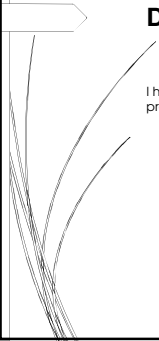


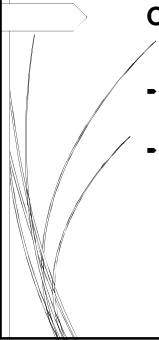
Name that Growth Issue: A Critical Approach to Diagnosing that “Common” Growth Problem

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Disclosure of Conflict of Interest

I have no actual or potential conflict of interest in relation to this program/presentation.



Objectives

- By the end of this session, participants should be able to discuss the varying approaches and differential diagnoses in a short stature evaluation.
- By the end of the session, participants should be able to apply knowledge to future growth evaluations at their home institution that will lead to improved diagnoses for that “routine” growth evaluation.

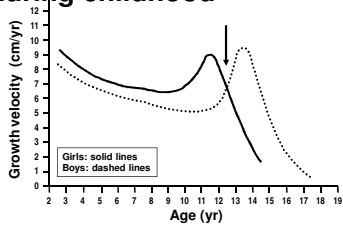
The Usual Short Stature Evaluation

- Review of Systems
- Physical Exam
- Laboratory studies
- Imaging

History and Physical Examination

- Birth History - Small for Gestational Age, Intrauterine Growth Retardation
- General History - Chronic Illness
- Family History - Genetic, Psychosocial
- Physical Examination - Proportions, Abnormalities
- Growth Chart - Growth Velocity, Change in Growth Pattern

Normal growth rates during childhood



Girls' peak growth rate: 11.5 yrs
Boys' peak growth rate: 13.5 yrs

National Center for Health Statistics.
Tanner JM, et al. J Pediatr. 1985.

Growth evaluation

- Laboratory studies
 - Endocrine: IGFBP-3, IGF-1, TFTs, Cortisol?, GH stimulation testing?
 - Non endocrine: CBC, CMP, Inflammatory markers (ESR or CRP), Celiac panel
- Radiology studies
 - Bone age
 - MRI of pituitary gland?

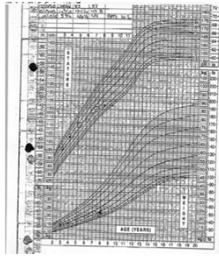
Differential Diagnosis

- Normal variants
 - CDGP
 - FSS
- Pathologic Conditions
 - Non Endocrine
 - Chromosomal Abnormalities
 - Disorders of bone formation
 - Chronic systemic disease (CKD, Celiac disease)
 - Nutritional Disorders
 - Various Syndromes
 - Metabolic Disorders
 - Pharmaceuticals (i.e. Steroids, stimulants)
 - SGA
 - Endocrine
 - Hypothyroidism
 - GHD
 - Hx of CPP
 - Cushing disease

Case #1

- Initially presented at age 10 years 8 months with concerns of growth deceleration
- ROS negative
- Family Hx
 - MPH 5'7"
 - No endocrine issues
 - No known autoimmune issues

Case #1- Growth Chart



Growth deceleration began at age 5 years from 75thile. By age 9, 3rdile.

Case #1- Physical Exam

- Presenting photo
- Hypertrichosis on back
- Wide neck
- Prepubertal

Evaluation at initial presentation

- Bone age delayed by 3 years
 - At 10 years 7 months, bone age just 7 years 10 months

What's Next?

- Let's discuss!
 - Differential Diagnosis
 - Evaluation

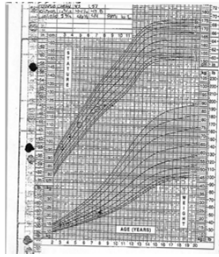
What we did?

- Evaluation
 - Laboratory studies
- Radiology
 - MRI of pituitary gland

Case #1 Outcome and Treatment

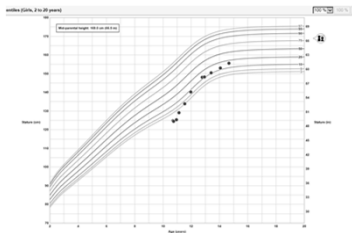
- Diagnosis- Hashimoto thyroiditis
- Treatment- Levothyroxine
 - Dose escalation
 - Flip back to growth chart
- ADD growth chart with adult height

Case #1- Growth Chart



Growth deceleration began at age 5 years from 75thile. By age 9, 3rdile.

Case #1 – Growth Chart following treatment



Case #2

- 15 year 4 month old female presented for a growth evaluation
- Concern about height (4'9.5") and lack of growth for past 2 years
- Normal weight gain
- Menarche age 12 years old – cycles regular

Case #2

- ROS
 - Recent diagnosis of ADHD and anxiety within the past year
 - Treated with Vyvanse and Prozac
 - "Feet pain" – EMG normal
- Family Hx
 - MPH: 5'3.5"
 - Paternal uncle with Type 1 DM, No other endocrine disease, MGM 5'
- Physical Exam
 - Tanner 5
 - High arched palate
 - Normal thyroid exam

Case #2

- Evaluation
 - Bone age – 17 years of age

Case #2 : What is Next?

- Evaluation
 - Laboratory studies ?
- Differential Diagnosis

Case #2 – Outcome and Treatment

- Evaluation
- Diagnosis
 - Hypothyroidism: Levothyroxine – 50 mcg daily
 - OTHER??

Case #3

- 12 years 2 month male originally presented at age 10 years 4 months for concerns of short stature (height 1st%ile)
- PMHx
 - Birth weight: 5lb 10oz
 - Gestational age: 37 weeks gestation
 - Hx of fetal intracranial hemorrhage and venous anomaly – monitored only

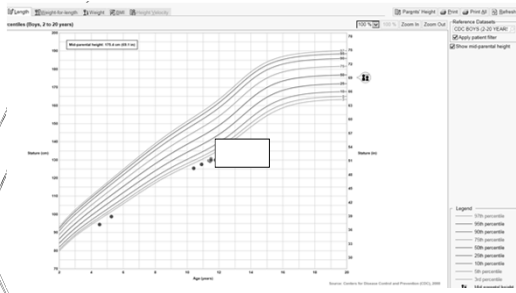
Case #3

- ROS
 - Negative for headaches
 - Mild intermittent asthma
 - Developmentally normal
- Family Hx
 - Adjusted MPH: 69"
 - Thyroid disease – MGM

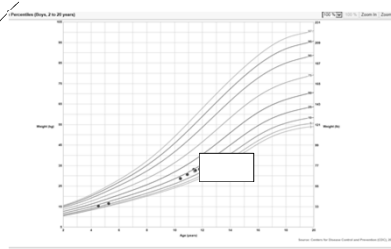
Case #3

- Physical Exam
 - Prepubertal
- Evaluation
 - Bone age read as 6 years at a chronologic age of 10 years
 - AHP normal for family's genetics
 - Laboratory studies unremarkable
 - CBC, CMP, IGF-1, IGFBP-3, TSH, fT4, Celiac panel, ESR

Case #3



Case #3



What's Next?

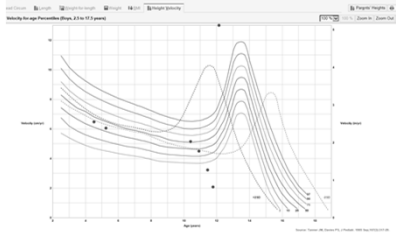
- Let's discuss!
 - Differential Diagnosis
 - Further Evaluation

What we did

- Further Evaluation
 - Laboratory studies
 - Provocative growth hormone stimulation test
 - GH peaked at 5.93 and 6.9
 - Repeat testing of pituitary hormones, including cortisol – ALL normal
 - Radiology
 - MRI of pituitary gland
 - Pituitary hemorrhage
- Treatment
 - Growth hormone with monitoring of MRI

Patient 4 months after starting GH

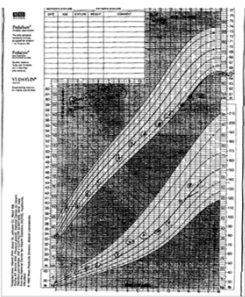
Patient 4 months after starting GH



Case #4

- 16 year 2 month old male presenting with growth deceleration and weight gain despite pubertal development

Case #4: Growth Chart



Case #4

- ROS
 - Weight gain despite activity with denied excessive intake
 - Vasovagal syncope
- PMHx
 - Hx of sixth never palsy s/p repair at age 11 years
- Family History
 - MPH: 66.5"
- Physical Exam
 - Round facies
 - Puberty: Tanner 4 PH; Tanner 5 Genitals (testes 15 cc)

Case #4: Evaluation

- Bone age at CA of 16 years 1 month, read as 14 years 6 months

Case #4 : What is Next?

- Further Evaluation
- Differential Diagnosis

Case #4: What we did

- Laboratory evaluation
 - IGF-1, IGFBP-3, TSH, IT4, CBC, CMP, Celiac panel, ESR
- Additional tests:
 - 24 hour urine cortisol
 - Dexamethasone suppression test
- Imaging
 - MRI of pituitary gland

Case #4: Outcome and Treatment

- Outcome
 - Cushing disease
- Treatment
 - Transphenoidal surgery
 - Adrenal insufficiency
 - Steroid wean
 - Aromatase inhibitor

Questions?
