Growth Failure- Faltering Growth and Short Stature

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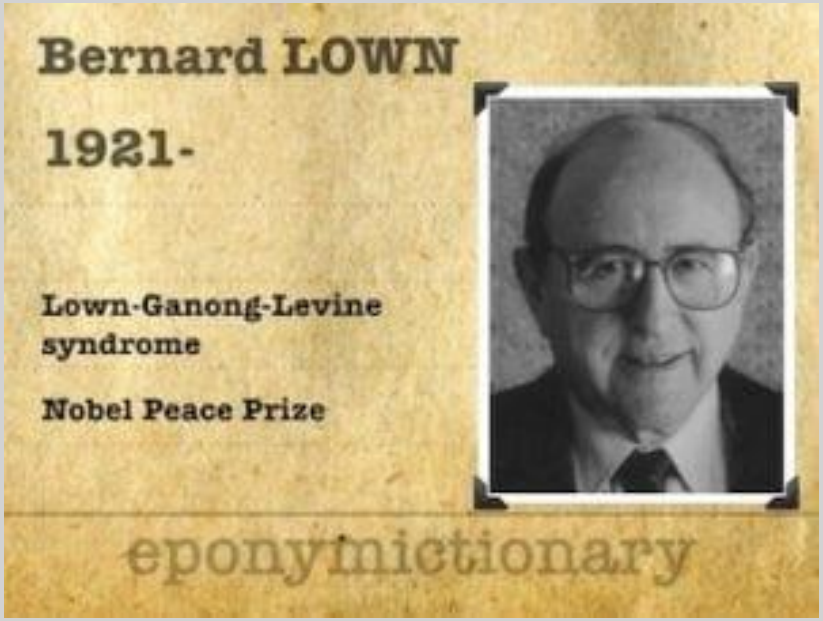
- Do as much as possible for the patient and as little as possible to the patient

-Dr Bernard Lown



Growth Failure-Types

- Weight only affected initially- Faltering Growth or classic FTT
- Height only affected- Short Stature
- Head circumference only affected- Neurological
- If weight/height/Head circumference affected – congenital Infections/syndromes/teratogenic

Definition of Faltering Growth

- In simple words is sub-optimal weight gain.
- This could be what the family feel but proved by the physicians as evidenced by growth chart readings and subsequent investigations

Technical definition for faltering Growth using UK WHO growth chart(NICE)

A fall across 1 or more weight centile spaces, if birthweight was below the 9th centile

A fall across 2 or more weight centile spaces, if birthweight was between the 9th and 91st centiles

A fall across 3 or more weight centile spaces, if birthweight was above the 91st centile

when current weight is below the 2nd centile for age, whatever the birthweight.

Growth charts (rcpch.ac.uk)

Incidence

- Poor weight gain is common. It occurs in approximately 5-10% of children in Primary care setting and 3-5% of those in the referral setting in resource –Abundant countries

Failure to thrive: an old nemesis in the new millennium

I D Schwartz

- Although failure to thrive (FTT) is a common problem, precise epidemiological data is lacking. FTT accounts for 1–5% of paediatric hospital admissions under 2 year of age. This will be an underestimate of its true incidence, however, as FTT is identified and treated primarily in the community. The population prevalence of FTT has been found to range anywhere between 1.3% and 20.9% depending on the definition of FTT that is used

- **Commentary: The epidemiology of failure-to-thrive in infants**
- Peter B Sullivan

Normal growth

Weight gain first 3 months (after initial weight loss should regain birth weight by 14 days)- 25-30 gms per day

20 gms per day from 4-6 months

10 gms per day from 7-12 months

Double the birth weight by 5 months and triple the birth weight by 1 year.

Height 75 cms by 1 year and 85-90 cms by 2yrs.

Then weight and height gain is steady(follows the centile till they hit puberty)

Classic Case presentation

- Concerned parents booking an appointment with family GP
- Issues with weight picked up when family present for a different problem
- Issues with weight picked up by health visitor team

Referral pathway

Acutely-

- in a infant who has fallen of centile- GP discusses via hotline/ rapid access referral pathway
- Unwell child with growth failure/safeguarding concerns
- Admitted for medical condition and Growth failure picked up

Outpatient based referral- If child has suspected growth failure but can wait for 8-10 weeks

Growth Charts

Growth charts (rcpch.ac.uk)

Digital growth charts | RCPCH

UK-WHO growth chart app

INADEQUATE CALORIC INTAKE	INADEQUATE CALORIC ABSORPTION/Utilisation	EXCESSIVE CALORIC EXPENDITURE
Infant or toddler		
Breastfeeding problem	Food allergy	Thyroid disease
Improper formula preparation	Malabsorption	Chronic infection or immunodeficiency
Gastroesophageal reflux	Pyloric stenosis	CF/Chronic Pulmonary conditions
Caregiver mental health conditions	Gastrointestinal atresia or malformation	CHD
Lack of food availability	Inborn error of metabolism	Malignancy
Cleft lip or palate		
Child or adolescent		
Mood disorder	Food allergy	Thyroid disease
Eating disorder	Coeliac disease	Chronic infection or immunodeficiency
Gastroesophageal reflux	Malabsorption	CF/Chronic Pulmonary conditions
Irritable bowel syndrome	Inflammatory bowel disease	CHD
	Inborn error of metabolism	Malignancy

Most common cause of Faltering growth

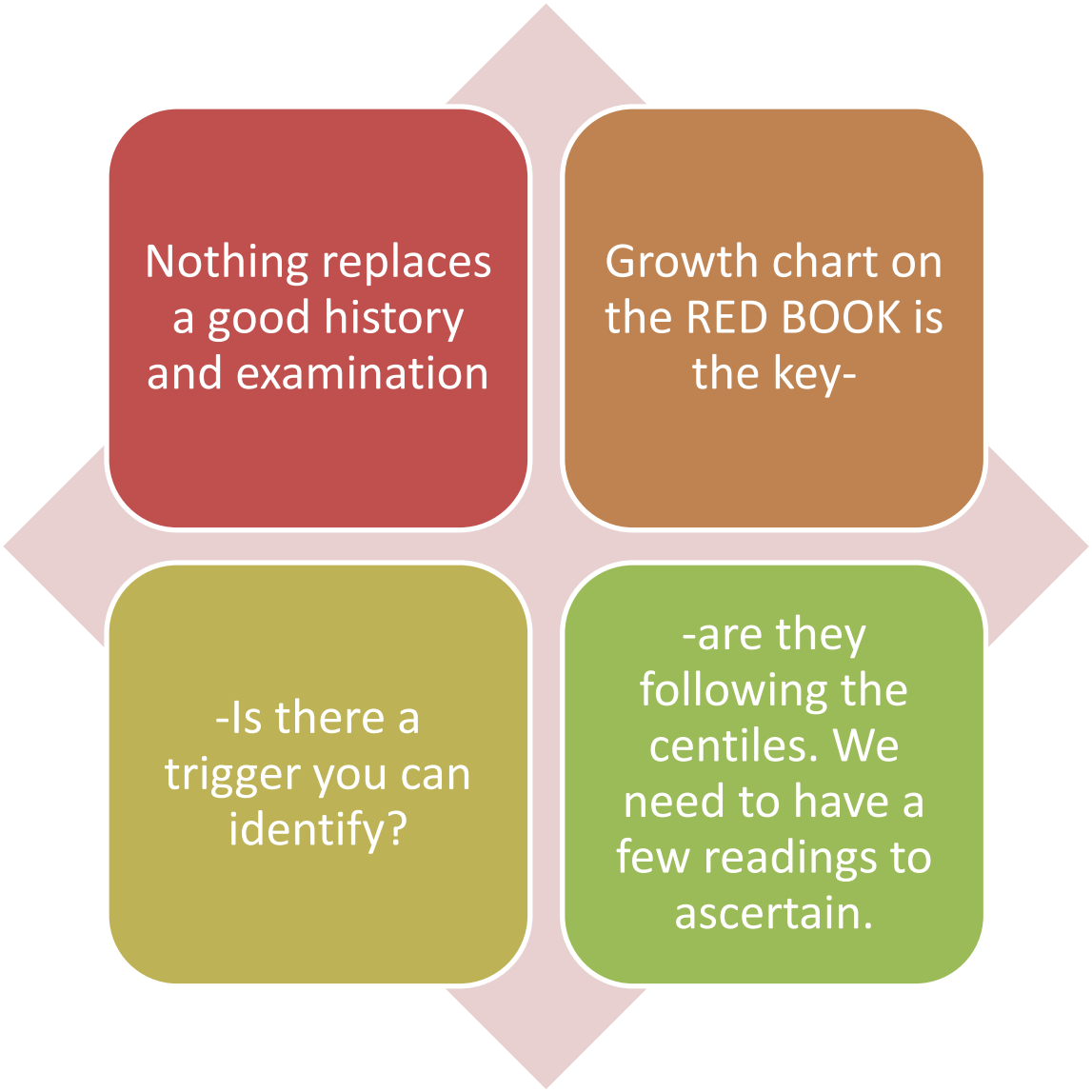
- Failure to thrive is a common presenting problem in the paediatric population in both resource-abundant and resource-poor countries. While epidemiology may vary by region, inadequate caloric intake remains the most common cause of FTT in both developed and developing countries, and poverty is the greatest risk factor for FTT worldwide

- **Failure to thrive: an update.**
- Sarah Cole, Jason S. Lanham
- Published 1 April 2011
- Medicine
- American family physician

Underlying organic disease ?

- **Faltering growth is often due to a combination of biological, psychosocial and environmental factors** — a specific underlying cause may not be identified.
  - UK population-based studies (n=97, n=136) suggest that underlying organic disease is the main cause of faltering growth in only a small proportion of children (approximately 5%) [Drewett, 1999; Wright, 2000a].

Tools to manage Faltering Growth



History –Question to ask?

a) Are they taking enough

- Diet history/feeds history(first three months of life need 5 ounces /kg- 150 ml/kg feeds)
- History of Sig.GORD/food aversion

b) If they are taking enough- are they losing a lot or needing more?

-Chronic D&V/cough

-Allergy/intolerance

-Recurrent infections

-excessive sweating and not completing feeds

Risk factors

1) Medical

.Prematurity

.Developmental delay

.Cong.anomalies

.Intrauterine exposure to toxins/infection

2) Psychosocial

.Poverty/family size/mental well being

.Health and nutritional belief

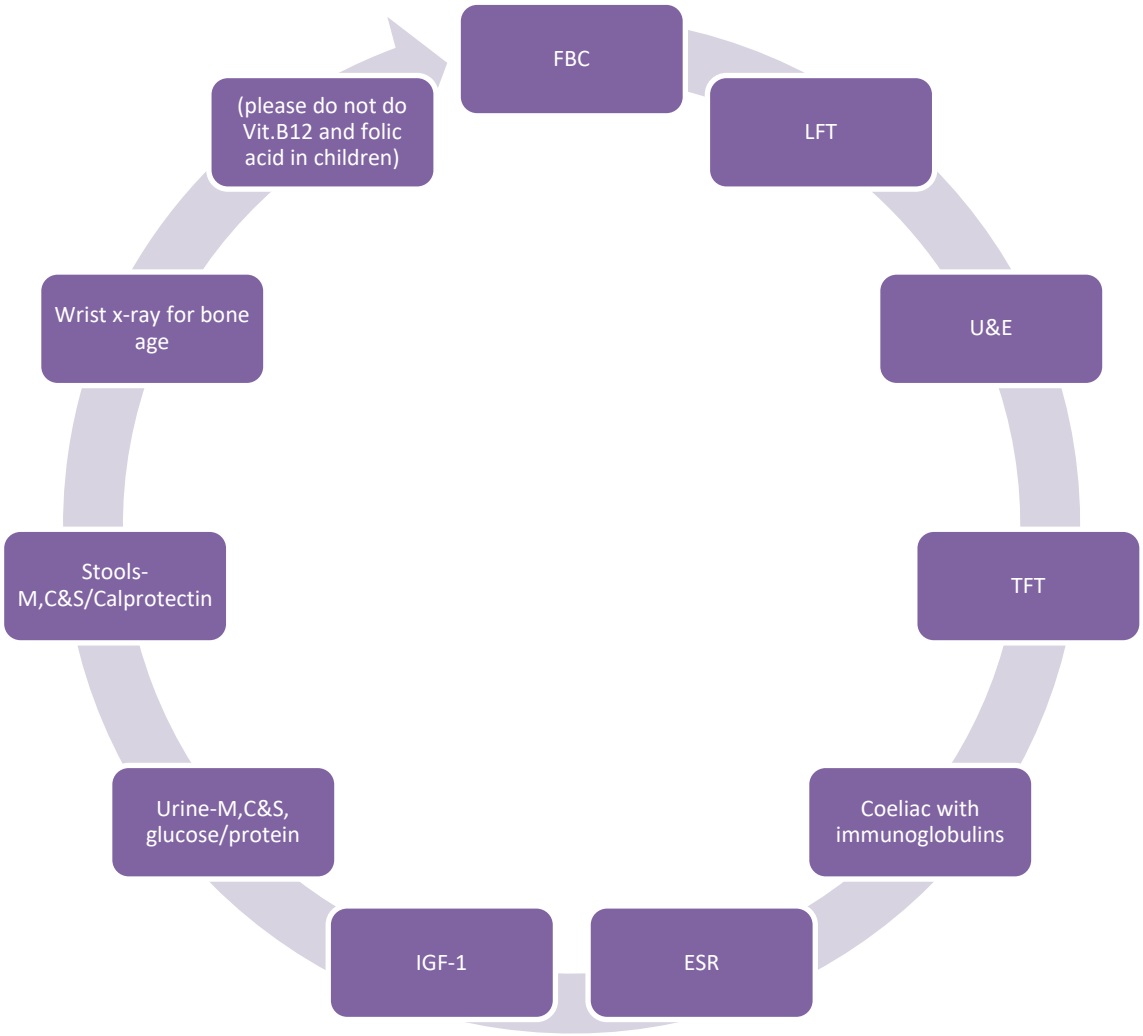
Examination

- Plotting a few readings on growth chart
- Dysmorphism
- Pallor/clubbing/cyanosis/jaundice
- CVS- Heart murmur
- Abdominal- organomegaly
- Development(are the age appropriate?)

Investigations

- Without a thorough history and examination including accurate recording on red book, investigations is a fishing expedition
- Investigations will depend upon the cause
- More often than not investigations are not needed but reassurance and follow up

Baseline Ix in Primary care




Short Stature

Definition

- Short stature is a term applied to **a child whose height is 2 standard deviations (SD) or more below the mean for children of** that sex and chronologic age(corresponds to height less than 2.3rd centile)

Normal parameters- length at birth 50 cms

Height gain/velocity

- 1st year- 25 cms
- 2nd year- 10 cms(4 inches)
- 3rd and 4th year- 5.5-9cm/yr
- 5th and 6th year- 5-8.5cm/yr
- From 6th birthday to puberty- 4-6 cm/yr
- Puberty-6-12 cm/yr for boys/5-10 cm for/yr for girls
- By 24 months to 30 months- reach ½ of adult height

Causes of short stature

1) Non pathological(most common 80%+)

-Familial

-Constitutional Delay in Growth and Puberty(CDGP)

-Idiopathic Short Stature(ISS)

2) Pathological- Proportionate/disproportionate

-Endocrine

-Underlying Systemic disease

-Skeletal dysplasia

Causes of short stature

- **Analysis of reasons of short stature**
- Anna Majcher [1], Joanna Bielecka-Jasiocha, Beata Pyrzak
- 1314 patients with short stature, aged 1 to 18 years (790 boys and 524 girls)
- In 246 children (18.7%) growth hormone deficiency was diagnosed: 176 boys and 70 girls. 49 girls had Turner's syndrome, 4 had coeliac disease (0.3%) and 4 boys had Noonan syndrome (0.5% boys). In 1011 children (76.9%) neither somatic disorders nor growth hormone deficiency were diagnosed

- **Utah Growth Study: growth standards and the prevalence of growth hormone deficiency**
- Serial measurements of elementary-school children were conducted for 2 consecutive years to assess height and growth velocity and to determine the prevalence of growth hormone deficiency (GHD) in American children. Trained volunteers measured 114,881 children the first year; 79,495 growth rates were calculated after the second measurements
- We examined 555 children with short stature (< 3rd percentile) and poor growth rates (< 5 cm/yr). Five percent had an endocrine disorder. The presence of GHD (peak level, < 10 ng/dl with two provocative tests) was found in 16 previously unrecognized children; 17 children from this school population were already known to have GHD. Boys outnumbered girls 2.7:1 ($p = 0.006$). Six girls with Turner syndrome also were identified

Growth Velocity and Bone Age KEY FACTORS

Growth velocity (lower end of normal)and bone age normal- Familial SS

Growth Velocity(lower end of normal) but bone age and puberty delayed – Constitutional SS

Growth velocity sub-optimal with delayed bone age- pathological causes of SS

Constitutional vs Familial SS

Near normal growth velocity after age of 2(lower end of normal) –Constitutional or Familial Short Stature

Look at Bone age and Puberty

Bone age and Puberty delayed in Constitutional SS–not in familial SS

Adult height normal in constitutional

Parents height- small in Familial

ISS- Idiopathic Short Stature

- Below the mid parental(does not have FamiliaL SS)
- Bone age not delayed(Does not have Constitutional SS)
- No systemic cause identified(Does not have pathological SS)

Examination

- Plotting height and weight on growth chart- need a few readings
- Mid-parental height
- Evidence of Dysmorphism
- Disproportionately large head with short upper arms and thighs
- Pubertal status

MPH

For girls, 13 cm is subtracted from the father's height and averaged with the mother's height.

For boys, 13 cm is added to the mother's height and averaged with the father's height

Investigations

Depends upon history, examination and plotting a few recordings on the growth chart

Baseline Investigations if needed

- FBC
- ESR
- U&Es and LFT
- Bone profile and Vitamin D
- IGF-1, TFTs and Coeliac screen
- Wrist x-ray for bone age
- urine dipstick

Refer to specialists in case of suspected

Skeletal dysplasia

Endocrine causes

Syndrome

Head circumference

Deceleration of Head circumference only- neurological causes

When head circumference is affected equally as the weight and height-

TORCH infection

Teratogenic exposure

Congenital syndromes

In Summary

- Red book/Growth Chart with few recordings most important tools
- Inadequate calorie intake most common cause of faltering growth or classic FTT
- Height velocity and bone age crucial parameters in short stature
- FSS/CDGP/ISS most common cause of Short stature