

Promoting Food to Decrease the Tube

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Disclosure Information

- ▶ I HAVE NO FINANCIAL INTEREST OR POTENTIAL CONFLICTS OF INTERESTS



Objectives

- ▶ Describe the process for the development of tube dependency in children
- ▶ Identify readiness cues in children and parents
- ▶ State one pharmacologic intervention to improve appetite
- ▶ Discuss methods for nutritional manipulation of tube feeding
- ▶ Describe a behavioral strategy for establishing oral intake

History of Enteral Nutrition

- ▶ 16th century, hollow tube with a bladder attached is inserted into the esophagus
- ▶ 18th century, orogastric tubes were designed to supply jellies and eggs along with milk and water
- ▶ 19th century, foods such as broths, eggs, milk, and alcohol were fed through rudimentary tubes to the esophagus
- ▶ The 1930s, protein hydrolysate formulations
- ▶ The 1940s, first infant formula developed



Prevalence of G-tube Placement

National trends and outcomes of pediatric gastrostomy tube placement

Retrospective study of admissions during 1997, 2000, 2003, 2006, 2009

- G-tubes were placed during **64,412 admissions**
- Surgical gastrostomy rates increased by 19%
- The highest increase among children <1 year: **32%**
- PEG rates did not increase

Fox, D., et al. J Pediatr Gastroenterol Nutr, 2014 Nov;59(5):582-8

Enteral Feeding

Pros

- ▶ Meets nutritional needs of child to support weight gain & growth
- ▶ Provides necessary hydration
- ▶ Allows for pleasurable mealtime experience
- ▶ Alternative to oral feeding
- ▶ Parent express sense of relief

Cons

- ▶ Delay in oral skill development
- ▶ Delay in ability to recognize hunger
- ▶ Not developmentally appropriate
- ▶ Family disruption/schedules
Gagging, retching, vomiting
Parent sense of failure



Approach to Tube Weaning

1. Start transition at time of G-tube placement!
Recognize if able to wean/timing
2. Assess child/caregiver readiness cues for weaning
3. Optimize medical and nutritional management
4. Optimize hunger through appetite manipulation
5. Consider referral for a team approach



Definition of Tube Dependency

“A tube-dependent child remains tube fed although his/her medical condition and developmental potential would allow the transition to oral nutrition.”

Dunitz-Scheer, M. Et al., Tube Dependence A Reactive Eating Behavior Disorder, ICAN (Infant, Child, & Adolescent Nutrition).2011, 3 (4), 209 – 215

- ▶ DSM5: ARFID Avoidant/Resistive Food Intake Disorder
Dependence on enteral feeding or oral nutritional supplements
- ▶ ICD10: Z93.1 Status Gastrostomy Tube

Association: Feeding Problems & Tube Dependence

- ▶ Children can require a tube as a result of a feeding problem
 - ▶ Food refusal
 - ▶ Limited oral intake
 - ▶ Dysphagia
- ↕
- ▶ Children can develop a feeding problem as a result of long term tube
 - ▶ Gagging, retching, vomiting
 - ▶ Oral aversion
 - ▶ Food refusal



Case study: Paul

34 week male with h/o severe laryngomalacia; GERD; constipation; poor weight gain

Assessment

Swallow study #1: dysphagia with aspiration on all consistency of liquids

Intervention

1. Admit directly from study for NG tube placement; NPO at 1 month old of age
2. G-tube placed at 3 months
3. Supraglottoplasty performed at 6 months of age

Reassessment

Repeat swallow study #2 performed at 9 months of age:

during study: gagging on spoon, poor oral skills, complete refusal of the bottle

What would you do next?

Can you wean?

- ▶ Permanent (not able to wean)
- ▶ Unsure
- ▶ Temporary (able to wean)

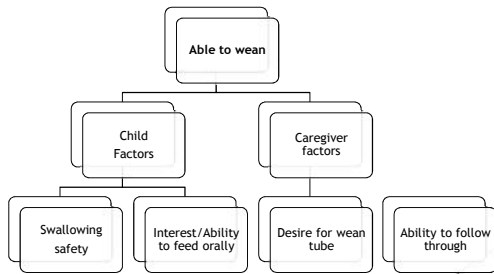


To Wean or Not to Wean



- Neurological impairment, unable to swallow
- Dysphagia, aspiration on all thickness of fluid
- Uncontrolled medical symptoms (asthma, seizures)
- Weight loss with decreasing z-scores (moderate & severe malnutrition)
- Unable to meet fluid and nutritional needs without enteral feeding
- Feeding intolerance and sensitivity to changes

Assess Readiness Cues



Readiness Cues: Child



- Tolerating tube feeding
- Is “safe” to initiate and/or resume oral feeding
- Skills to eat (normal swallow, ability to chew)
- Hunger cues (shows interest in eating, watches others)
- Developmentally appropriate (able to understand simple commands, able to sit in a chair)
- Underlying medical/comorbid conditions managed

Readiness Cues: Caregiver

- Able to identify hunger cues in the child
- Able to tolerate child not gaining weight
- Agree to reduce feeds sufficiently to stimulate hunger
- Motivated to wean child from tube feeding



Begin transition with Enteral Tube



- Offer non-nutritive opportunities
- Provide tube feeding while seated in high chair
- Offer oral feeds around bolus feeds
- Offer blended formula (i.e. Real Foods Formula) for older children
- Identify readiness cues and begin weaning process early



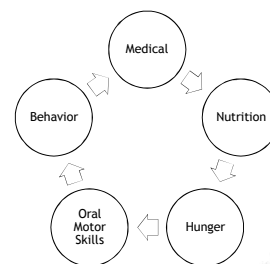
Case Progression: Paul

Assessment

- ▶ Bringing fingers to mouth, accepting a pacifier
- ▶ Started to show interest in what his parents are eating
- ▶ Started vomiting at random times during the day
- ▶ Noted to hiccup often and had hard swallows
- ▶ Having hard stools with streaks of blood
- ▶ Gaining less than age-appropriate weight

What would you do now?

Optimize Management



Optimize Medical Management

Constipation

- ▶ Identify etiology: common
 - > Diet
 - > Liquid intake
 - > Slow emptying
- ▶ Manage:
 - ▶ Fiber supplement
 - ▶ Laxative/stool softener
 - ▶ Stimulant
 - ▶ Behavior

Vomiting

- ▶ Identify etiology: common
 - > GERD
 - > Feeding intolerance
 - > Gastroparesis
- ▶ Manage:
 - ▶ Reflux medications
 - ▶ Change in formula



Optimize Nutritional Management

- ▶ Appropriate method for measuring
 - ▶ Weight for height (<24 months) WHO Growth Chart
 - ▶ BMI (>24 months) CDC Growth Chart
- ▶ Weight gain is adequate based on z-score trend
 - ▶ Age-appropriate
 - ▶ Catch-up weight gain



Optimize Nutritional Management

- Wean from J-tube to G-tube: note location of tube
- Tolerates higher calorie formula: note concentration
 - Formula (Pediasure, Pediasure 1.5, Nutren Jr, Peptamen Jr)
 - Blenderized tube feeding
- Tube feeding schedule: note tolerance and sensitivity with changes
- Accepts tastes or input around mouth
- Tolerance with oral feeds and tube feeds

Tube Feeding Manipulation

Goal: weight maintenance

- ▶ Start with 10% decrease
- ▶ Stop >10% weight loss

Systematic adjustment tube feeds

- Bolus feeds
- Overnight feeds
- Increase rate
- Decrease caloric density of formula (i.e. 30 to 24)



Optimize Oral-Motor Skills & Safety

Community therapists goals

- ▶ Able to show hunger cues
- ▶ Able to tolerate touch to his/her face
- ▶ Able to accept utensil to lip
- ▶ Able to utilize adaptive equipment
- ▶ Able to sit in chair



Case Progression: Paul

Intervention:

1. Decreased tube feeds by 10% calories
2. Increased rate of overnight feeds to decrease length of feeds
3. Offered food before each bolus feed
4. Sat in highchair for bolus feed

Outcome: accepts 6 spoons of stage 2 baby food, continues to throw utensils & plate, pockets food, meals >90 minutes

What would you do next?

Optimize Hunger

- ▶ Hunger-Satiety Cycle assists
 - ▶ Developmental acquisition of feeding skills
 - ▶ Self-regulation
 - ▶ Hunger (I want to eat) - start eating
 - ▶ Satiety (I am full) - stop eating
 - ▶ Satiation (I am satisfied) - interval



Appetite Manipulation

Citation	Presenting Problem	Outcome
Couluris, M. (2008)	Pediatric Cancer	Improved weight
Chinuk, R. (2014)	Cystic Fibrosis	Improved weight
Sant'Anna, A. (2014)	Feeding Disorder	Improved appetite
Rodriguez, L. (2013)	Dyspeptic Symptoms	Improved symptoms
Merhar, S. (2016)	Feeding Intolerance	Improved symptoms
Madani, S. (2016)	Functional GI Disorders	Improved symptoms
Najib, J. (2008)	Undernourished Children	Improved weight

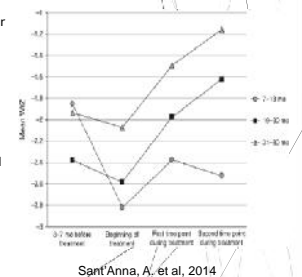
Cyproheptadine

- First generation H1- antihistamine
- Lipophilic: crosses blood-brain barrier into CNS
- Side effects: increased appetite, sedation, irritability, abd. pain
- Works by improving with gastric accommodation
- Dosing: 0.25 mg/kg/day divided BID or TID
- Recommend cycling
- Evidence: Strong



Use of Cyproheptadine in Young Children With Feeding Difficulties and Poor Growth in a Pediatric Feeding Program

- ▶ Retrospective chart review, 2007 - 2011
- ▶ Patients in behavioral-based feeding program with poor weight gain - received CY
- ▶ N=127 comparison =82
- ▶ Not receiving Tube Feeds
- ▶ Dose 0.25 mg/kg/day divided
- ▶ 96% of parents report positive change in mealtime & feeding behavior
- ▶ Improvement in mean Wt Z after starting CY compared with wt Z before



Megastrol Acetate (Megace)

- Synthetic progesterone derivative
- Dose: 10 mg/kg/day
- Central hypothalamic effect and may lead to adrenal suppression
 - ▶ 19 children with malignant cancer were retrospectively reviewed
 - ▶ Positive weight gain median of 1kg (z-score of 0.36) after 3 to 6 weeks; decrease in cortisol levels after taking MA for median of 42 days. Had 1 death; Orme, L.(2003)
- Evidence: Mixed

Prokinetics

- Prokinetic agents in children with poor appetite: Bekem, O. (2005)
 - Enteral intolerance
 - Dysmotility (delayed gastric emptying)
- Anecdotally shown to improve symptoms
- Drug: Erythromycin
- Evidence: Lack of studies

Gabapentin

Gabapentin Improves Oral Feeding in Neurologically Intact Infants with Abdominal Disorders (2018)

- Mechanism: visceral hyperalgesia increases pain receptors
- At risk: abdominal wall disorders or surgery, G-tube/Nissen
- Gabapentin may improve enteral and oral feeding tolerance
- Clinical Vignette: full oral feeds obtained in 3 patients within 3 to 4 months of starting gabapentin
- Evidence: Not strong; small sample size, case studies

When to Refer to a Feeding Team

- ▶ Medically complex children
- ▶ Inappropriate texture, food refusal, oral aversion
- ▶ Working with community therapists: slow progression
- ▶ At risk for a needing GT
- ▶ Unable to wean from GT
- ▶ Parent request



Behavioral Team Approach

- Outpatient Program
 - Length varies: up to 18 months
- Day Treatment Program
 - Length: 4 to 6 weeks
- Inpatient Treatment Program
 - Length: 2 to 3 weeks
- Online: Notube®
 - ▶ Length: 90 days “coaching”



Behavioral Intervention: Evidence

Author	Country Sample	Methodology	Length	Outcome
Shalem, T., et al. 2016	Israel N=34 ;28 GT depend. Mean age 3.4 yr	Retrospective Chart Review	Inpatient Average 3 weeks	85% achieved target goal
Hartdoff, C., et al 2015	Netherlands N=22 Ages 9 - 24 mos..	Prospective, cross-over design 2-week inpatient (study) 4-week outpatient	Both Average 4 weeks	9 out of 11 weaned in the study group
Brown, J., et al 2014	USA N=30 Mean 3.9 yr	Retrospective Chart Review	Inpatient Average 3 weeks	Before: 69% calories from GT After: 90% d/c GT
Wilken, M., et al. 2013	Germany N=39 Mean age 16 months	Prospective	Home based Rapid weaning, 4 - 10 day	Oral feeding in 89.7% Followed up at 2 years: BMI z-score remained constant
Silverman, A., et al. 2013	USA: Wisconsin N=77 Mean age 4.5 years	Retrospective Chart Review +prospective	Inpatient Average 2 weeks	51% fully weaned after 2 wks Remainder weaned by 1 yr Nutrition maintained 1 yr
Wright, C., et al. 2011	England N=41	Retrospective Chart Review	Outpatient Mean 1.7 years	78% achieved normal diet 17% remained EN 2% reliant oral supplement

Measure of Child Success

- Increase variety of food
- Wean to high calorie nutritious beverages
- Developmentally appropriate mealtime behavior
- Reduction in gagging, retching, vomiting
- Overall reduction calories
- Weight maintenance
- Growth and development appropriate



Influence of Parenting Style

Estrem, H. (2016), Edwards, S. (2015), Webber, L. (2010)



Parent Success

- Achieve positive caregiver-child interaction
- Feed majority of meals to child
- Problem-solve around challenging meals
- Feel reassured that the child can/will maintain and gain weight without supplemental tube feeds
- Less family stress
- Reduction in caregiver stress



Case Progression: Paul

Assessment

Completed four week behavioral outpatient feeding program at 18 months of age

Intervention

G-tube removed, full oral feeder at 24 months

Maintaining age-appropriate weight gain off tube feeds at 26 months

Eating variety of tastes and textures at 36 months



Take Home Points: 5 Steps

1. Weaning starts with placement of tube feeding
2. Assess readiness cues
Child & Caregiver
3. Ensure child is medically and nutritionally stable
4. Optimize hunger
Nutrition (oral & enteral)
Pharmacological
5. Consult with experts: consider a team approach
Community therapists
Interdisciplinary Feeding Teams



Thank you!
Questions?



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