

JOHNS HOPKINS ALL CHILDREN'S HOSPITAL

Indications and Guidelines for Insertion of Transpyloric/ Duodenal Feeding Tubes in the Neonatal ICU Clinical Pathway

Johns Hopkins All Children's Hospital

Indications and Guidelines for Insertion of Transpyloric/Duodenal Feeding Tubes in the Neonatal ICU

Table of Contents

1. [Scope](#)
2. [Guideline Panel](#)
3. [Executive Summary](#)
4. [Clinical Practice Guideline](#)
5. [Summary](#)
6. [Glossary](#)
7. [References](#)
8. [Clinical Pathways Team Information](#)

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Insertion of Duodenal Feeding Tubes in the Neonatal ICU

Johns Hopkins All Children's Hospital

Scope

This Clinical Practice Guideline (CPG) applies to:

All Children's Hospital, Inc., and

All Children's Health System, Inc.

o West Coast Neonatology, Inc.

Guideline Panel

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Executive Summary

- A. To provide formal guidelines for the insertion of nasoduodenal feeding tube (NDT) and oroduodenal feeding tube (ODT) in Neonatal ICU.
- B. Duodenal feeding is an enteral method in which the feeding tube bypasses the stomach through the pylorus into the duodenum. It is a safe and effective alternative to enteral nutrition in the term and pre-term infant in whom intra-gastric feeding is poorly tolerated.
- C. Verification of NDT/ODT placement is by radiography. The tip of the tube should be just beyond the second portion of the duodenum.

Clinical Practice Guideline

Literature on Transpyloric Feedings

Gastroesophageal reflux (GER) is common in premature infants due to transient lower esophageal sphincter relaxation (TLESR). TLESR occurs in all infants, and is further exacerbated in preterm infants due to their supine nature and presence of feeding tubes in those receiving enteral nutrition. GER may lead to aspiration of gastric contents into the airway which has been associated with respiratory complications in neonates, including studies that have demonstrated worsened pulmonary dynamics (tidal volume, compliance, resistance) in infants receiving intermittent gastric gavage feeds compared to continuous gastric feeds. GER may also lead to exacerbation in the course of patients with Bronchopulmonary Dysplasia (BPD), and management with medications and surgical interventions has been shown to decrease the overall respiratory support needed for patients with BPD.

Transpyloric feeds may be used to bypass the stomach and directly feed the small intestine, theoretically decreasing the amount of gastric reflux that contributes to aspiration. A Cochrane review of 9 studies evaluating the effect of transpyloric feeds on feeding tolerance, growth, and development in premature infants found that transpyloric feeds were non-inferior to gastric feeds, but may be associated with an increased risk of mortality. However, there are many limitations to this systematic review. The studies evaluated were performed between 1975 and 1992, prior to the adaptation of many modern standards of medical management of premature infants such as surfactant use for respiratory distress syndrome. Five of the studies reviewed the use of nasojejunal feeds, which is not a routinely used method of transpyloric feeding. Most studies did not have a uniform approach of initiating and advancing feeds. Additionally, formula was the source of enteral nutrition in the majority of patients rather than breast milk, which is not the standard in modern neonatal care given the known benefit of breast milk in the prevention of necrotizing enterocolitis (NEC). With regards to the increased risk of mortality reported with transpyloric feeds, this was seen in the study performed by Laing et al. in 1986. In this study, there was a significant selection bias whereby the baseline characteristics of the transpyloric group compared to the gastric group differed significantly with respect to gestational age (27.7 versus 28.5; $p = 0.05$) and APGAR scores at 1 (3.6 versus 6.2, $p < 0.001$) and 5 minutes (6.3 versus 8.3, $p < 0.001$); the authors suspected that these differences likely justified the increased mortality in the transpyloric group.

Recently, a retrospective cohort study conducted in a center which frequently utilizes early transpyloric feeds in ELBW patients found improved overall composite outcome of death and BPD compared to ELBW infants receiving gastric feeds. They also demonstrated no difference in growth outcomes or adverse gastrointestinal events in these two groups. Transpyloric feeds have been demonstrated to be non-inferior to gastric feeds with regards to caloric intake, weight gain, and time to achieve full enteral feeds. They have also been associated with decreased events of apnea and bradycardia in preterm infants. In the adult literature, duodenal feeds have been shown to decrease ventilator-associated pneumonia in patients requiring mechanical ventilation. There is concern for increased fat loss with use of continuous feedings of breast

milk, whether gastric or duodenal, when compared to bolus feedings however the impact of this on growth is not adequately studied.

Patients in whom duodenal transpyloric feeds can be considered:

- Any neonate with the following features refractory to alternative measures
 - o Intolerance of gastric feeds
 - o Poor gastric emptying
 - o Clinical or radiographic evidence of chronic or silent pulmonary aspiration
 - o Significant enteral feed-related apnea/bradycardia/desaturations thought to be secondary to gastroesophageal reflux

- Premature infants (<32 weeks gestational age) with the following features:
 - o Continued need for mechanical ventilation at 28 days of life
 - o Need for non-invasive ventilation and significant FiO₂ requirement (>30%) at 28 days of life

Guideline for Duodenal Tube Placement:

- A. Discuss with parents the need for duodenal feeds.
- B. Any caregiver is encouraged to bring up the discussion for duodenal feeds on Patient Care Rounds.
- C. All patients must be on continuous cardiorespiratory and pulse oximetry monitoring during insertion of feeding tube with emergency equipment available at bedside.
- D. Parents can be present to provide comfort and support to their child during this procedure.
- E. Individuals who may place a nasoduodenal feeding tube (NDT) or oroduodenal feeding tube (ODT) include RN, NNP, or MD.
- F. Equipment
 - 1. Transpyloric Enteral feeding tube of appropriate size for NICU patient (non-weighted and with no stylet)
 - a. Infants < 1000 grams, a 5 Fr tube is recommended.
 - b. Infants >1000 grams, a 6 Fr or 8 Fr is recommended, based on the infant's nares size.
 - 2. 10 ml Syringe
 - 3. Stethoscope
 - 4. Clean Gloves
 - 5. Sterile water
 - 6. Water-soluble lubricant
 - 7. Hydrolloid dressing
 - 8. Retention tape (i.e., Hypafix)

9. Measuring tape
10. Permanent marker
11. Enteral feeding infusion pump
12. Feeding-tube extension
13. Suction equipment
14. Cardiorespiratory monitor
15. Pulse oximetry

I. Procedure

1. Obtain and verify that orders for duodenal tube placement, duodenal enteral feeds and post-procedure X-ray have been placed by medical provider.

* note *

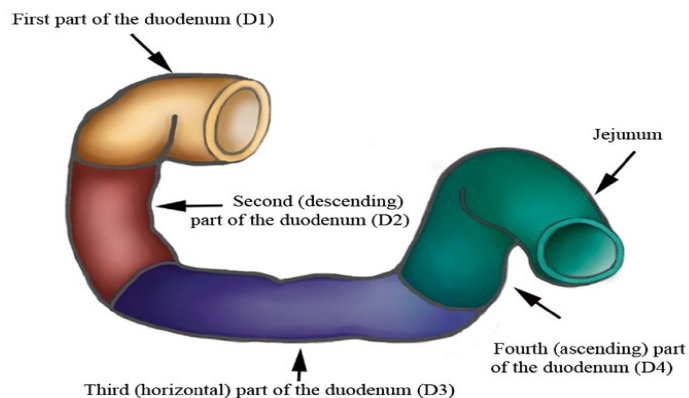
Medical provider may also place an order for placement of Naso/oral gastric tube if the patient does not already have NGT/OGT. (See PG024)

2. Gather equipment.
3. Explain procedure to patient's family.
4. Identify patient using 2 patient identifiers.
5. Clean procedure area, perform hand hygiene, and don gloves.
6. Measure two distances: Length of insertion to stomach by measuring from tip of nose to ear, to half-way between xiphoid process and umbilicus (NEMU). Mark this length on feeding tube with permanent marker. Then make a second mark with permanent marker which would be the measurement for duodenal distance by adding 5- 6 centimeters further than gastric measurement.
Alternately, measure from tip of nose to ear, to xiphoid to right lateral costal margin and compare the two.
7. Clear infant's nose and oropharynx by gently suctioning airway as necessary.
8. Swaddle infant with hands and feet away from face. Place in supine and sniffing position with head of bed elevated 30-45 degrees.
9. Clean infant's skin, and place hydrocolloid dressing on cheek for ND placement and chin for OD placement.
10. Via NGT/OGT instill up to 5ml of air for infants <1000g and up to 10ml of air for infants > 1000g into the stomach.
11. Next, lubricate tip of NDT/ODT with sterile water or water-soluble lubricant.
12. Insert duodenal tube to into nares or mouth. Pass tube into stomach to first mark and auscultate for gastric placement with 1ml of air.
Assess for changes in clinical status when inserting tube. Remove tube and attempt placement again if patient demonstrates the following:
 - prolonged or persistent coughing, gagging, or choking.
 - cyanosis, extreme bradycardia, extreme oxygen desaturation and
 - change in respiratory effort.
 - change in quality of cry and overall clinical status.
12. Place patient in right-side-lying position.
13. For optimal results, allow patient to rest in right-side-lying position for 5-10 minutes.

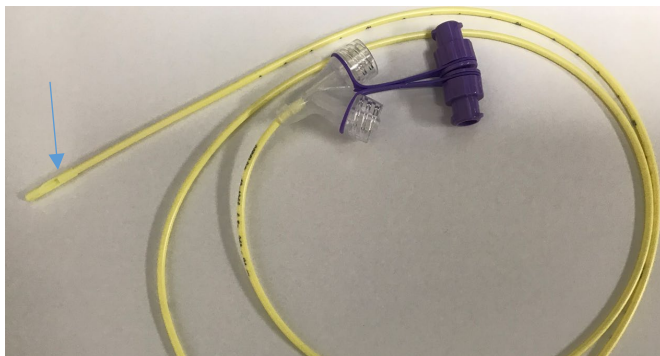
14. Slowly advance duodenal tube past pylorus into duodenum to second mark. If resistance is met or tube does not pass easily, withdraw tube a few centimeters and reattempt.
15. Secure tube with retention tape (i.e., hypafix) over prepared hydrolloid on patient's cheek or chin.
16. Obtain X-ray to confirm placement. If three separate attempts to place the transpyloric tube are not successful as defined by three X-rays, please contact primary provider for next steps.
17. Verify proper placement with medical provider.
18. Document in EHR insertion of tube and internal or external length.

Radiographic Confirmation of Duodenal Tube Placement

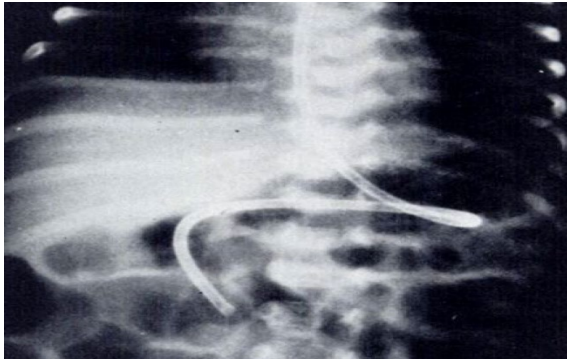
A. Schematic view of the duodenum:



B. Familiarize yourself with the type of ND tube the institution carries and know the position of the hole at the tip

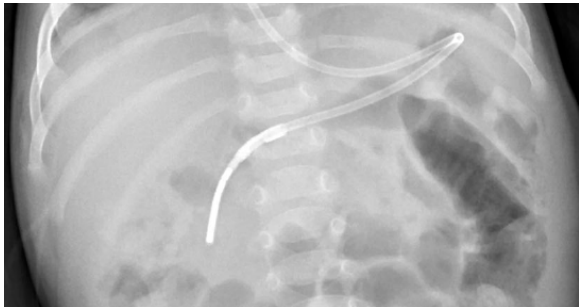


C. Radiographic confirmation: Adequate placement should be radiographically confirmed and is defined as the ND tip in the second portion of the duodenum.



Pediatrics. 1975 Dec;56(6):1065-72

Adequate positioning where the NDT takes a descending course after crossing the midline toward the right side



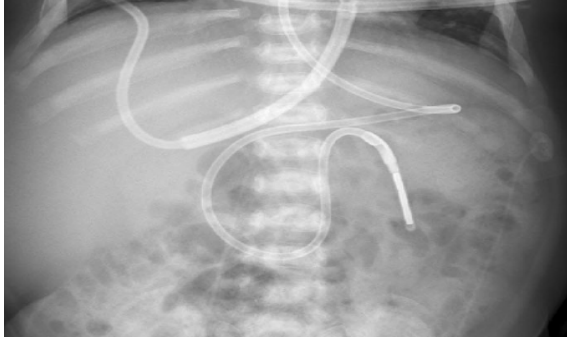
Pediatr Radiol. 2017 Sep;47(10):1302-1311

NDT tip in the second part of the duodenum. However, the side hole is in the region of the first duodenum



Pediatr Radiol. 2017 Sep;47(10):1302-1311

NDT tip within the third portion of the duodenum. Once the tubing begins to take a horizontal course across the midline to the left at the level of L3-L4, it will pass the junction of the 2nd and 3rd portions of the duodenum



NDT tip in the proximal jejunum

Pediatr Radiol. 2017 Sep;47(10):1302-1311



Coiled NDT within the stomach

Pediatr Radiol. 2017 Sep;47(10):1302-1311

If the tube appears too proximal or distal it should be adjusted as needed with the need for subsequent images as determined by the primary medical team.

Summary

Duodenal feeds are a safe and effective alternative to enteral nutrition in neonates who do not tolerate gastric feeding or are at great risk for aspiration. Using NEMU + 5-6 centimeters and gastric insufflation in the right-side-lying position, placement into the second part of the duodenum can be safely and efficiently accomplished at the bedside. X-ray is the standard assessment for initial tube placement, but external measurements should be done prior to each use. The need for continued duodenal feedings should be discussed regularly and transition to bolus gastric feeds performed once patient's clinical condition allows.

Glossary

Neonate: For the purposes of this CPG, a neonate is an infant less than 28 days of age, or an infant with a condition arising during the neonatal period resulting in a continuous hospitalization until 6 months corrected gestational age.

Continuous feedings: continuous infusion of enteral nutrition into the gastrointestinal tract.

NEMU: measurement of nose to the earlobe to mid-umbilicus (point halfway between xiphoid process and the umbilicus).

Nasogastric tube (NGT): an enteral feeding tube inserted into the nose and passed into the stomach used for feeding or venting.

Orogastric tube (OGT): An enteral tube inserted into the mouth and passed into the stomach used for feeding or venting.

Nasoduodenal tube (NDT): an enteral feeding tube inserted into the nose and passed through the stomach into the duodenum.

Oroduodenal tube (ODT): an enteral feeding tube inserted into the mouth and passed through the stomach into the duodenum.

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Clinical Pathway Team

Insertion of Duodenal Tubes in the Neonatal Intensive Care Unit

Clinical Practice Guideline

Johns Hopkins All Children's Hospital

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