**Johns Hopkins Anesthesiology Colorectal ERAS Pathway**

To be administered by a designated ERAS anesthesia provider (CRNA or anesthesiologist).

**Preoperative:**

GOALS: Prevention of pain, nausea and vomiting, disruption of metabolism and hypothermia.

1. Preoperative analgesics/postoperative nausea vomiting prevention with sip of water:

-Gabapentin 600 mg PO x1

-Do *not* give to patients on hemodialysis, 300mg for pts with ↓ renal fxn, age >70

-Acetaminophen 1 gm PO x1

-Do *not* give to patients with liver failure or ↑ liver enzymes

-Celebrex 200mg PO x 1

-Do *not* give to patients with allergic-type reactions to sulfonamides

-Scopolamine patch x1

-Do *not* give to patients with angle-closure [narrow angle] glaucoma

2. Convective warming blanket to be started in the pre-anesthesia holding area.

3. Carbohydrate drink (e.g., Gatorade – clear liquid) 2 h prior to surgery.

*-Please consider ordering preoperative meds the night before surgery.*

**Intraoperative:**

GOALS: maintain normothermia (>36 C); avoid blood transfusions; minimize hypotension/hypoxia; maintain normocarbia.

AVOID: ketamine; inhalation agents, opioids

**For All Patients:**

1. Metronidazole (Flagyl) 500mg with no redosing/cefazolin (Ancef) 2 gm (3 gm for patients >120kg) IV (clindamycin and gentamicin for Penicillin allergy). Cefazolin should be redosed every 4 hours.

2. Heparin (unfractionated) 5000U subcutaneous at time of incision (earliest time given = 1 hour after epidural insertion).

3. Warming: IV fluid warmer; upper and lower body (convective) heater, circuit humidified 50% low flow oxygen (<2-3 liter/min).

4. Fluids (goal is euvolemia): Initial LR carrier at 1-3 ml/kg/hour. If hypotensive, consider use of phenylephrine, with additional boluses of 250-500ml LR, titrating to desired effect. May adjust carrier rate as desired for open abdomen maintenance or bolus as appropriate. May give 5% albumin (250ml bolus) judiciously as needed.

5. Magnesium: 2 g/hr rate to a total of 4 g (2 hour infusion) – start on induction.

6. Lung-protective ventilation strategy: Tidal volume = 6-8 ml/kg of predicted body weight, PEEP 2-5, intermittent recruitment maneuvers (every 30 minutes) with 30 PEEP x 30 seconds

7. Analgesics: Ketorolac 30 mg IV at end of case (decrease to 15 mg IV for age >75).

8. PONV prophylaxis: ondansetron 8mg IV 30 min prior to end of case (NO dexamethasone).

9. Muscle relaxant: titrate to effect, reverse fully at end of case.

-*Note: For* *breakthrough pain provide intermittent fentanyl or hydromorphone as first-line agent*

-*Note: no epidurals for laparoscopic cases; APS to write for* ***all*** *postoperative analgesia orders from day of surgery - can write orders on these patients while they are in the OR; no IV PCA for ileostomy reversals.*

-*Intraoperative Anesthesia Team: please page/ping the Acute Pain Service pager and provide the relevant patient information (name. MR #, surgeon, epidural status, etc) so that appropriate preparation can be made for a smooth transition in the PACU or ICU.*

-*Phenylephrine infusion: titrate to maintain appropriate BP (please set up before start of case) or offset the reduction in vascular resistance associated with epidural usage (see below).*

**For EPIDURAL ANALGESIA-GENERAL ANESTHESIA:**

-**TIVA**: propofol infusion; *midazolam* IV as indicated on induction; titrate to BIS of 40-60 (no inhaled agents – either nitrous oxide or inhaled fluorinated agents)

-**Epidural** (T7-8): 2% *lidocaine* with 1:200,000 epinephrine as a test dose (3 ml) followed by a bolus (up to ~10ml in divided doses) to obtain T4 level. This is followed by an infusion of 2% lidocaine (no epinephrine) at 4-6ml/hr. Consider giving an appropriate bolus (4 -6 ml) of 0.25% bupivacaine via epidural at end of case depending on the clinical status of the patient.

**For GENERAL ANESTHESIA (No epidural):**

-TIVA + opioid

-**TIVA**: propfol gtt as needed; midazolam IV on induction; titrate to BIS of 40-60.

-**IV Lidocaine infusion**: ~1.5mg/kg bolus on induction + ~1.5 mg/kg/h – stop at end of surgery. 20cc syringe with two 10cc ampules of lidocaine 2%.

-Opioid: fentanyl or hydromorphone IV as needed

-Transversus Abdominus Plane (TAP) Block for laparoscopic cases/ileostomy reversals.

-Please obtain consent preoperatively

**Postoperative:**

Goals: superior pain control, be opioid sparing (‘opioid free’ by three days after surgery), promote early mobility and oral intake.

*While patient is NPO:*

-PCEA: 0.0625% or 0.125% *bupivacaine only* (no fentanyl) at 5ml/h + 3ml q10min PRN

-Adjuvant agents (assuming no contraindications):

-Acetaminophen 1 gm IV x1 dose

-Ketorolac 30 mg IV Q6h (decrease to 15 mg IV Q6h for age >75; max 5 days total).

-Lidoderm patch 1-2 patches at incision site every 24 hours.

-Breakthrough pain: replace epidural if needed; hydromorphone IV Q3h prn (if needed, order IV PCA hydromorphone for pain not controlled with above analgesic meds).

*When oral intake resumes:*

-Tramadol 50 mg PO Q4h PRN (max dose: 400mg/d, or 300mg/d age >75 y)

-A*void* in patients with h/o seizures and those taking SSRIs

-Acetaminophen 1 gm PO Q8h

-Gabapentin 100 mg PO TID. APS may titrate upward as tolerated.

-NSAID around-the-clock: Ibuprofen 400 mg PO Q6h

-*Avoid* in patients with decreased renal function.

-*Breakthrough pain (if tramadol fails): PRN opioid (eg, hyrdomorphone 2 mg PO Q4h PRN breakthrough pain; no combination products – eg, Percocet).*