Updated: April 2019.

ERAS Pediatric Craniosynostosis Pathway
Preop & Intraop Components

Pre-Admit

- **Screening & Optimization: T&S, CBC, coags (in order of priority)**
- **If anemic or if patient is Jehovah's Witness, optimize Hct preoperatively with iron supplementation and erythropoietin given SQ 3-4 weeks prior to surgery**
- **Additionally, if patient is Jehovah's Witness, surgeon to order cell saver and hematology consult for additional recommendations**
- **Airway evaluation and comorbidity management as needed in Anesthesia Pre-Care clinic visit**
- **Education provided during patient's clinic visit**

Preop DOS

Labs if not obtained prior to DOS

- T&S, CBC, coags (in order of priority)
- Post arterial line placement, send baseline ABG

Pre-emptive Analgesia

- Acetaminophen PO:
  - <40 kg: 15 mg/kg
  - 40-59 kg: 650 mg
  - >/=60 kg: 1000 mg

Fasting and Carbohydrate Loading Guidelines

- NPO breast milk 4 hours, formula 6 hours, solid food 8 hrs prior to scheduled arrival time. Clear fluids (recommend Pedialyte or apple juice) up to 2 hrs prior to scheduled arrival time.

OR set-up guidelines

Emergency drugs available: succinylcholine, atropine, epinephrine, calcium
Arterial line and PIV x2 setup
Blood and albumin in the room
Order blood as split packs for children <20 kg; for >20 kg, order 2 units

Intraoperative

Types, Doses, and Routes of Anesthetics Administered

- Sevoflurane inhalation induction +/- Nitrous oxide
- Maintenance with volatile agent titrated to MAC 0.5-1
- Discontinue nitrous oxide post induction to avoid VAE
- Use NMB (reverse at end of case)

Mechanical Ventilation Strategy

- Controlled ventilation: 8 ml/kg IBW, PEEP 4

Goal to extubate at end of surgery

Pain Management

- Bolus Fentanyl 1-2 mcg/kg IV on induction then titrate to need using either
  - intermittent bolus 0.5-1 mcg/kg (limit 4-5 mcg/kg for case) **OR**
  - Fentanyl gtt 1-2 mcg/kg/hr (turn off at start of closure)
- Optional boluses Morphine 0.025-0.1 mg/kg IV titrated to need (max 0.1 mg/kg)
- Acetaminophen IV (if not given preoperatively):

<2 years old: 10 mg/kg; >/= 2 years old: 15 mg/kg

Patient Warming Strategy

- Raise room temp (75-80 F) prior to patient arrival in OR
- Active warming devices
  - Forced air warming blanket
  - IV fluid warmer
  - Core temperature monitoring (esophageal, rectal)
  - Goal to maintain normothermia

Nausea Prophylaxis

- Ondansetron 0.1- 0.15 mg/kg IV (max 4 mg)

Edema Reduction

- Dexamethasone 0.5 mg/kg IV (max 8 mg)

BP Goals

- Maintain SBP within 20% of baseline

Intraoperative Fluid Management Strategy

- Limit excess crystalloid administration
- 5% Dextrose/Lactated Ringer's (D5/LR) if < 6 months, Lactated Ringer's (preferred) or Normal Saline (if indicated) if > 6 months at maintenance rate (4-2-1 rule)
- 5% Albumin 5-10 ml/kg (limit 20 ml/kg) as needed to avoid excess crystalloid

Antifibrinolytics

- Tranexamic acid loading dose 10 mg/kg following by infusion 5 mg/kg/hr

Blood Transfusion Guidelines (check blood products PRIOR to incision)

- Transfusion threshold hemoglobin 7 - 8 g/dL
- Discuss transfusion with surgeon prior to administration of blood product
- Administer pRBCs 10-20 ml/kg or 1 pack /unit at a time (unless clinical condition dictates otherwise)
- During periods of rapid ongoing blood loss, hemodynamic parameters may trigger / guide transfusion
- During periods of hemodynamic stability, lab parameters should trigger / guide transfusion to maintain goal hemoglobin
- Check ABGs w/ Hgb Q 1H or as clinically indicated
- In the absence of lab results, when blood loss / replacement approaches 1.5x patient's blood volume (or clinical evidence of coagulopathy), FFP and platelets should be given to correct the anticipated dilutional coagulopathy
- Treat hypocalcemia and / or hyperkalemia as a result of transfusion accordingly

PACU

All patients routinely go directly to PICU

ERAS Pediatric Craniosynostosis Pathway:
Post-Operative Components

Floor	Service-Specific	Pain Management	Nutrition & GI Recovery	Early Mobilization	Drains and Lines
POD 0	•PICU monitoring for at least 24 hours post-op •Post-op fluids: General guideline to minimize IVF •Avoid low sodium containing IVF •Use 4-2-1 rule for maintenance calculation •Medlock IVF once taking enough by mouth •Check CBC/ BMP/ Coags	•Postoperative pain medications listed below will continue for entirety of hospitalization unless otherwise noted: **<u>For mild to moderate pain</u>** •Acetaminophen PO Q6H (alternating with Ibuprofen) scheduled for 48H then prn: ○<40 kg: 15 mg/kg ○40-59 kg: 650 mg ○>/=60 kg: 1000 mg •Ibuprofen 10 mg/kg PO Q6H (alternating with Tylenol) scheduled for 48H then prn **<u>For moderate to severe pain</u>** •Oxycodone 0.1 mg/kg PO q4 hours prn •Morphine 0.05 mg/kg IV Q2H prn	• Clear liquid diet •Advance to regular diet as tolerated	•Day of surgery: OOB	•Remove foley on POD # 0, if satisfied with fluid status; keep foley until POD # 1, if additional fluid resuscitation required. • Remove Arterial line and CVL ASAP (if applicable)
POD 1	•Check H/H, sodium and other labs as indicated •Transfer to floor				•Remove foley on POD # 1 (if not removed on POD # 0)
POD 2					
POD 3 +	For >/= POD # 5, if persistent fever > 38.4 or hemodynamic instability suggestive of sepsis, cultures should be obtained				
Post-Discharge	**Criteria for Discharge:** Pain control on oral pain meds, hydrated off IVF **Tracking of Post Discharge Outcomes:** Readmission within 30 days, ED visits, LOS, Opioid utilization in hospital and at home per opioid stewardship program, NSQIP-P complications				

DISCHARGE OPIOIDS per Opioid Stewardship Program:

Participating Pediatric Services	Total Doses of Oxycodone (mg) in last 24 hrs	# of Opioid Doses Recommended^
Pediatric Patients < than 12 years of age or < 40 kg	0 doses	0
	1-2 doses	5
	3-4 doses	10
	5 doses	15
	≥ 6 doses	30
Pediatric Patients ≥ than 12 years of age or ≥ 40 kg	0 mg	0
	1-15 mg	15
	16-35 mg	30
	≥ 36 mg	45