MASSACHUSETTS GENERAL HOSPITAL

MGH Pancreas ERAS Pathway
Updated 07.29.2021

ANESTHESIA BUNDLE

Element	Definition
Preoperative Testing Surgeons, residents, fellows PPE/PATA Anesthesia	• In accordance with hospital policy, all patients should receive an anesthesia preoperative phone call, or visit, per departmental guidelines, prior to the day of surgery. Anesthesia consultant will communicate any recommendations for further testing with primary surgeon's office. • Patients with high degree of medical or anesthetic complexity as assessed by the surgeon at the preoperative visit should be referred to anesthesia for preoperative evaluation per institutional best practice via e-mail at least 7 days prior to surgery to facilitate preoperative workup • In accordance with departmental guidelines, patients older than 65 and patients with a history of cardiac disease should have an EKG performed within 6 months of surgery • A CBC, CMP, PT/INR, HBA1C, Type and Screen, CEA, and CA 19-9, should be performed within 30 days • Routine preoperative chest x-rays are not indicated • Diabetic patients should have a preop fingerstick on day of surgery
Preoperative Medication Management Surgeons, residents, fellows PPE/PATA Anesthesia	• Hold ACE inhibitors and ARBs on the day of surgery • Take prescribed beta-blockers on the day of surgery • Patients on long-acting narcotic therapy (e.g. OxyContin) should take their extended-release narcotic on the day of surgery • Anticoagulation management will be at the discretion of the primary surgeon
Preemptive Analgesia Surgeons, residents, fellows CPC / pre-op Nursing Anesthesia	• Patients should receive 975mg to 1,000mg of acetaminophen orally prior to surgery • Patients should NOT receive gabapentin or celecoxib prior to surgery
Pre-operative Fluid Management Anesthesia	• Saline lock IVs prior to arrival in operating rom • OK to access Porta-Cath
Premedication CPC / pre-op Nursing Anesthesia	• Routine premedication with midazolam is discouraged in older patients • Regional anesthesia placement may be facilitated by fentanyl +/- midazolam for procedural sedation; however, patients over 65 should receive no more than 1 mg IV midazolam (fentanyl only sedation preferred)
Intraoperative Antiemetic Prophylaxis Anesthesia	• Unless contraindicated, patients should receive intraoperative antiemetic prophylaxis with dexamethasone 0.1mg/kg (max 8mg) IV and at least one of the following medications: 1. Zofran 4mg IV 2. Haloperidol 1mg IV 3. Scopolamine patch (should not be used in patients over 65)
Postoperative Antiemetic Use Surgeons, residents, fellows Anesthesia PACU Nursing Floor Nursing	• The following medications are acceptable for rescue antiemetic use: 1. Zofran 1-4mg IV 2. Haloperidol 1mg IV 3. Metoclopramide 5-10mg IV 4. Promethazine 6.25-12.5mg IM • The first line rescue antiemetic given in the PACU should be a drug not given pre- or intraoperatively
Intraoperative Medication Use Anesthesia	• The following medications are **NOT PREFERRED** and should be avoided if possible: 1. Isoflurane 2. Morphine • Fentanyl is the preferred narcotic for intraoperative use • Total intravenous anesthesia (TIVA) is preferred for appropriate patients

	• Remifentanil infusions should be used sparingly given concern for remifentanil-induced hyperalgesia • Antibiotic prophylaxis should be provided with appropriate antibiotic per institutional guidelines within 60 minutes of incision • In the absence of epidural placement, multimodal analgesia should be achieved with use of two or more of the following, unless contraindicated: 1. Ketamine 0.5mg/kg bolus and 5mcg/kg/min 2. Lidocaine 1mg/kg bolus and 1.5mg/kg/hr (should not be used for patients receiving regional anesthesia) 3. Dexmedetomidine 0.5mcg/kg/hr 4. Non-epidural regional anesthetic techniques
Neuromuscular Blockade Anesthesia	• NMB may be maintained with either rocuronium, vecuronium or cisatracurium; cisatracurium is preferred in patients with renal dysfunction • Adequate offset of neuromuscular blockade should be ensured with either: sustained handgrip on 100 Hz tetanic stimulation of >5 seconds or quantitative TOF monitor with ratio >0.9 or documentation of adequate conditions for reversal (>2 twitches) and appropriate dose of reversal agent per best practice.
Intraoperative Fluid and Ventilation Management Anesthesia	• Intraoperative fluid management should be aimed at maintaining adequate end-organ perfusion while minimizing iatrogenic volume overload • Hypotension alone should not necessarily be treated with fluid boluses unless other clinical signs point to hypovolemia • Vasopressors should be considered a first line treatment for hypotension due to induction of general anesthesia • Insufficient data exists for noninvasive cardiac output monitors (NICOMs) to recommend their routine use; however, clinicians may opt to use these devices to guide resuscitation in patients whose volume status is difficult to ascertain clinically. NICOMs or other measures of volume status should be used in cases where fluid administration exceeds 1600 mL of IV Fluid or EBL exceeds 500 mL. • Best Practice: o No fluids should be administered in preop holding o If patients are hypotensive with other indicators of hypovolemia, crystalloid boluses should be given at no more than 3-5mL/kg/hr with appropriate time allowed for clinical response o Colloid may be substituted for crystalloid at the anesthesiologist's/surgeon's discretion • Urine output o Accept urine output of 0.2mL/kg/hr o Do not give fluid to treat low urine output if other data imply euvolemia • Ventilation strategy o Goal ventilation strategy should be TV of 5-7 mL/kg of IBW with PEEP $\geq$ 5 cm H_2O
Postoperative Analgesia Surgeons, residents, fellows Anesthesia PACU Nursing Floor Nursing	• Patients should receive scheduled acetaminophen 650gm PO q 6 hrs • If patients are unable to tolerate PO meds, then intravenous acetaminophen 1gm IV q 6 hrs should be administered • Narcotic therapy should be minimized 1. First line rescue therapy for mild to moderate pain should be a non-narcotic such as Acetaminophen or adjustment of regional analgesia catheter 2. Oxycodone 5-10mg PO or tramadol 50-100 mg PO are the preferred first line narcotic agents; IV narcotic therapy should be used for third line rescue use only for patients tolerating oral agents 3. For patients receiving IV narcotic therapy, PCA is preferred rather than intermittent IV bolus dosing • Patients undergoing planned open surgery should consider regional anesthesia unless otherwise contraindicated. Patients who do not undergo epidural placement should be considered for regional anesthesia to assist with postoperative analgesia.
Regional Anesthesia Catheter Management Surgeons, residents, fellows Anesthesia PACU Nursing Floor Nursing	• Regional anesthesia catheters should be removed by post-op day 4.

SURGICAL BUNDLE

Element	Definition
Demarcation and Verification as ERAS/SSI Patient Surgeons, residents, fellows Surgical clinic nursing	• All patients undergoing Whipple or Distal Pancreatectomy are considered ERAS patients
Patient Education Surgeons, residents, fellows Surgical clinic nursing PPE/PATA	Educational material will be provided by the surgeon's office at the time of booking covering: 1. Preoperative discharge preparation including dietary recommendations, home preparation, physical activity, and alcohol/tobacco abstinence 2. Day of surgery workflow / expectations 3. ERAS pain control methodology, including regional anesthesia 4. Routine postoperative care and expectations
Preoperative Nutritional Supplement Surgeons, residents, fellows Surgical clinic nursing	• All patients should receive a preoperative nutritional supplement drink prior to surgery. • Patients should be given instructions to drink one of the accepted carbohydrate drinks starting 4 hours before induction and finishing no later than 2 hours prior to induction • Acceptable pre-op nutritional supplement drinks: Pedialyte 1 serving
Preoperative antibacterial shower Surgeons, residents, fellows Surgical clinic nursing	• Shower/bathe with liquid chlorhexidine soap for 2 days prior and on the morning of surgery per institutional best practice.
Maintenance of Normothermia Surgeons, residents, fellows Anesthesia OR Nursing	• Actively warm before and throughout surgery to achieve target temperature of 36° C using one or more of the following: 1. Room temperature at >68° F until patient prepped and draped 2. Fluid warming device 3. Forced warm air under-body or over-body device
Intraoperative Skin Prep Surgeons, residents, fellows OR Nursing	• Acceptable skin preps: 1. Chloroprep is the preferred skin prep 2. Duraprep is an acceptable substitute 3. Prep must be allowed to air-dry (minimum 3 minutes) before draping and incision 4. Exclusive iodine-only solutions are not acceptable except in emergent cases
Intraoperative Drain Placement Surgeons, residents, fellows OR Nursing	• Nasogastric tubes should be removed on POD #1. • Drain care per surgeon orders
Optimized Postoperative Fluid Management Surgeons, residents, fellows Anesthesia PACU Nursing Floor Nursing	• Initial postoperative fluid orders: 75mL/hr or 1 mL/kg/hr, discontinue within 36 hours or once PO intake > 500 mL Postoperative Hypotension and Fluid Responsiveness: • Do not intervene unless: 1. MAP < 65 **or** 2. UOP < 0.2 mL/kg/hr **and** patient has other signs of hypovolemia • If any of the above occur, the patient should be examined and causes of hypotension other than inadequate fluid administration excluded (e.g. bleeding, myocardial ischemia etc.) • If the patient meets above criteria, initial response may be: 1. Crystalloid or colloid 250mL bolus up to 3 times and/or 2. Vasopressors if patient is in a step-down or ICU setting (consider placing patients in such a setting if you anticipate fluid management challenges)

	• Failure to respond appropriately should result in: 1. A call to the senior resident or attending before administering additional fluid 2. A more objective measure of fluid status. Inferring fluid status is difficult and frequently inaccurate. Ideally, non-invasive monitoring should be made available (e.g. ultrasound machines that allow simple echocardiography). 3. The on-call Acute Pain Service (APS) resident or equivalent anesthesia provider on call should be notified for patients with fluid-refractory hypotension with an epidural.
PACU Care PACU Nursing	• Incentive spirometry • Fingerstick glucose every six hours. • Head of bed at 30 degrees.
Early Postoperative Diet Advancement Surgeons, residents, fellows PACU Nursing Floor Nursing	• For Proximal Pancreas Surgery (Whipple): o PACU/POD 0: NPO except ice chips o POD 1: NPO except sips of water o POD 2: Clear liquids or full liquids o POD 3: Full liquids o POD 4 and onward: Soft diet o Diabetic diet if appropriate o If nausea or vomiting, delay advance until symptoms have improved. • For Distal Pancreas Surgery: o POD 0: NPO except sips of water o POD 1: Clear liquids or full liquids o POD 2: Full liquids o POD 3 and onward: Soft diet o Diabetic diet if appropriate o If nausea or vomiting, delay advance until symptoms have improved.
Early Postoperative Mobilization Surgeons, residents, fellows PACU Nursing Floor Nursing	• The following activity orders should be placed for all ERAS patients: 1. Patients should be out of bed as soon as tolerated with goal by POD#1 to be OOB for all meals and at least 8h per day. 2. Patients should be OOB to chair at the latest 3-6 hours postoperatively (goal would be OOB to chair in the PACU, if tolerated). Patients may ambulate as tolerated starting immediately postoperatively. 3. On POD #1 and thereafter: Ambulate in hallway at least 3 times daily • Patient may shower on POD 3. • Expectations regarding early postoperative mobilization will be clearly conveyed to patients with patient education bundle. • The Acute Pain Service (APS) on-call resident or equivalent anesthesia provider on call should be notified for any patients who are unable to ambulate due to leg weakness from an epidural.
Early Urinary Catheter Removal Surgeons, residents, fellows PACU Nursing Floor Nursing	• Urinary catheters should be removed POD 2
DVT prophylaxis Surgeons, residents, fellows CPC / pre-op Nursing OR Nursing PACU Nursing Floor Nursing	• Pre-operative DVT prophylaxis per primary surgeon orders. • DVT prophylaxis per departmental guidelines while regional anesthesia catheters are in place. • After regional anesthesia catheter removal or for patients without regional anesthesia catheters, patients should receive DVT prophylaxis per institutional best practice.
Post-Operative Labs Surgeons, residents, fellows PACU Nursing Floor Nursing	• POD 1: CMP, CBC, magnesium, phosphate, amylase • POD 2: CBC, BMP • POD 4: CBC, BMP
Post-Operative Meds Surgeons, residents, fellows PACU Nursing Floor Nursing	Scheduled pain meds in absence of epidural catheter. If patient has an epidural catheter, please contact the Acute Pain Service for assistance with narcotic medications: • Oxycodone immediate release 5-10 mg PO q4 hrs PRN

	Pain Meds: • Tylenol 650mg PO q 6 hrs Fever or mild pain: • Ibuprofen per primary surgeon order • Ketorolac per primary surgeon order Moderate pain if no epiudral: • Oxycodone immediate release 5-19mg PO q4 hrs PRN Severe pain if no epiudral: • Morphine 2-6mg IV q 4 hrs PRN • Hydromorphone 0.2-0.5mg IV q 4 hrs PRN Antiemetic: • Zofran 4mg IV/PO q 6 hrs PRN • Compazine 10mg PO q 6 hrs PRN • Reglan 10mg IV/PO q 8hrs PRN Antibiotics: • Per primary surgeon order (should be discontinued within 24 hours unless clinically indicated for source control).
GI Prophylaxis Surgeons	GI Prophylaxis • Proton pump inhibitor per primary surgeon order