number and Name		Composition	Some Functions
I	Olfactory	Sensory only	Olfaction (smell)
II	Optic	Sensory only	Vision
III	Oculomotor	Motor and sensory	Serves muscles of the eye
IV	Trochlear	Motor and sensory	Serves the superior oblique eye muscle
V	Trigeminal	Motor and sensory	Sensory from face and mouth; motor to muscles of mastication (chewing)
VI	Abducens	Motor and sensory	Serves the lateral rectus eye muscle
VII	Facial	Motor and sensory	Serves the muscles of facial expression, lacrimal glands, and salivary glands
VIII	Vestibulocochlear	Sensory only	Equilibrium and hearing
IX	Glossopharyngeal	Motor and sensory	Serves the pharynx (throat) for swallowing, posterior third of tongue, parotid salivary gland
X	Vagus	Motor and sensory	Sensations from visceral (internal) organs, and parasympathetic motor regulation of visceral organs
XI	Accessory	Motor and sensory	Serves muscles that move head, neck, and shoulders
XII	Hypoglossal	Motor and sensory	Serves muscles of the tongue



Eye Opening Response	Spontaneous--open with blinking at baseline	4 points
	Opens to verbal command, speech, or shout	3 points
	Opens to pain, not applied to face	2 points
	None	1 point
Verbal Response	Oriented	5 points
	Confused conversation, but able to answer questions	4 points
	Inappropriate responses, words discernible	3 points
	Incomprehensible speech	2 points
	None	1 point
Motor Response	Obeys commands for movement	6 points
	Purposeful movement to painful stimulus	5 points
	Withdraws from pain	4 points
	Abnormal (spastic) flexion, decorticate posture	3 points
	Extensor (rigid) response, decerebrate posture	2 points
	None	1 point

Craniotomy
70kg 65years old male

- ♦ **Indication:** Surgical debulking or removal of a brain tumor.
- ♦ **Procedure sequences:** craniotomy is done and a flap of bone is lifted-> durotomy -> surgeon carefully frees the lesion of interest from the surrounding brain tissue-> removing the specimen-> obtain hemostasis-> the site is closed in reversed order.
- ♦ **Consideration:** **pain** control during maximal stimulation with head pinning, scalp incision, cranial opening, and emergence.

♦ TODAY'S ANESTHETIC PLAN

- ♦ GETA with NMR, Possible SSEP / MEP. Remi gtt with 0.5 MAC Sevo.
- ♦ Glidescope for difficult airway

♦ PREOPERATIVE MEDS & DOSES

- ♦ Midazolam (benzo) 2mg IV- decrease anxiety and produce amnesia. Titrate to effect. Be careful with hypoventilation which increases PaCO₂ and vasodilates cerebral arteries- will affect neuro eval.

♦ ANTICIPATED PATIENT POSITION

- ♦ May be supine, lateral, seated, or prone depends on the location of tumor. Both arms tucked at the sides.
- ♦ HOB increased 15-30degrees (venous drainage). Head of the table may be turned away 90 degrees from anesthetist. Surgeon will be in the HOB during pinning. Assist surgeon but do not interfere his/her work.

♦ **INDUCTION MEDS & DOSES**

- ♦ The goal is smooth induction with minimal changes in BP.
- ♦ Lidocaine 1mg/kg, Fentanyl 1-2mcg/kg(or Remi 2-3mcg/kg) IV, Propofol 2-3mg/kg IV, Zemuron 0.6mg/ kg IV NMR(if MEP used, give minimum dose required for DL or do not give at all).
- ♦ Glide scope intubation. A line, 2nd PIV, CVP, Foley
- ♦ Check ABG
- ♦ Check IV patency before tucking arms
- ♦ Reinforcement of ETT placement with tegaderm/ benzoin(especially in Prone)
- ♦ Extension tubing with ETT/ IVs

♦ MAINTENANCE MEDS & DOSES

- ♦ Iso or sevo 0.5MAC if EP(Evoked potential monitoring) is used. Propofol gtt(50-100mcg/kg/min) can be used to further decrease cerebral blood volume, metabolism, and CMRO₂. Remi gtt (0.15- 0.3mcg/kg/min) can be used to supplement the anesthetic agents without interfering with EP monitoring.
- ♦ During Head pinning & intubation, HTN can cause increased ICP. Be ready with bolus of Propofol , Beta blocker (Labetolol or Esmolol), or Fentanyl(or Remi) IVP to blunt the SNS response. (follow preceptor preferences)
- ♦ Nicardipine or SNP IV gtt can also be used.
- ♦ Maintain hyperventilation to decrease ICP.

♦ **EMERGENCY PLAN, INCLUDING ANY “REVERSAL” MEDS & DOSES**

- ♦ Turn off Remi gtt. / propofol gtt and Increase IA to 0.8-1 MAC when close to closing and EP test is over.
- ♦ While the surgeon is suturing(communicate with Surgeon), turn off IA and increase O2 fresh gas flow .
- ♦ Titrate long acting pain med like Dilaudid 0.2- 2mg IV as pt. respiratory status
- ♦ If MR is used, give reversal agent Robinul 0.01mg/kg and Neostigmine 0.05mg/kg
- ♦ Suction pt gently.
- ♦ Extubate and applied NC 2L
- ♦ Take pt. to neuro ICU and give report to RN. Discuss Pain control and PONV mngt with RN.

POTENTIAL PATIENT-SPECIFIC OR CASE- SPECIFIC CONSIDERATIONS/ PROBLEMS

1. HTN with Increased ICP

- ♦ The specific pressure depends on the case and the surgeon's preference.
- ♦ Anticipate HTN with intubation (stimulation) and head pinning (very painful).
- ♦ CPP 20% lower than normal. $CPP = MAP - ICP$ (CVP)
- ♦ Smooth intubation/ emergence are vital in this case

2. Neuro deficits

- ♦ Sustained increase in ICP > 25-30mmHg is associated with severe neurologic injury and poor outcome.
- ♦ Document the preop neurologic assessment thoroughly.

Rating	Observation
0	No muscle contraction is detected.
1	A trace contraction is noted in the muscle by palpating the muscle while the patient attempts to contract it.
2	The patient is able to actively move the muscle when gravity is eliminated.
3	The patient may move the muscle against gravity but not against resistance from the examiner.
4	The patient may move the muscle group against some resistance from the examiner.
5	The patient moves the muscle group and overcomes the resistance of the examiner. This is normal muscle strength.

3. Difficult intubation

- ♦ Use Glidescope.

4. Risk of seizure

- ♦ Know the type/ dose/last time given of seizure meds (phenytoin, carbamazepine, valproate..)

5. Cerebral edema

- ♦ Decadron 8-12mg IV
- ♦ Mannitol(osmotic diuretic) 0.5- 1g/kg IV or furosemide(loop diuretic) 10-20mg IV.
- ♦ Vigorous diuresis - hypokalemia.
- ♦ limit OR fluid to < 10ml/kg + replacement of UO. If volume is needed, administer albumin 5% as required.

6. Cerebral ischemia

- ♦ Hyperventilation to keep PaCO_2 25-30.-> cerebral vasoconstriction.-> decrease CBV(cerebral blood volume) to provide better surgical access and decrease ICP.
- ♦ check ABG post induction and calculate ETCO_2 to PaCO_2 gradient.

7. Anesthetic effects on CMRO_2 , CBF, CBV, ad ICP.

- ♦ IA- Iso is the best. Use IA < 1 MAC (avoid N_2O)
- ♦ MR- Succs may increase ICP transiently. Certain NMR has histamine mediated vasodilation effect
- ♦ Propofol/ Etomidate/ opioids are potent vasoconstrictor.
- ♦ Avoid Ketamine.

8. Interference with EP monitoring

- ♦ Evoked potentials can be monitored in the presence of IA with $< 1\text{MAC}$ (usually 0.5MAC).
- ♦ If MEP is used, avoid long acting NMR or avoid NMR at all if possible. If giving NMR give short acting in minimum dose (Follow preceptor preference).
- ♦ Communicate with monitoring person and the surgeon

9. Air embolism

- ♦ Watch out s/sx of air embolism such as decreasing BP, CO, O₂ sat, ETCO₂, and Mill wheel murmur.
- ♦ Know how to response in case of air embolism.

10. Hemodynamic instability

- ♦ Keep close regulation of BP.
- ♦ Minimize postop cerebral edema by limiting crystalloid volume to < 10ml/kg+ replacement of UO.
- ♦ Maintain normovolemia.

11. Infection

- ♦ Ancef 1g IV (if > 80kg, give 2g Ancef)
- ♦ Carefully monitor head dressing and be careful of bond flap on transfer.

12. Dehydration

- ♦ 4-2-1 rule
- ♦ use fluid replacement judiciously to prevent cerebral edema.

13. PONV

- ♦ Zofran 4-8mg IV and Decadron 8-12 mg IV

14. postop pain

- ♦ Titrate dilaudid 0.2-2mg IV prior to d/c of Remi.

15. Nerve injury

- ♦ maintain head in neutral position (no extension)
- ♦ HOB is usually increased 15-30 degree to help venous drainage

16. ETT displacement/ IV line disconnect/ kink

- ♦ Reinforce the ETT placement with Tegaderm and benzoin.
- ♦ extension tubing on all IVs. check the patency of all lines before tucking the arms
- ♦ Smooth emergence is imperative.

17. Hypothermia

- ♦ bair hugger LE.
- ♦ Know the complication r/t to hypothermia- risk of MI, interference with monitoring, Hypoperfusion ,coagulopathy, hyperglycemia, accentuation of residual sedations.

18. Corneal Abrasion

- ♦ Paper tape and Eye ointment

17. Hyperglycemia

- worsen neurological outcome Due to neural apoptosis.

ENT: Total Laryngectomy

61 yo male with PMH 40 pack year smoker, prior heavy ETOH use. PSH left arm orif presents with laryngeal carcinoma requiring total laryngectomy.

Brief description:

Total removal of the larynx.

Reinforced tube.

Risk of airway fire.

Stoma either at beginning or end of surgery

Be prepared to make airway changes during surgery

GETA and MR are essential, check with surgeon for MR.

ENT: Laryngectomy

PREOP MEDS & DOSES:

Versed 5 mg IV (titrate)

ANTICIPATED PATIENT POSITION:

Supine

INDUCTION MEDS & DOSES:

Lidocaine 80 mg

Fentanyl 200 mcg

Propofol 200 mg

Rocuronium 50 mg

Decadron 10 mg

MAINTENANCE MEDS - DOSES:

Sevoflurane 2%

Fentanyl 50 mcg prn

Dilaudid 0.4-1 mg titration

EMERGENCE PLAN, INCLUDING ANY "REVERSAL" MEDS & DOSES:

Neostigmine 4 mg

Robinul 0.8 mg

Ondansetron 4 mg

Awake to PACU

ENT: Anesthetic Considerations

Tracheal anatomy may be affected –

- Preop assessment of the airway, review CT neck and chest
- Have emergency equipment available.
- If compromised, use premedication judiciously. **Consider awake intubation or tracheotomy**

Hx often smokers, ETOH abuse with liver dysfunction, COPD, chronic bronchitis.

- Preop ABG, PFT, saturation, CBC, LFT, Coags, chem 7

Antisialagogues (scopolamine or robinul) or antihistamines (Benadryl or Tigan) can be given to ↓ oral secretions

Surgeon working close to head :

- Eye care: ointment, paper tape, eye pads, goggles

ENT: Anesthetic Considerations

Positioning

- Supine with shoulder roll to slightly extend head
- Arms are tucked
- Slight reverse Trendelenburg.
- 90 or 180 degrees turned away from anesthesia.
- **Will need extensions for all tubing, including IVs & invasive lines.**

Some surgeons like having OGT in place to better feel the esophagus

ENT: Anesthetic Considerations

Risk of Airway Fire

Communicate with the surgeon especially when the trachea is being entered and bleeding will need to be cauterized by bovie.

Decrease O₂ to 30% before cautery .

The surgeon will request the ETT to be pulled back slowly as the incision for the tracheotomy is made. There is risk of airway fire at this point if electro cautery is used above the exposed ETT.

Despite this, 100% oxygen should be used because of the possibility of desaturation.

***** note conflicting information!! Discuss with surgeon!!**

The surgical tech will have a bottle of sterile NS on the field as back up to extinguish an airway fire.

ENT: Anesthetic Considerations

Risk of swelling - Decadron 10mg IV per surgeon

Improve connection to ventilator – use flex tube extension

Risk of bleeding, hematoma, suture line disruption

- Type and CM
- MAP goal 60-70mmg
- **Typical EBL:200-1,000 mL**
- Smooth emergence
- Antiemetics

ENT: Anesthetic Considerations

Monitors and IV access:

a-line (possible), 2 large bore IVs

IV fluids and volume req's:

NS or LR, keep normovolemic or slightly dry

Risk of drying of secretions and mucous plugs :

warmed, humidified gases

Risk of bradycardia

Notify surgeon. Surgeon may infiltrate area with Lidocaine.

Atropine can be administered.

ENT: Anesthetic Considerations

Surgical concerns:

Case generally starts with ETT

The surgeon will manipulate & eventually remove ETT when tracheotomy or tracheostomy is placed.

There may be times when the ETT/trach is not in the pt. This can last several minutes.

Vigilance is required as well as good communication w/ surgeon to prevent desaturation

ENT: Anesthetic Considerations

Procedure description:

Total laryngectomy includes excision from posterior third of tongue (or vallecula) to first or second tracheal rings.

A tracheotomy is placed for surgery, but then the trachea is usually placed end to skin & the trach tube may no longer be needed.

Thyroid gland is spared unless it is part of specimen.

Supraglottic/hemi/near-total laryngectomies are all variations of the procedure.

Frequently accompanied by neck dissection, pharyngectomy.

ENT: Anesthetic Considerations

Complications:

- **Fistula formation (5-20%)**
- **Bleeding**
- **Hematoma**
- **Infection**
- **Nerve injury: facial n. (facial droop), phrenic n. (ipsilateral diaphragmatic paralysis)**
- **Parathyroid damage**
- **Pneumothorax**
- **Subcutaneous emphysema**

ENT: Anesthetic Considerations

Muscle relaxation to be determined by surgeon

- **Neuro monitoring may be needed for facial nerve.
If so, avoid muscle relaxants**

Venous air embolism is possible from large open veins in neck.

- **Monitor ETCO₂ - may also use precordial Doppler**

ENT: Clinical Pearls

Likely history of smoking and etoh. Check cardiac history

Dr. Ho says for him it is **Ok for us to intubate with regular tube, but tape the tube north** (like we do for oral surgery)

Use a **glidescope** especially if the tissue is friable

When **switching** ETT for stoma, use **reinforced** tube.

Decrease **O₂ to 30%** when approaching the airway

At the end of surgery, apron sutures- stoma- he extubates.
2 drains will be in the lateral sides. NGT will be sutured in place.

ENT: Clinical Pearls

Premed with Robinul 0.1mg

Indigo is used in the oropharynx at the end to test the sutures.

Suction the back of the throat at the end of the case (performed by PA)

Note manufacture and size of tracheostomy, have obturator on transport to ICU.

Use trach collar for O₂.

Ortho Careplanning

What to review

- ♦ *Spinal*
- ♦ *Regional*
 - ♦ Interscalene
 - ♦ Femoral
 - ♦ Sciatic
 - ♦ Popliteal
 - ♦ Bier block
- ♦ **Management of the positions**

Total Knee Replacement

- ♦ 67 year old female
- ♦ PCN allergy
- ♦ H/O Tonsillectomy, adenoidectomy, THR, hysterectomy, cholecystectomy
- ♦ PONV with previous surgeries, no motion sickness
- ♦ OA
- ♦ HTN
- ♦ DM II
- ♦ Meds
 - ♦ Lisinopril
 - ♦ Simvastatin
 - ♦ Metformin
 - ♦ MVI
 - ♦ Calcium
 - ♦ Fish Oil (Last dose 1 week ago)

Total Knee Replacement

Position

- ♦ Sitting for spinal placement then placed supine

Preoperative Medications

- ♦ *Versed* IV 2 mg
- ♦ *Fentanyl* IV up to 100 mcg titrated
- ♦ *FIO₂*
- ♦ *Femoral* catheter placed after Marcaine 0.2% 20 ml injected
- ♦ *Sciatic* => Marcaine 0.5% 20 ml

Induction Medications

- ♦ Spinal => *Bupivacaine* 0.75% in Dextrose 8.25% 1.4 ml => 10.5 mg
- ♦ *Propofol* infusion titrated per patients response

Emergence

- ♦ *Propofol* infusion discontinued

Total Knee Replacement

Estimate Blood Volume

- ♦ 3,575 ml

Allowable Blood Loss

- ♦ 715 ml

Labs

- ♦ Blood Glucose 135
- ♦ H&H 13.1/39.3
- ♦ CMP WNL

Total Knee Replacement

Potential patient-specific or case-specific considerations/problems

Risk for intraop & post op pain

- ♦ Ultrasound guided femoral block & catheter placement
- ♦ Spinal
 - ♦ Verify spinal needle placement
 - ♦ Position supine
 - ♦ Verify level of block

Risk for Hematoma

- ♦ Avoid multiple needle insertions
- ♦ Do not perform blocks in anticoagulated patients
- ♦ Stop procedure for arterial or venous puncture
- ♦ Apply pressure to puncture site for 2-3 minutes

Risk for vascular puncture

- ♦ Know anatomy
- ♦ Stop procedure if vascular puncture occurs
- ♦ Apply pressure to puncture site for 2-3 minutes
- ♦ Sciatic block
 - ♦ Avoid deep needle insertion

Total Knee Replacement

Risk for nerve injury

- ♦ Use ultrasound and/or a nerve stimulator
- ♦ Slow needle advancement
- ♦ Pain on injection=> withdraw needle and redirect

Risk for infection with neuraxial placement, femoral block, sciatic block, and surgical procedure

- ♦ Use sterile/strict aseptic technique
- ♦ If continuous catheter is used, remove after 48-72 hours
- ♦ Administer prophylactic antibiotic within 1 hour of initial incision

Total Knee Replacement

Risk for hemodynamic instability (↓ BP, ↓ HR)

- ♦ Preload and follow 4-2-1 rule
- ♦ Emergency drugs drawn up & dated
 - ♦ Ephedrine
 - ♦ Phenylephrine
 - ♦ Robinul
 - ♦ Atropine
 - ♦ Epinephrine??

Total Knee Replacement

Risk for nerve injury with spinal placement

- ♦ Verify lab work
- ♦ Utilize a 25G Whitacre spinal needle
- ♦ Avoid multiple sticks
- ♦ Stop procedure with vascular puncture & apply pressure

Risk for hypothermia the first 30 minutes of surgery

- ♦ Warming devices

Total Knee Replacement

Risk for PDPH

- ♦ Utilize 25G Whitacre or Sprotte spinal needle

Risk for respiratory difficulty

- ♦ When patient complains of SOB or difficulty breathing ask the patient to blow air into your hand or squeeze your fingers as hard as possible

Risk for diabetic complications

- ♦ Glycemic management

Possible difficult airway

- ♦ Ask patient to do prayer sign
- ♦ Have appropriate airway equipment readily available

Risk for aspiration

- ♦ Insert OGT to decompress stomach if intubated

Total Knee Replacement

Risk for CV compromise

- ♦ Optimize BP

Risk for PONV

- ♦ Fluids
- ♦ Prevent/treat hypotension
- ♦ Prevent hypoxia
- ♦ Optimize blood glucose
- ♦ Propofol used for MAC case
- ♦ Control pain
- ♦ Administer Antiemetic
 - ♦ Decadron
 - ♦ Zofran

Total Knee Replacement

Dehydration

- ♦ 4-2-1 rule
- ♦ Account for insensible loss and NPO status
- ♦ Fluid bolus prior to spinal

Risk for nerve injury

- ♦ Ensure proper alignment with padding

Risk for DVT's

- ♦ Verify sequential compression hose are in place

Total Knee Replacement

Risk for bleeding

- ♦ Verify type & cross-match done preoperatively
- ♦ Establish 2 large bore peripheral IV's
- ♦ Controlled hypotension

Risk for tourniquet complications D/T overpressurization

- ♦ Set 50-100 mmHg above the patients systolic pressure
- ♦ Tourniquet release after 2 hours

Risk for tourniquet complications D/T underpressurization

- ♦ Set 50-100 mmHg above the patients systolic pressure

Total Knee Replacement

Risk for tourniquet pain

- ♦ Do not extend tourniquet time beyond 2 hours
- ♦ Administer narcotics appropriately

Transient decreased BP, increase in ETCO₂, metabolic acidosis, decrease in oxygen saturation with tourniquet deflation

- ♦ Fluid bolus
- ♦ Moderate-to-Severe lung disease and intubated continue ventilation

Risk for skin and subcutaneous tissue damage

- ♦ Verify skin is wrapped with cuff padding

Total Knee Replacement

Risk for complications of MMA bone cement

- ♦ ***Hypotension***
 - ♦ Aggressive fluid resuscitation
 - ♦ Alpha agonists
- ♦ ***Desaturation/Hypoxia***
 - ♦ Increase FIO₂ during cementing
- ♦ ***Fat Embolism***
 - ♦ Supportive
 - ♦ Oxygenation & Ventilation
 - ♦ Corticosteroids
 - ♦ Long bones are immobilized
 - ♦ Albumin administration

Total Knee Replacement

Risk for LA toxicity

- ♦ Halt injection of LA
- ♦ Assess ABC's/Prepare to secure airway
- ♦ Be prepared to initiate ACLS
- ♦ Administer 100% O₂
- ♦ Administer a benzo for seizures
- ♦ Administer 20% Intralipid
- ♦ Obtain a series of cardiac troponin levels

Total Knee Replacement

Risk for Bupivacaine Cardiotoxicity

- ♦ 100% O₂
- ♦ Intubate & initiate mechanical ventilation
- ♦ ACLS if indicated
- ♦ Promptly treat ventricular arrhythmias
- ♦ Support BP with vasopressors
- ♦ Consider Calcium Chloride
- ♦ Check ABG frequently
- ♦ Treat acid-base disturbances aggressively
- ♦ Administer 20% IL
- ♦ Consider open cardiac massage &/or cardiac bypass

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