

Failure to Thrive

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Resident Education Series

Reviewed by Sandeep Gupta, MD of the Professional Education Committee

Case Presentation

- 9 mo old male presents for a check- up
- Parents state he is doing very well
- Taking 6-8 oz of formula every 5 hours
- Eating jar baby foods three times a day
- No spitting up with feeds
- Stools twice a day: brown, soft stool

Case Presentation

- Mixing formula by adding 1 scoop of formula to 2 ounces of water
- He sits alone, pulls to stand and has started to cruise
- He is babbling, makes eye contact and shares attention

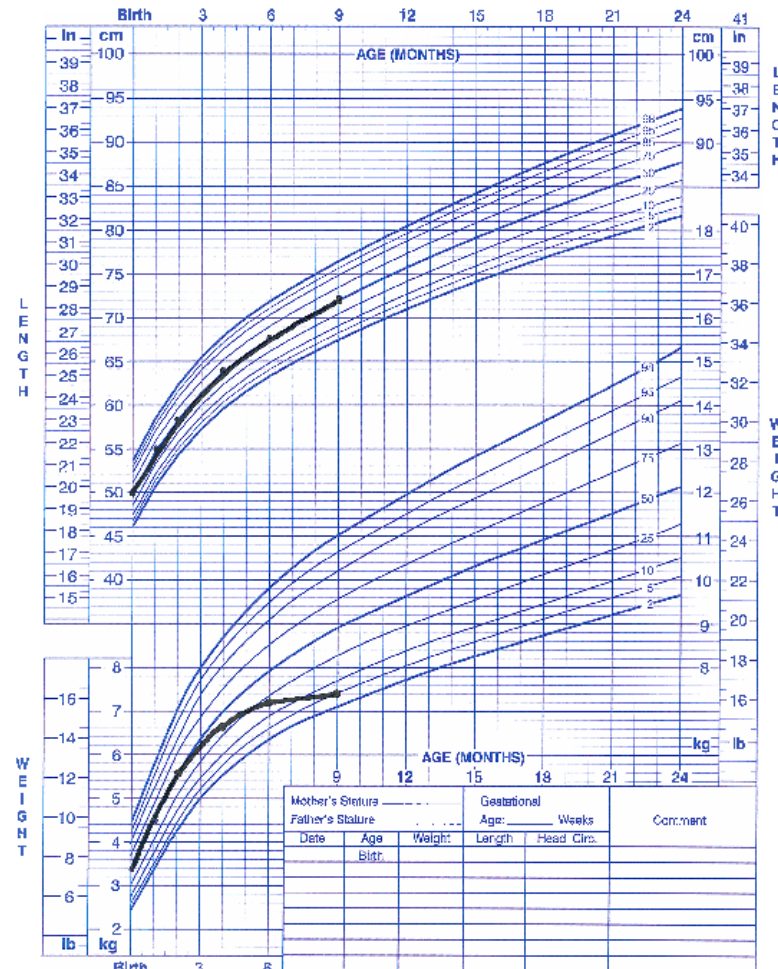
Case Presentation

- PMH: Full term, born by spontaneous vaginal delivery. Pregnancy uncomplicated. No NICU stay. He has no chronic illnesses. No hospitalizations
- FH: Family history negative.
- SH: Patient lives at home with his parents and three siblings.

Growth Chart

Birth to 24 months: Boys
 Length-for-age and Weight-for-age percentiles

NAME _____ RECORD # _____



Mother's Stature _____	Gestational Age: _____ Weeks	Comment
Father's Stature _____		
Date _____	Age _____	
Birth _____	Weight _____	Length _____
	Birth _____	Head Cir. _____

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Case: Physical Exam

VITAL SIGNS: Temperature 37, heart rate 125, respiratory rate 35, blood pressure 80/40, **weight 7.4 kg (5th percentile)**, length 72 cm (50th percentile), head circumference 45.1 cm.

GENERAL: The patient is alert, awake, vigorous. **He is a thin male with minimal subcutaneous fat.**

HEENT: Normal

CHEST: Normal

CARDIOVASCULAR: Normal

ABDOMEN: Normal

GU: Tanner 1 circumcised male.

EXTREMITIES: Normal

NEUROLOGIC: Normal

SKIN: No jaundice, rashes or bruising

Failure to Thrive

What is the technical definition?

Failure to Thrive

Commonly Used Criteria (one of the following):

- Percentiles
 - Weight or weight for height less than 3rd or 5th percentile
 - For children 2 years and older, use BMI
- Percent of Median
 - Weight expressed as a percentage of median weight for age OR
 - Weight expressed as a percentage of median weight for length
- Standard deviation or Z scores
 - Z scores of -2.0 or less for wt for age, ht for age, or wt for ht
- Crossing of percentiles
 - Downward crossing of more than two major percentile lines

Shashidhar H, Tolia V. Failure to Thrive. In: Wyllie R, Hyams JF, eds. *Pediatric Gastrointestinal and Liver Disease 3rd ed.* Philadelphia, PA: Saunders; 2006: 193-202. Table 13.1 p. 137

Failure to Thrive: Terminology

- Wasting
 - Underweight for height
 - Marker for acute undernutrition

- Stunting
 - Below normal height for age
 - Marker for chronic malnutrition

Careaga MG, Kerner JA. A Gastroenterologist's Approach to Failure to Thrive. *Pediatric Annals. Pediatr Ann.* 2000;29:558-567.

Case Presentation

What is the cause of the patient's failure to thrive?

Etiology

- Decreased caloric intake
- Increased caloric requirements
- Excessive caloric losses

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Etiology: Decreased Calorie Intake

- Neurologic disorders with impaired swallowing
- Injury to mouth and esophagus
- Congenital anomalies
- Chromosomal abnormalities
- Metabolic diseases
- Diseases leading to anorexia
- Accidental or inadvertent Psychosocial
- Iatrogenic

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Etiology: Increased Requirements

- Sepsis
- Trauma
- Burns
- Chronic respiratory disease
- Hyperthyroidism
- Congenital heart disease
- Diencephalic syndrome
- Hyperactivity
- Chronic infection

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Etiology: Excessive Caloric Losses

- Persistent vomiting
 - Pyloric stenosis
 - Gastroesophageal reflux disease
- Malabsorptive states
 - Carbohydrate malabsorption
 - Protein malabsorption
 - Fat malabsorption
 - Pancreatic insufficiency
 - Chronic cholestasis

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Etiology: Excessive Caloric Losses

- Carbohydrate malabsorption
 - Celiac disease
 - Enzyme deficiency
 - Short bowel
 - Anatomic gut lesions
 - Postenteritis syndrome
- Protein malabsorption
 - Microvillus inclusion disease
 - Protein-losing enteropathy
 - Chronic inflammatory bowel disease
 - Chronic immunodeficiency
 - Allergic gastroenteropathy
 - Parasite infestation
 - Chronic enteric infection

Diagnosis

- Detailed history and physical exam
- Diet history
- Use of Correct Growth Chart
 - World Health Organization Growth Chart
 - Growth data developed from healthy breast-fed infants
 - Recommended for use in ages 0-2 years
 - Down's Syndrome Growth Chart
 - Cerebral Palsy Growth Chart

Evaluation

- < 2% of lab tests performed for FTT are of diagnostic value
- Routine Screening Tests
 - CBC with differential
 - BUN
 - Creatinine
 - Electrolytes
 - Albumin
 - Calcium
 - Phosphorus
 - Alkaline phosphatase
 - Urinalysis
 - Urine culture

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Case Presentation

- Analysis of his diet revealed he was getting a total of 60 kcal/kg/day from formula.
- CBC and Thyroid function tests were normal.

Evaluation: Optional Investigations

Guided by findings in the history and physical exam

- Calorie count
- Celiac disease serologies
- Stool alpha one antitrypsin
- Fecal fat
- Fecal elastase
- Upper and lower endoscopy
- Pancreatic stimulation test
- Sweat chloride test
- Karyotype
- Quantitative immunoglobulins
- HIV Ab
- Urine organic acids
- Serum amino acids
- Liver function tests
- Chest x-ray
- Echocardiogram
- Head MRI
- Abdominal US
- Bone age
- Heavy metal screening (lead, arsenic)
- Video feeding study

Case Presentation

- Calorie count performed
- Recommend:
 - 3 meals + 2 snacks
- 24-28 ounces of formula a day fortified to 22kcal/oz
- Goal kcal/day: 120 for catch up growth

Management

- Goal: increase calorie intake to enable weight gain
 - Higher daily weight gain goal than that of typically developing child
 - Increase caloric intake by 50% greater than basal requirement
 - Example: typically developing 1 yr old child requires 100 kcal/kg/day; in FTT child would increase goal to 150 kcal/kg/day for catch up growth
- Nutrition consultation
- Multivitamin including iron and zinc

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Management

- Strategies for increasing calories in:
 - Infants
 - Frequent feedings
 - Addition of high calorie additives such as rice cereal or baby oatmeal
 - Toddlers
 - Frequent meals
 - Energy dense foods
 - Adding extra calories to foods
- Appetite stimulants
 - Cyproheptadine (Periactin)
 - Megestrol (Megace)
- 4-6 weeks after initiation of intervention
 - If no weight gain, then initiate NG feeds to supplement PO intake

Management

- Nutritional Recovery Syndrome
 - Experienced by some malnourished children during nutritional recovery
 - Symptoms include:
 - Diarrhea
 - Excessive sweating
 - Hepatomegaly
 - Caused by increased glycogen deposition in the liver
 - Widening of the suture
 - Caused by brain growth that is greater than the growth of the skull in infants with open sutures
 - Irritability or mild hyperactivity

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Management: Complications

- Refeeding Syndrome
 - Potentially fatal
 - May occur within hours or days of initiating nutrition
 - Increase in caloric intake stimulates insulin production which leads to intracellular uptake of phosphorus, glucose and water causing fluid and electrolyte abnormalities:
 - Hypokalemia
 - Hypomagnesemia
 - Hypophosphatemia
 - To avoid refeeding syndrome
 - Start calories at 75% of required caloric intake
 - Gradually increase over 3-5 days

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Prognosis

- Almost all children get better with intervention
- Many children improve growth, even without intervention
- Some children are picky eaters later in childhood
- FTT in infancy has been shown to be associated with deficits in IQ in later childhood

Gahagan S. Failure to Thrive: A Consequence of Undernutrition. *Pediatr in Review*. 2006;27:e1-11.

References

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Gahagan S. Failure to Thrive: A Consequence of Undernutrition. *Pediatr in Review.* 2006;27:e1-11.

Gahagan S, Holmes R. A Stepwise Approach to Evaluation of Undernutrition and Failure to Thrive. *Pediatr Clin North Am.* 1998;45(1):169-187.

Shashidhar H, Tolia V. Failure to Thrive. In: Wyllie R, Hyams JF, eds. *Pediatric Gastrointestinal and Liver Disease 3rd ed.* Philadelphia, PA: Saunders; 2006: 193-202.

Zenel JA. Failure to Thrive: A General Pediatrician's Perspective. *Pediatr in Review.* 1997;18:371-378.