

PedsCases Podcast Scripts

This is a text version of a podcast from Pedscases.com on "Failure to Thrive." These podcasts are designed to give medical students an overview of key topics in pediatrics. The audio versions are accessible on iTunes or at www.pedcases.com/podcasts.

Failure to Thrive

This podcast was written by Dr. Melanie Lewis. Dr. Lewis is a general pediatrician at the Stollery Children's Hospital in Edmonton. She is also the Year 3 Clerkship Director for Pediatrics at the University of Alberta.

Introduction

You have just admitted a two month old to your children's hospital with respiratory distress, severe failure to thrive and anemia. History reveals a previously well child, formula fed with iron-fortified formula with an intake of 180ml/kg/day. There is no history of diarrhea or vomiting. There is also no overt history of blood loss or black stools. What the heck is going on here? What will be your approach to explain this child's presentation?

This podcast will discuss the topic of failure to thrive. Failure to thrive is a term generally used when discussing weight gain, but may entail growth velocity or height as well. First of all, one has to remember, that much like 'anemia', Failure to Thrive defines a problem, not a diagnosis. The etiologies for failure to thrive are so numerous and diverse the development of a simple approach to this complex problem is essential.

Definitions

Failure to thrive has numerous definitions. Some texts will define failure to thrive as weight less than the third percentile on the appropriate growth chart. Others will define it as crossing two major percentiles on the appropriate growth chart. You may be getting the drift...YOU NEED TO PLOT YOUR PATIENT ON THE APPROPRIATE GROWTH CHART FOR GENDER, ETHNICITY, AND SYNDROME. For instance, children with Down syndrome and Turner Syndrome have unique growth charts.

Some text will break down FTT into organic and non-organic etiologies. While psychosocial issues have a significant impact, they generally translate into kids who are simply not fed enough.



In addition to plotting the children on the appropriate growth chart, you also need common sense. Remember big, fat babies are fat related to *in utero* influences. Some of these fat babies may cross several percentiles while they try to find their appropriate genetic percentile. So if the baby has a nice fat bum and thighs and they are referred to you for FIT... take the growth chart and the physical exam into consideration before embarking on investigations!

The Approach

Failure to thrive can be slotted into three simple categories: not enough calories in, increased metabolic demands or too much output. Simply put: there are not enough calories going in or there are too many calories going out. At times a child may have a diagnosis that involves all three categories. For instance, a child with Crohn's disease will have a loss of appetite and hence not have enough calories in, have increased caloric demands as a result of the ongoing inflammatory process and the diarrhea is obviously a source of increased output.

Not Enough In

First of all, let's discuss the concept of 'hot enough calories in." The first step is knowing exactly how many calories the average kid is suppose to consume a day to grow.

Listen up this is crucial information: the average infant needs 100 kcals/kg/day with a range of 80 – 140 kcal/kg day. The average child requires 40 – 90 kcal/kg/day. And an adolescent needs 30 – 50 kcal/kg/day. So that may seem pretty straightforward for those of you with photographic memories but the tricky part with infants is how much formula or breast milk does this actually translate in to.

Again, listen up this is important info: regular formula and breast milk both contain 20kcal/30mls or for you old school types 20 kcals/ounce. And here is where is gets confusing this equals 0.67kcal/ml which if you are a math wizard translates into 120 – 210ml/kg/day. If you are seeing an infant with failure to thrive and trying to figure out if there is enough calories going in: Remember they need roughly 100kcals/kg/day with a range of 80-140kcal/kg/day and this translates into 120 –210ml/kg/day of formula or breast milk. Trust me you should write this down somewhere.

Possible etiologies for inadequate input include difficulties breast feeding, improperly mixing the formula resulting in a calorically dilute mixture, neglect, swallowing difficulties related to an underlying neurologic problem, or a baby with occult respiratory or cardiac issues which prevents them from consuming adequate amounts of calories before they tire out.



Increased Metabolic Demands

This leads nicely to the concept of "increased metabolic demands". These issues may be obvious such a child with cerebral palsy who require a tremendous amount of calories to simply move their limbs, to more occult issues such a congenital heart disease, hyperthyroidism, inflammatory diseases such as Crohn's disease, renal disease or malignancies. The list of occult problems in infants and children that contribute to failure to thrive is lengthy. Remember the challenge in paediatrics is that really anything could be going on, and the babies are not going to help you by providing a clear history.

Too Much Out

And finally the concept of "too much out." This one is pretty straightforward. The baby or child vomits or refluxes too much, has too much stool or urine output, or in the case of cystic fibrosis, there are high insensible losses.

Key points on History and Physical Exam

So now you have a definition of failure to thrive and an approach. Another key in the history is the onset of the problem: was it right after solids were started? Perhaps the baby has celiac disease and had no problems until you introduced gluten in the diet. Or the older child was fine until you prescribed a stimulant to treat ADHD. When dealing with adolescent girls, be on the look out for a history suggestive of an eating disorder.

On physical exam, look at fat stores. In infants, the buttocks and thighs are good areas to look at. A child with a plump bum and hefty thighs is very reassuring. Meticulous cardiac and pulmonary examinations are critical. And finally, you have to specifically search out subtle clues such as: does the child have any extra-intestinal manifestations suggestive of inflammatory bowel disease, such as peri-anal disease, clubbing, erythema nadosum, or canker sores. If you don't ask and look for these, they usually won't be handed to you by the patient or family when you take the history.

Investigations

Your investigations should be directed by your clinical suspicions. A shot gun approach is rarely helpful. A stepwise approach beginning at the most likely to the less likely is far more rewarding. In fact, close follow-up is all that is required in many cases, and the failure to thrive improves without a clear etiology.

<u>Summary</u>

To summarize the take home points from this podcast:

1. Failure to thrive is usually recognized as a problem when an infant, child or adolescent crosses two major percentiles on the appropriate growth



chart.

- 2. Your simple approach to this problem encompasses three aspects which should guide your history: there are not enough calories going in, there are too many calories going out, or there are extraordinary metabolic demands that you may or may not be aware of.
- 3. Physical exam should seek out any occult diseases involving the GI, cardiac, or pulmonary systems to name the most commons systems involved. However, the challenge in paediatrics is that anything could be going on in that little body and in the case of infants they are unable to tell you first hand their symptoms.

To go back to the case at the top of the podcast: a brilliant medical student diagnosed RSV bronchiolitis, and determined the anemia and failure to thrive were related to the mother improperly mixing the formula. The mom was adding just enough powdered formula to color the water and while the baby seemed to be taking in a sufficient quantity of formula, the formula was extremely calorically dilute.

This concludes this podcast.

References

References available upon request.