

Nuss Procedure for Pectus Excavatum Care Guideline

Inclusion Criteria: All pectus excavatum patients undergoing the Nuss procedure

Exclusion Criteria: All pectus excavatum patients undergoing any procedure besides the Nuss procedure

Post Operative Assessment

- VS, pain assessment per unit standards of care
- Alert NP/resident that patient arrived to floor

Post Operative Interventions

- Admit to surgical floor
- Advance diet as soon as awake and alert
- Saline lock IVF when tolerating PO
- Respiratory therapy: IS, continuous pulse ox if on PCA until d/c, O2 if needed
- Call PT to notify of patient arrival to unit
- OOB as tolerated
- Immediate assessment for nausea, may use Ondansetron prior to PT

Medication Management

- Antibiotic prophylaxis – Cefazolin 30mg/kg q 8 hours start intraoperative until discharge or 24 hrs postop
- Antiemetic
 - * Ondansetron – q 8hrs PRN nausea for 24 hours post op
≤ 40kg: 0.1mg/kg/dose as single dose; max 4mg/dose > 40kg: 4mg/dose as single dose
 - Or
 - * Scopolamine Transdermal – place one disc behind ear at least 4 hours prior to surgery, change q 3 days as needed
- Miralax PO 17g/day
- Peri-Colace 1 to 2 tablets PO PRN
- Gabapentin 100mg QHS

Pain Management

D/C Home Same Day

- Scheduled Ketorolac IV 0.5mg/kg dose q 6 hours
- Hydromorphone hydrochloride 0.01mg/kg IV PRN q 3hr, STOP at 1600 (if being d/c'd home the same day)
- Diazepam – 0.1mg/kg (5mg max) PO PRN spasms or anxiety
- Acetaminophen/hydrocodone 325/5mg 1 tab PRN q 4hr

Pain Management

Patients without bilateral cryoablation

- PCA Hydromorphone hydrochloride (Demand Dose Only for 24 hours) – 0.1 to 0.2mg
- Ketorolac IV 0.5mg/kg dose q 6 hours x 48 hours transition to PO Ibuprofen
- On-Q pumps as ordered
- Acetaminophen IV x 24 hours, transition to PRN PO Acetaminophen/hydrocodone
- Diazepam – 0.1mg/kg (5mg max) IV/PO PRN spasms or anxiety
- Hydrocodone hydrochloride 0.01mg/kg IV PRN for breakthrough pain after PCA discontinued

Preoperative Education

- CHG product baths:
 - * 2 days before surgery, at bedtime, shower with CHG product
 - * One day before surgery, at bedtime, shower with regular soap followed by CHG product wipes
 - * Day of surgery – CHG product wipes in pre-op
- GI prophylaxis – Miralax if patient has h/o constipation
- Gabapentin dose per prescription – QHS 3 night prior to surgery
- Place scopolamine patch, if ordered, in pre-op

Recommendations/Considerations

- Cryoablation – the decision regarding cryoablation preference is decided preoperatively by the surgeon, patient and family.
- Indications for extending antibiotic prophylaxis beyond 24 hours post op described in CHOC Children's "Antibiotic Prophylaxis for Surgery Guideline"
- Pain Management - Refer to Patient Care Policy F918 - Pain Management; Policy F684 - Organizational Pain Policy; Policy F886 - Pain Assessment Scales

Resources

- Antibiotic prophylaxis <http://paws/careguidelines/antibioticprophylaxisforsurgeryguideline.pdf>
- Patient and family education – Nuss packet, SSI Prevention
- Preop CHG bath – CHOC POI infection prevention (b3 skin preparation: CHG used for skin preparation unless patient has documented allergy or otherwise contraindicated)

Patient Education

- Care recommendations following minimally invasive repair of pectus excavatum
- Pectus discharge instructions
- Incision Care
- Safety awareness
- SSI, VTE prevention

Discharge Criteria

- Pain management PO meds only
- Tolerating DFA
- VSS
- No respiratory distress
- Tolerating ambulation and has been seen by PT

Reference List

Hall-Burton, D.M., & Boretsky, K.R. (2014). A comparison of paravertebral nerve block catheters and thoracic epidural catheters for postoperative analgesia following the Nuss procedure for pectus excavatum repair. *Pediatric Anesthesia* 24, 516-520. Doi: 10.1111/pan.12369 (Level III)

CHOC Children's "Antibiotic Prophylaxis for Surgery Guideline" Pathway: PAWS ;Resources; Care Guidelines: <http://paws/careguidelines/AntibioticProphylaxisForSurgeryGuideline.pdf>

CHOC Children's "Pre-operative Bath with Chlorhexidine Gluconate (CHG) Cloths (For Spinal Fusion Patients" Pathway: PAWS; Resources; CHOC POI; Infection Prevention; Section: General Infection Prevention; Number:340; Title "Pre-operative CHG Bath" Attachment A.

CHOC Children's "Surgical Site Infection (SSI) Prevention" Pathway: PAWS; Resources; CHOC POI; Infection Prevention; Surgical Site Infections:
http://paws/formbank/acct_diff2.cfm?subcategory=SSI

Graves, C.E, Idowu, O., Lee, S., Padilla, B., & Kim, S. (2017). Intraoperative cryoanalgesia for managing pain after nuss procedure. *Journal of Pediatric Surgery* 52, 920-924. Doi: 10.1016/j.jpedsurg.2017.03.006 (Level IV)

Graves, C.E., Moyer, J., Zobel, M., et al.(2019). Intraoperative intercostal nerve cryoablation during the Nuss procedure reduces length of stay and opioid requirement: A randomized clinical trial. *Journal of Pediatric Surgery*, 0022-0368. Doi: 10.1016/j.jpedsurg.2019.02.057 (Level II)

Harbaugh, C.M., Johnson, K.N., Kein, C.E., Jarboe, M.D., Hirschl, R.B., Geiger, J.D. & Gadepalli, S. K. (2018). Comparing outcomes with thoracic epidural and intercostal nerve cryoablation after nuss procedure. *Journal of Surgical Research* 231, 217-223. Doi: 10.1016/j.jss.2018.05.048 (Level III)

Keller, B. A., Kabagambe, S.K., becker, J.C., Chen, Y.J., Goodman, L.F., Clark-Wronski, J.M., Furukawa, K., Stark, R.A., Rahm, A. L., Hirose, S., & Raff, G.W. (2016). Intercostal nerve cryoablation versus thoracic epidural catheters for postoperative analgesia following pectus excavatum repair: Preliminary outcomes in twenty-six cryoablation patients. *Journal of Pediatric Surgery* 51, 2033-2038. Doi: 10.1016/j.jpedsurg.2016.09.034 (Level III)

Linhares, S.G.D., Pereira, J.C.D., Fernades, P.M.P., & Campos, J.R.M. (2016). Functional exercise capacity and lung function in patients undergoing an early rehabilitation program after the Nuss procedure: a randomized controlled trial. *Pediatric Surgery International* 33: 69-74. Doi: 10.1007/s00383-016-3992-0 (Level II)

Noricia, D. (2019). The Nuss procedure for repair of pectus excavatum: 20 error traps and a culture of safety. *Seminars in Pediatric Surgery* 28, 172-177. Doi: 10.1053/j.sempedsurg.2019.04.020 (Level V)

Sujka, J., Benedict, L.A., Fraser J.D., Aguayo, P., Millspaugh, D.L., & St. Peter, S.D. (2018) Outcomes using cryoablation for postoperative pain control in children following minimally invasive Pectus Excavatum repair. *Journal of Laparoendoscopic & Advanced Surgical Techniques* 28 (11) 1383-1386. Doi: 10.1089/lap.2018.0111 (Level III)