DukeMedicine

Enhanced Recovery after Surgery (ERAS) Pathway

For open and laparoscopic liver resection

DAY of SURGERY

1. Carbohydrate drink: Given to patient by preop screening to drink 1 hour before scheduled arrival time.

DAY of SURGERY, PREOP HOLDING

1. Preop nursing staff will
    a. IDENTIFY ERAS patient and initiate protocol
    b. DOCUMENT if CHO drink was taken and document time
2. Multimodal analgesia and anti-emetics to be given (analgesia to be ordered by surgery)
    a. Gabapentin 600 mg PO
    b. Naproxen 500 mg PO
    c. Scopolamine patch for high risk PONV patients
3. Discussion with surgery about ERAS preop and intraop elements including
    a. Estimated length of surgery
    b. Estimated hospitalization (days)
    c. Estimated blood loss
    d. Postoperative destination
    e. Pain management plan
4. Mid thoracic epidural
    - T7-9 unless contraindicated. Relative CI includes extended resections and pre-existing liver failure with increased chance of postoperative coagulopathy. Discuss with attending surgeon.

INTRAOPERATIVE

1. ARTERIAL LINE AND LARGE BORE PIV X2
2. ADMINISTER VT PROPHYLAXIS - 5000U heparin SC can be given immediately after epidural placement
3. MULTIMODAL ANALGESIA

(A) Thoracic epidural in-situ

- Hydromorphone 0.4 mg-0.8 mg (epid) before induction of anesthesia
- Open cases - consider lidocaine bolus at least 10 minutes pre-incision (40-100 mg epidural)
- Run infusion of Epidural 0.125% bupivacaine / hydromorphone 10mcg/ml throughout case (3-6 ml/hour) as tolerated
- GOAL IS TO AVOID IV OPIOIDS. No intraoperative IV opioids after induction without discussion with Attending Anesthesiologist. If patient is frail this may be achieved with epidural hydromorphone alone, especially in laparoscopic cases
- 15 mg IV ketorolac towards the end of the case if good hemostasis (confirm with surgeon)
- In chronic pain patients consider adding pre-incision IV ketamine 0.3-0.5mg/kg and infusion 4 mcg/Kg/min during surgery

(B) Thoracic epidural unsuccessful or contraindicated

- IV ketamine pre-incision bolus 0.3-0.5mg/kg and infusion 4mcg/kg/min
- IV lidocaine pre-incision bolus 1mg/kg and infusion 0.5 - 1 mg/kg/hour
- Hydromorphone boluses as needed
- 15 mg IV ketorolac towards the end of the case good hemostasis (confirm with surgeon)

4. ANTIBIOTIC PROPHYLAXIS
    a. First line – Cefazolin 2g IV (3g if >120Kg). Re-dose after 4 hours. Add metronidazole 500mg IV if biliary involvement. No metronidazole redose.
    b. Second line – Clindamycin 600mg IV (redose 6 hours) + ciprofloxacin 400mg IV (no redose).
5. LOW FLOW ANESTHESIA with isoflurane at flows ≤1l/min
6. GASTRIC TUBE - orogastric tube to be removed at the end of surgery
7. PONV prophylaxis – dexamethasone 4mg IV at start of case (avoid in unstable diabetes), Zofran 4mg IV when closing
8. FLUID THERAPY

Part 1 - until liver specimen removed – run patient 'dry'

- LR infusion 3ml/Kg/hour only based on IDEAL BODY WEIGHT.
- Goal is to run the patient 'dry' with permissive hypovolemia. Albumin to replace blood loss 1:1 if hypotensive. Phenylephrine infusion as needed.

Part 2 - once liver specimen removed – optimize with Goal Directed Fluid Therapy

- Continue LR infusion 3ml/Kg/hour
- GDFT with boluses of colloid to optimize SV/SVV using a CO monitor
- Record stroke volume (SV)
- Give a 250ml colloid bolus over <15 min (can omit if SVV < 10%)
    - If SV increases by >10 % repeat bolus
    - If SV increases by < 10% patient does not require a further bolus
    - Record peak value achieved
    - If still hypotensive consider phenylephrine bolus or infusion
    - Give a further colloid bolus when SV drops 10% from peak value
    - Repeat cycle

8. VENTILATION/OXYGENATION
    - Maintain TV 6-8ml/kg IBW
    - If oxygenation OK, consider no PEEP until after liver specimen removed

Revision History:

Version: 2 Created by: Timothy Miller, MB Date: 4/2016