



# Feeding Difficulties 2/2 GER, Delayed Gastric Emptying with G-Tube Displacement

By: Lauren Zendarski

# Patient Profile

- Male
- 6 months old
- DOB: 2/12/2011
- Admit: 2/20/2012
- Discharge: 3/23/2012



# Admission

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- Pt was presented with gagging, vomiting, emesis, and constipation for 4 to 5 days.
- When he came to emergency room he had a distended abdomen, was in pain, and shock.
- Resuscitated him with 80 ml/kg crystalloids to determine cause of these symptoms.
- Found to have duodenal perforation from G-tube –subsequent bleeding, blood and contents in peritoneal space.

# Home Life

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- 2 siblings:
  - 10 and 5 yr old who are healthy and have no major history of illness or hospitalizations.
- MOC and FOC have been at bedside throughout stay, but have seem overly suspicious.
- MD noted that family misinterpreting info and expressed distrust.

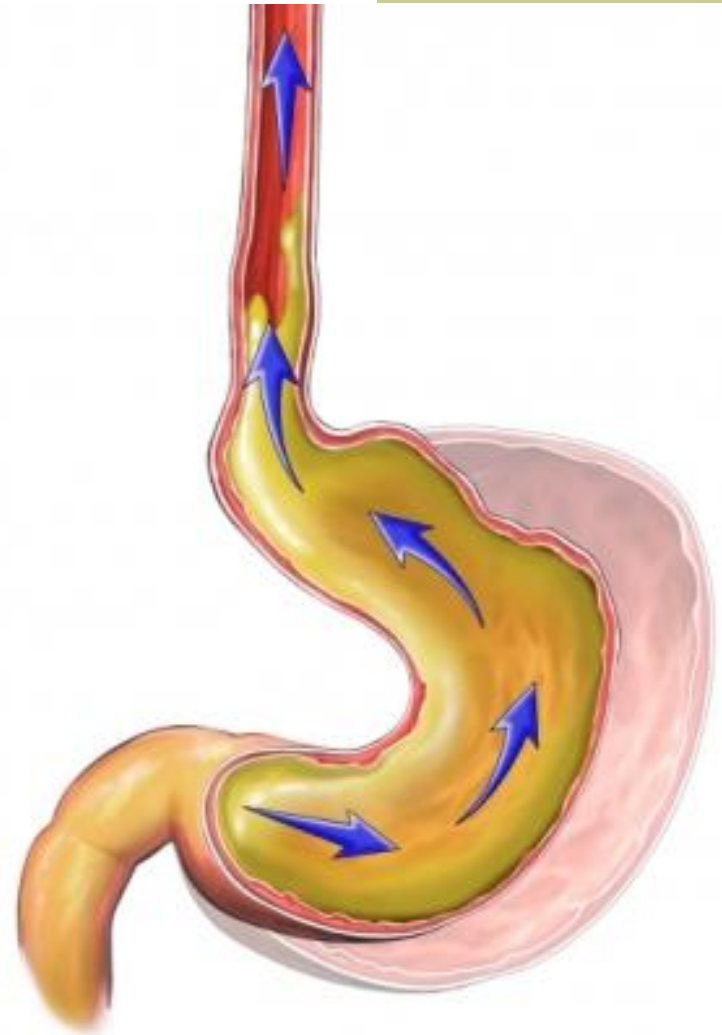
# Medical Hx

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- Born: 37 weeks gestation, 5lbs, 3.8 oz
- Had frequent spitting up and emesis, poor PO intake.
- 09/25/2011- Found to have delayed emptying and GER
- Developmental delay, FTT 2/2 feeding difficulties.
- Nissen Fundoplication and G-tube placement- 12/23/2011

# Disease Background

- ❑ **GER:** GERD is different from **gastroesophageal reflux**
- GER is a common disorder seen in infants, which causes them to spit up. (emesis)
- Most infants outgrow this within 12 months.



# Symptoms

- **Frequent or recurrent vomiting.**
- **Failure to thrive**
- **Refusal to feed or difficulty feeding**
- Irritability or fussiness with/after feeding
- Regurgitation or bloody vomit
- Frequent or persistent cough.
- Difficulty swallowing
- Recurrent Pneumonia



# Etiology

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- Abnormal pressure to the lower esophageal sphincter (LES), a valve that keeps food in the stomach
- Narrow or short esophagus
- Possibly a genetic link
- **Delayed emptying of the stomach or Gastroparesis**
- Triggers/risks: ETOH, spicy, citrus foods, Cigarettes, diabetes and asthma, overweight

# Gastroparesis

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- Stomach contracts less often and less powerfully, causing food and liquids to stay in the stomach for a long time.
- May be Caused by: (vagus nerve damage)
  - Brain's inability to communicate with nerves in the gastrointestinal tract: slows the contraction of the muscles in the intestines, which help to move food along.
  - viral infections, or systemic diseases diabetes or autoimmune problems

# Symptoms Gastroparesis

- Abdominal distention
- Premature abdominal fullness after meals
- Heartburn/reflux
- Weight loss
- Nausea
- Vomiting



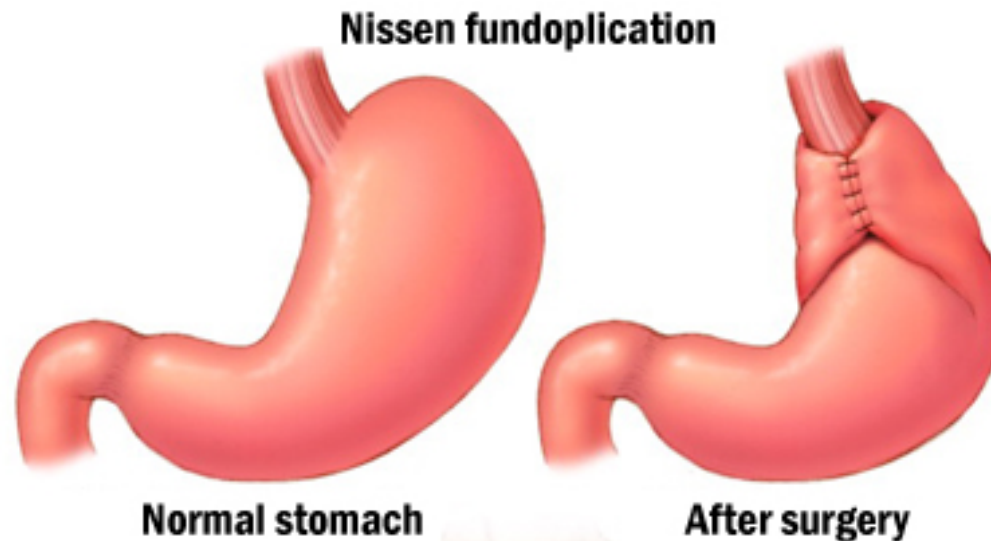
# Treatment for GER

- Hold baby upright when feeding
  - 30 min after feeding.
- Check car seats
- Smaller, more frequent feeds
- Rice Cereal- 1 tsp/ oz formula/EBM
- Burping infant several times.
- **Acid suppressors-** tagaemt, pepcid, zantac, axid.
- **Acid Blockers-** prilosec and prevacid
- G-tube placement



# GER Treatment in Infants

- When medication does not work:
  - Nissen Fundoplication
  - The upper curve of the stomach is wrapped around the esophagus and sewn in place.
  - Strengthens the LES.



# Treatment for Gastroparesis

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- Some babies with gastroparesis tend to have GER:
  - Contraindications for rice cereal
- **Breast Milk Best Option!**
- Hypoallergenic formulas
- **Prokinetics:**
  - reglan, erythromycin

# Transitioning from TF to PO

- Problem:
  - because of reflux/vomiting and/or other experiences they just associate the bottle with pain, so they're not interested.
- Solution
  - Do not “force feed”
  - Do not fill the spoon too full.
  - Try to PO feed before TF.
  - Allow for hungry cues- no grazing
  - Try to make the time pleasant, exciting and rewarding
  - Do not try to wean a child from a G-tube single-handedly

# Effects Of Probiotic and Prebiotic on Gastrointestinal Motility in Newborns

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- By: Ingrio, F., G Riezzo, et al.
- Grade: +
- Has been suggested that adding probiotics and prebiotics as functional components to formula can mimic effects of breast milk.
- Breastmilk:
  - several glycoprotein and soluble oligosaccharides that have been found to stimulate bifidobacteria.

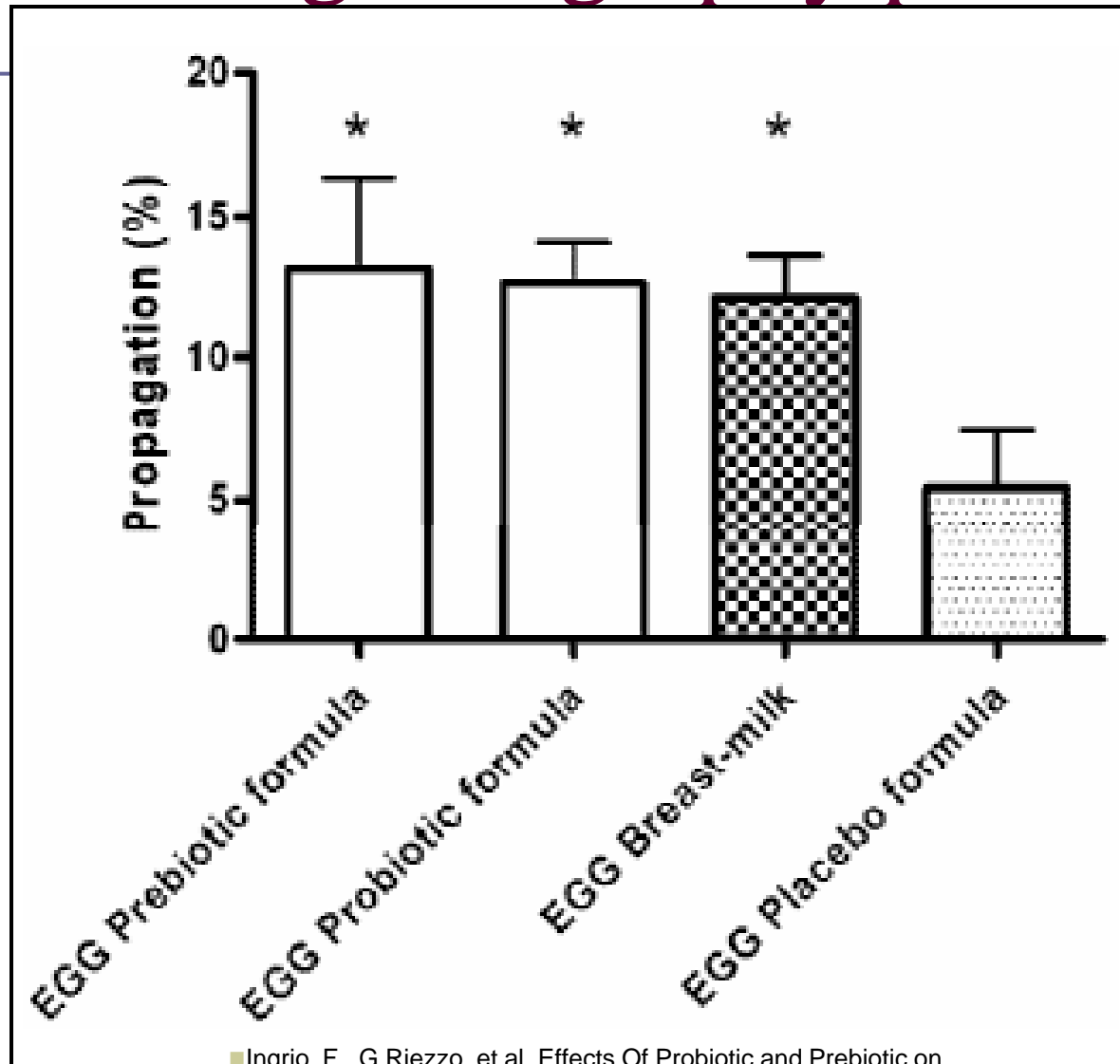
# Subject and Protocol

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- Double-Blind placebo controlled
- Included:
  - Healthy preterm, appropriate for gestational age.
  - Enrolled within first week of life.
- Excluded:
  - Respiratory distress, congenital malformation, inborn errors of metabolism, proven sepsis or infection

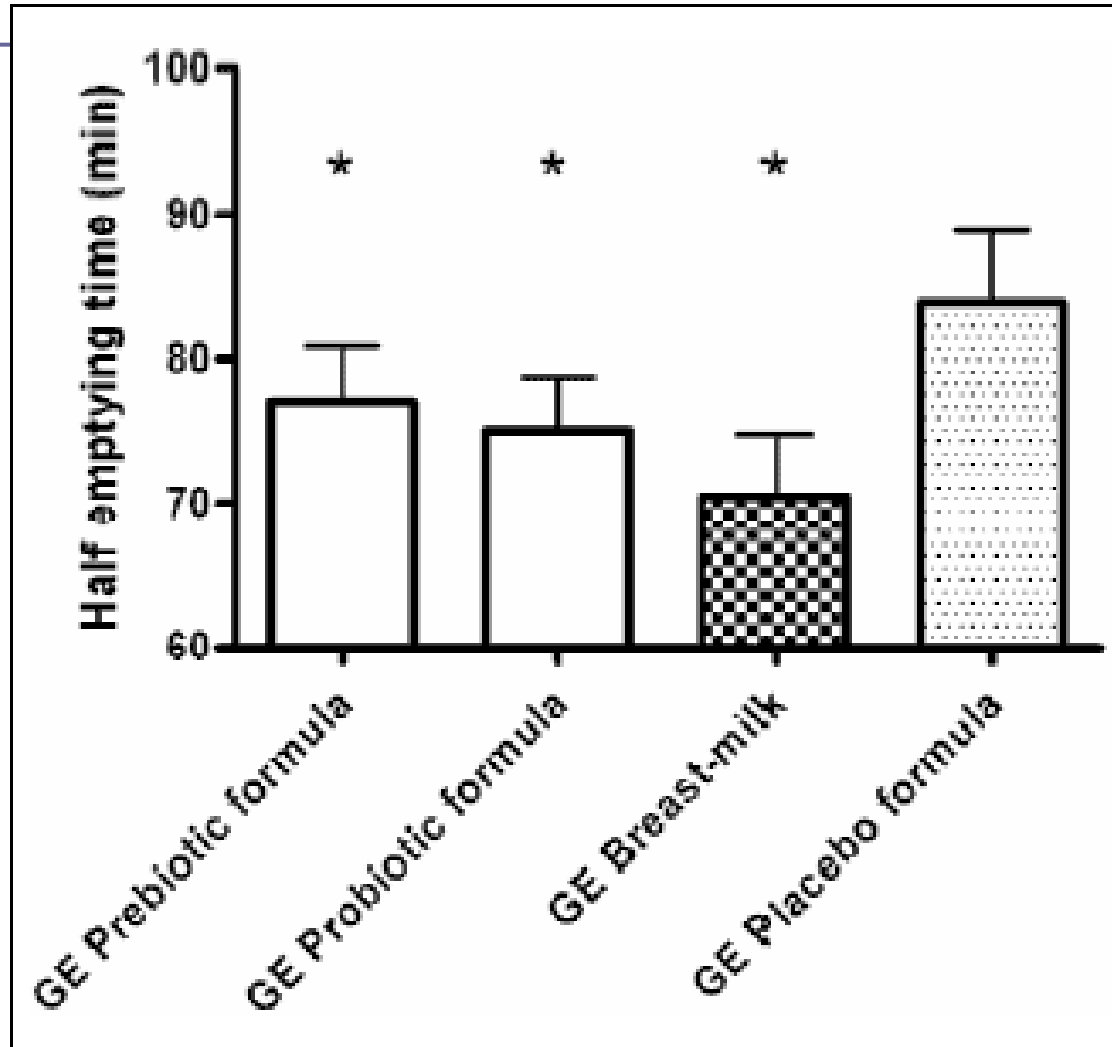
	Prebiotic group	Probiotic group	Breast-milk group	Placebo group
Gender	5/5	4/6	8/9	7/6
Gestational age (wks)	34±0.3	34±1.1	34±0.8	33.9±0.6
Weight (g)	2209±321	1890±432	2326±329	2041±268
Length (cm)	42.9±1.7	44.4±2.3	45.0±2.3	43.7±2.1
Head circumference (cm)	32.7±1.5	32.1±1.6	32.1±1.1	31.2±2.6

# Electrogastrography $p < 0.05$



Ingrio, E., G Riezzo, et al. Effects Of Probiotic and Prebiotic on Gastrointestinal Motility in Newborns. JOURNAL OF PHYSIOLOGY AND PHARMACOLOGY 2009, 60, Suppl 6, 27-31

# Ultrasound Gastric Contents $p < 0.05$



■ Ingrio, F., G Riezzo, et al. Effects Of Probiotic and Prebiotic on Gastrointestinal Motility in Newborns. JOURNAL OF PHYSIOLOGY AND PHARMACOLOGY 2009, 60, Suppl 6, 27-31

# Results

- Average body wt increase:
  - 35g/day
- Probiotic and Prebiotic added to formula induces a GI motility pattern similar to breast milk.
- Underlying significant difference in placebo group.
- Could be a future solution for formula fed babies with delayed gastric emptying.

## Study # 2

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*Pureed by Gastrostomy tube Diet Improves  
Gagging and Retching in Children with  
Fundoplication*

By: Pentiuk, Scott MD, Therese O' Flaherty  
RD, et al.

Grade: +

# The study and pts

- N=33. Children post– fundoplication surgery with symptoms
  - gagging and retching with gastrostomy feedings
- An individualized PBGT diet was designed to meet the child’s nutrition goals- ESHA.
- Weight gain was recorded at each f/u
  - (2-3 months)- over 3 years
- A telephone survey:
  - determine parents’ perceptions of the child’s symptoms and oral feeding tolerance.

**Table 1. Sample Ingredients for a Pureed by Gastrostomy Tube Diet**

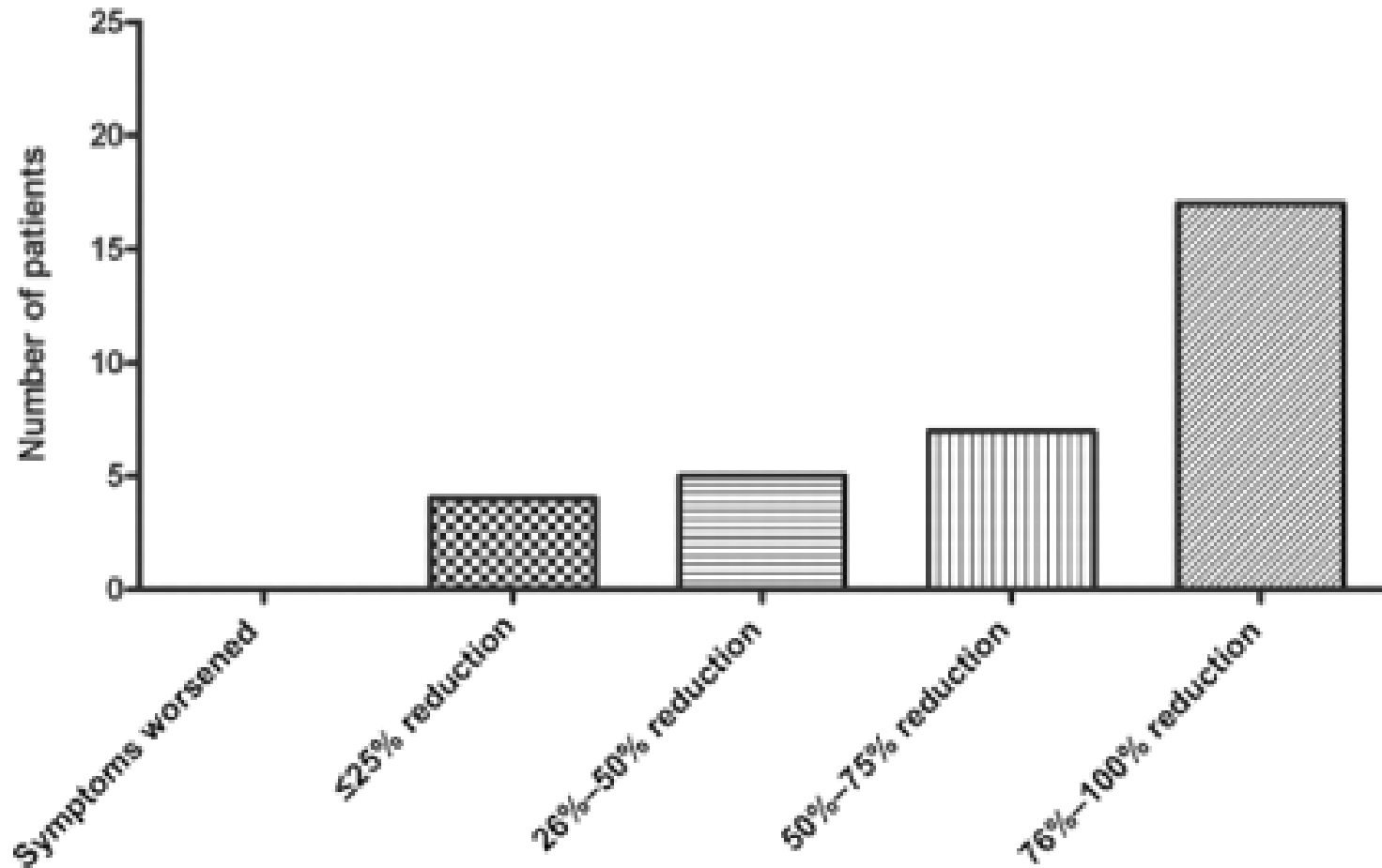
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Diet	5 oz strained meats
	8 oz strained plums or bananas
	4 oz strained pears or applesauce
	4 oz strained squash or sweet potatoes
	6 tbsp infant cereal
	1 tbsp oil
	4 oz yogurt
	3 tbsp cornstarch or sugar
	60 mL commercial formula or milk
Total volume	25 oz (750 mL)
Feeding regimen	
Calorie content	942 kcal
	30% kcal from fat
	55% kcal from carbohydrate
	15% kcal from protein
	65% free water content

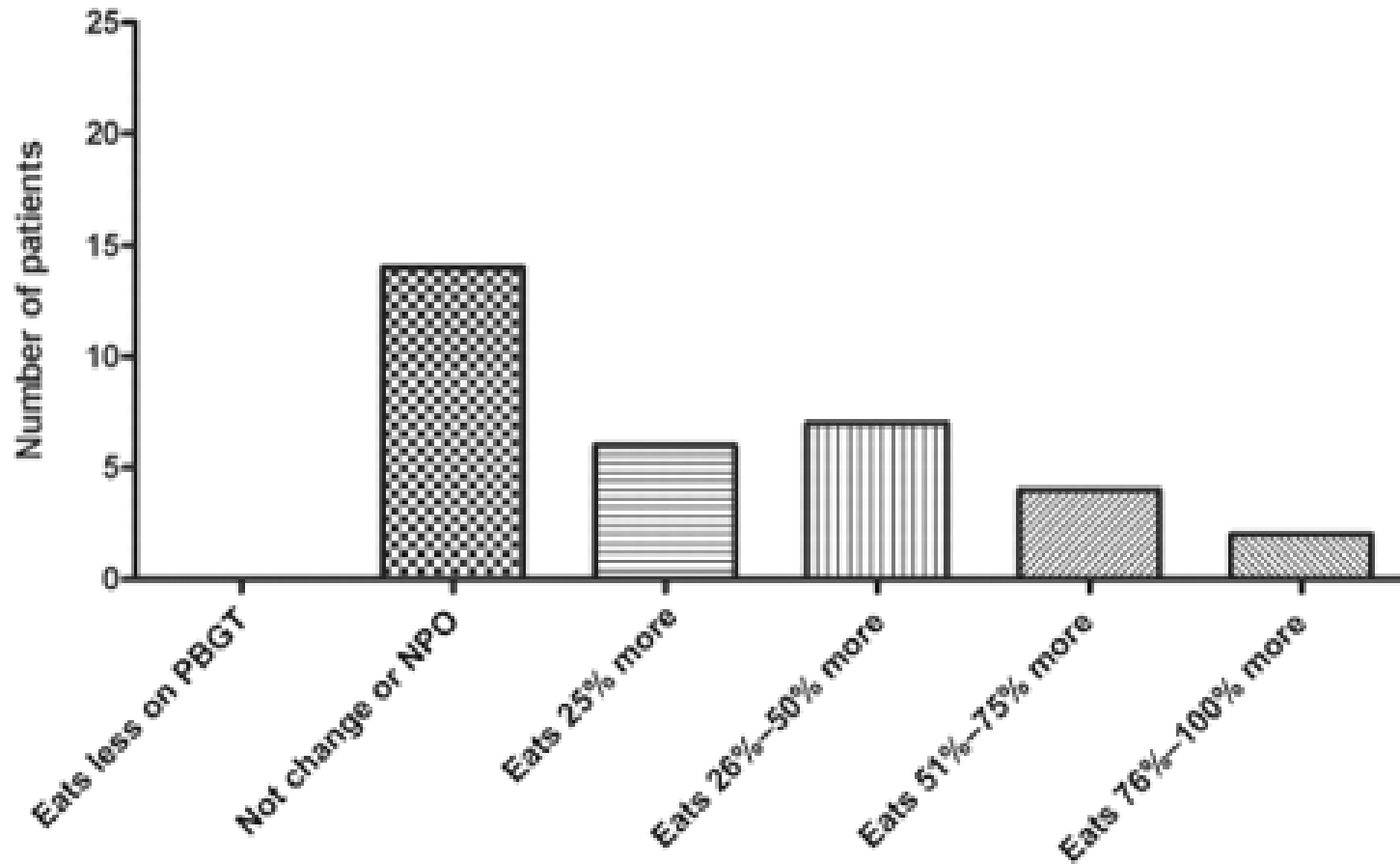
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# Improvement of Gagging and Retching

$p < 0.001$



# Improvement In Oral Intake $p < 0.05$



■ Pentiuik, Scott MD, Therese O' Flaherty RD, et al. Pureed by Gastrostomy Tube Diet Improves Gagging and Retching in Children With Fundoplication. JPEN J Parenter Enteral Nutr. May 2011. Vol. 35 no. 3 375-379.

# Age and Weight Gain for Children on a Pureed by Gastrostomy Tube Diet.

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- 31 weights obtained at f/u visits -chart
- Children were weighed on the same scale for consistency.
- After initiation of the pureed diet,
  - Gained an average of 6.2 g/d
  - Four children lost weight during the f/u period  
Review of clinic records demonstrated that 3 of these children regained their weight

Pentiuk, Scott MD, Therese O' Flaherty RD, et al. Pureed by Gastrostomy Tube Diet Improves Gagging and Retching in Children With Fundoplication. JPEN J Parenter Enteral Nutr. May 2011. Vol. 35 no. 3 375-379.

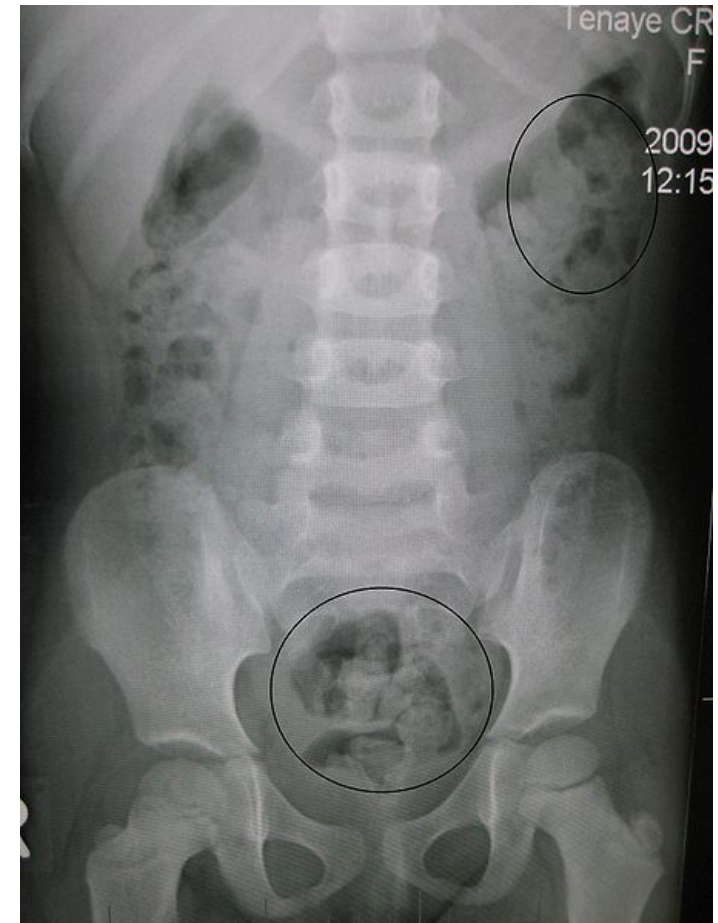
# What They Found...

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- More than half of the parents reported that their child's symptoms had improved by 76% to 100%.
- Child's symptoms improved almost immediately.
- May have decrease oral aversion
- Pt has decrease constipation
- More satisfied, cheaper

# Patient Admission

- Dx: G-tube displacement, gastroparesis
- Diagnosis procedures:
  - CT scan
    - Acities, uncertain placement of G-tube
  - Fluoroscopy
    - Displacement of tube
  - Paracentesis
  - Exploratory laparotomy
    - Perforated Duodenum
  - KUB
    - Kidneys, Ureters, Bladder
  - Blood cultures/labs



Prevacid	stomach pain, constipation, diarrhea, nausea, headache, dizziness	Avoid ETOH, methotrexate (especially high-dose treatment), nelfinavir.
Erythromycin 40mg on by 5th	stomach pain, diarrhea, loss of appetite, nausea, vomiting, bloody stools, hearing changes, irregular heartbeat, red, swollen, or blistered skin, and yellowing of skin or eyes.	Grapefruit juice, Avoid long term use- fungi, bacterial infections. Many medication interactions.
Florastor Probiotic –d/c 6th <i>Saccharomyces boulardii</i> lyo 250mg	stomach gas or bloating  5 billion strains per capsule.	Antibiotics may prevent these products from working well. Take 2 hours before or after taking antibiotics. Interact: antibiotics, antifungals
Gentamycin on s/p repair patch	upset stomach, vomiting, fatigue pale skin, bacterial overgrowth	severe hearing and kidney problems. diuretics, platinol, antifungals other antibiotics
Clindamycin on s/p repair patch. Restarted 13 <sup>th</sup> PICC	Diarrhea, upset stomach, bacterial overgrowth, white patches in mouth	erythromycin, kaolin-pectin, vaccines that contain live bacteria
Ampicillin- s/p repair patch	nausea, vomiting, stomach pain Headache swollen, black tongue, or thrush	Allopurinol, probenecid a sulfa drug or a tetracycline

# NCP: Nutrition Assessment

Date	Diet
2/21/12	Pedialyte 4 oz q 4 hours, 648 ml IVF
2/24	NPO, intubated, s/p surgery: TPN 7.5g AA, 5.25g INL, 45g D.
2/29	Was receiving elecare 24 kcal/oz @ 30ml/hr- stopped. TPN: 20g AA, 22.2g INL, 115g D.
3/5	d/c vent. Refusing bottle. TPN @10ml/hr: 15gAA, 14g INL, 75gD. Volume 600ml + elecare 20 kcal/oz @ 25ml/hr.
3/6	MD requests high kcal feeding recs elecare 24 kcal/oz @ 35 ml/hr

# NCP: Nutrition Assessment

3/8	Elecare 22 kcal @ 15 ml/hr. TPN 16.5g AA, 10g INL, 120g D.
3/13	Elecare 22 cal/oz @ 25 ml/hr
3/14	Tolerating elecare 24 kcal @ 35 ml/hr. TPN d/c.
3/14-3/23	Tolerating Feeds of Elecare 24 kcal @ 35 ml/hr.

# Anthropometrics

- Weight: 6.8 kg
  - Wt for age (25<sup>th</sup>), Wt for height (50<sup>th</sup>)
  - Highest: 3/10- 7kg, Lowest 3/9 6.4 kg.
- Admit FOC: 41 cm (10<sup>th</sup> %tile)
  - 3/6: FOC: 41 cm
- Length: 65 cm (10-25<sup>th</sup> tile)
  - 3/6: Length: 65 cm
- IBW for length/ht: 7.2kg (90% IBW)

Labs	2/21	2/24	2/29	3/3	3/9	3/12
Na	135L	142	136	137	138	135L
K	4.4	3.1L	4.5	4.1	3.7	4.4
BUN	5L	27	20	13	8L	12
Glucose	120H	111H	112H	114H	113H	103
Albumin	4.2	3.2	3.4	3.0L	N/A	3.1L
Amylase			22L			
AST	27					85H
ALT	19					101H
Alk Phos	156H					168H

# Diet History

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- Breast Milk
- History poor PO intake.
- Diet at home: Elecare 24cal/oz 4 oz q 4 hr.  
Takes  $\frac{1}{2}$ -  $\frac{3}{4}$  PO then rest is bolus via G-Tube
- Elecare is used for:
  - Intact protein intolerance, malabsorption, severe food allergies or GI tract impairment.
- Provided: 576kcal, 22 grams of protein.

# Estimated Needs

- Admit: 535-635 kcal (DRI 102kcal/kg to RDA 108 kcal/kg)
- Protein: 10g-11g (DRI 1.52g/kg-RDA 2.2 g/kg)
- Protein for A.S.P.E.N. guidelines: 16.3g - 19.5g(2.5g/kg-3.0g/kg)
- Fluid: 650ml (holliday-Segar)
- Some estimations by age

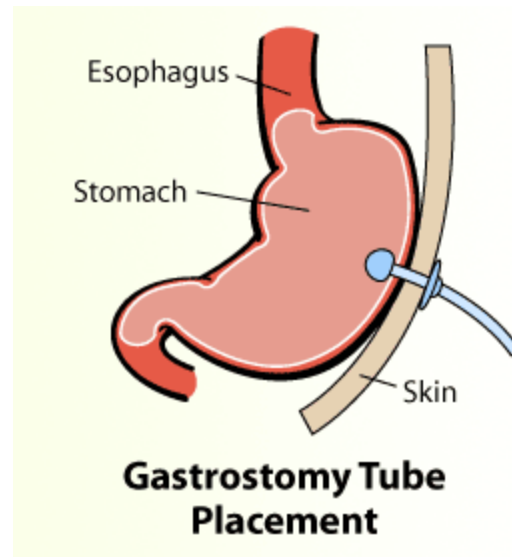
Wt in kg	Fluid needs
1-10kg	100ml/kg
11-20 kg	1000ml + 50ml/kg for each kg >10
>20kg	1500ml + 20 ml/kg each kg >20

Estimated needs	-	535-635 kcal	10-11g protein ASPEN 16-19.5g
<b>Date</b>	<b>Diet</b>	<b>Kcal</b>	<b>Protein</b>
2/24	TPN: 7.5g AA, 5.25g INL, 45g D.	235	5.25g
2/29	TPN @ 24ml/hr. 20g AA, 22.2g INL, 115g D. 600ml volume	665	21g
3/5	TPN @ 10ml/hr: 15gAA, 14g INL, 75gD. Volume 600ml + elecare 20 kcal/oz @ 25ml/hr.	582	21

Date	Diet	Kcal	Protein
3/8	Elecare 24 kcal @ 15 ml/hr. TPN @ 25 ml/hr: 16.5g AA, 10g INL, 120g D.	723 kcal	23.5g
3/13	Elecare 24 cal/oz @ 25 ml/hr	440 kcal	16.5g
3/14-3/23	Elecare 24 cal/oz @35 ml/hr	672	25g

# PES

- Altered GI function related to perforated duodenum, and gastroparesis as evidence by intolerance to feeds.



# Interventions

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- Initiating and advancing formula feedings as medically appropriate.
- Tapering TPN when meeting at least 60% of estimated needs.
- Continuous feeds vs. Bolus feeds
- Erythromycin
- SLP/OT for PO intake
- Probiotic/Prebiotic: Florastor

# Outcome/Monitor

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- Monitor: Wt, labs, tolerance to diet, BM's.
- Goals:
  - Increase PO intake to at least 50% of energy intake.
  - Tolerating EN to meet at least 75% of needs.
  - Promoting a positive growth velocity

# Personal Impression

- Child will begin to take in more PO
- Support from SLP and OT
- Parents really involved
- Unfortunate events, but is young
- **Prebiotics** - Enfamil PREMIUM with Triple Health Guard and Similac Advance EarlyShield
- **Probiotics** - Nutramigen with Enflora LGG and Nestle Good Start Protect Plus



Something to think about...

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# Questions?



"Holy Crap! I've been cloned!"