Polycystic Ovary Syndrome
A case study - what happens next?

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Introduction

• Case study
• Points to consider for discussion
• PCOS information
  – Diagnosis
  – Management
  – Future management
Polly

• Presented to the General Practitioner (GP) aged 13 years May 2014
  – ‘High BMI’
  – Gaining weight
    • Mum ‘very strict – diet and exercise’
  – Menarche – 11 years
    • Regular / heavy
    • Started on Logynon - improvement

• ? PCOS
  – Did not want an ultrasound

• No other abnormalities – endocrine cause? Referral..

• Bullying

  Thoughts / questions / next steps?
Thoughts..

• Oral contraceptive pill
  – Decreases hyperandrogenism by reducing production of androgens

  De Melo, 2017
  NHS, 2019

  – Young teenage girl..?

• Body Mass Index measurements in children
  – “Problematic in growing youth as great divergence is evident in bone, muscle, and adipose tissue development”

  Brown, 2017

• ?Stopped growing
• Accurate measurement ?
Referral to Paediatric Endocrinology
July 2014

History

• Weight increasing since age 8 years
  – Parents separated
• Birth
  – 2.3kg at 41 weeks
• Second of 4 children
• Weight problems on Dad’s side
  – Grandmother – ‘diabetes’
• Still on OCP
  – No other medication

On examination

• Overweight
• No other clinical indications
  – Acne
  – Hirsutism
  – Acanthosis
• Genu valgum ‘knock knees’
Next steps?

• Bloods
• Dietician referral
• Pelvic ultrasound

Bloods

Thyroid function tests
Vitamin D levels
Bone profile
Adrenal androgens
Testosterone
SHBG
LH / FSH
Pelvic ultrasound – right ovary

RT Ovary

1 L 3.43 cm
2 H 2.70 cm
3 W 2.08 cm
Vol 10.09 mL
Pelvic ultrasound – left ovary
Pelvic ultrasound - report

• Both ovaries were visualized and appeared bulky with multiple microcysts, most of which were arranged around the periphery. Appearance are suggestive of polycystic ovaries

• Right ovary: 34 x 27 x 20mm

• Left ovary: 32 x 19 x 25mm

• Largest follicle is 7mm, in left ovary
Paediatric endocrinology – March 2015

- Pelvic ultrasound reviewed
- Bloods ‘normal’
- Regular periods
  - Still heavy
  - ‘At least they are regular’
- Mum wanted no further endocrine follow up
- Referral back to GP for dietician referral..

Thoughts?
• Amenorrhea since January
• Abdominal pain
• Increased BMI
• On examination
  – Abdomen soft
  – Hirsutism noted
• Investigations
  – Bloods
  – Ultrasound
• Treatment?
Inofolic sachets

- Combination of Folic Acid and Myo-Inositol (MYO)
- MYO
  - Involved in the signal of insulin from the insulin receptor, so important for patients with insulin resistance.
  - Important role in nuclear and cytoplasmic oocyte development
- Helps menstrual cycle disturbances
- Reduces obesity
- Reduces hyperandrogenism

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PCOS

Effects of myo-inositol in women with PCOS: a systematic review of randomized controlled trials

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²Mother-Infant Department, University of Modena and Reggio Emilia, Modena, Italy
• History of eczema since puberty
• Increased hirsutism
  – Face, arms, legs, back and chest
  – Waxes / hair removal creams
• ‘Velvety thickened skin on neck, between the breasts and axillae’
  – Acanthosis nigricans
• Acne
• No longer on Logynon – but says has lost weight
• No mention of Inofolic sachets

Thoughts?
• Recommends referral to endocrinology
  – ? Insulin resistance
  – ? Metformin
• Makes referral to laser hair removal clinic
Acanthosis Nigricans

• Visible marker which strongly suggests Insulin Resistance
  – Higher than normal levels of insulin cause the darkened growth of skin
  – Activates keratinocyte receptors, especially IGF-1
    • Increased IGF may lead to increased keratinocyte and dermal fibroblasts
Metformin

- Used widely to treat Type 2 diabetes
- Increase in insulin action at an intracellular locus
  - Results in decreased hepatic glucose production
- Stimulates tissue uptake of glucose
- Reduces gastro-intestinal absorption of carbohydrate
  - Does not cause hypoglycaemia
  - Not associated with weight gain
Oral Glucose Tolerance Test

- Used to measure how the body can process large amounts of sugar
- Oral glucose solution
  - 1.75g/kg, up to 75g
- Baseline, 120 minutes
  - Glucose
  - Insulin
- Fasting baseline glucose should be below 6.1mmol/L
- Between 6.1 and 7.0 is borderline
- 120 minute sample, glucose is normal if below 10mmol/L
Paediatric Endocrinology – July 2018
Age 17 years

- Androstenedione ↑ 9.3 nmol/L (2-5.4)
- DHEAS N 4.4umol/L (1.6-7.8)
- SHBG ↓ 14nmol/L (20-130 females)
- Testosterone 2.1nmol/L (0.2-2.9)
- Liver Function, Fasting Lipids
- HbA1c 24mmol/mol (20-41)

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<td>Insulin</td>
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- Periods now regular
- ‘Exercises loads’
- Due laser treatment for hirsutism

**Thoughts?**

**DIET**

- Skips breakfast
- Snacks on crisps
- Drinks LOTS of juice
Role of Adrenal Androgens

- DHEA is the predominant androgen
  - DHEAS
- Ovary
  - 20% of DHEA
  - 50% of Androstenedione
  - 25% of circulating Testosterone
- Healthy women
  - 80% of circulating Testosterone is bound to SHBG
- PCOS
  - Increased Testosterone
  - Elevated DHEAS
  - Lower SHBG

Meek et al (2013) The Obstetrician & Gynaecologist
Sex Hormone Binding Globulin

- Made in the liver
- Usually twice as high in women than in men
- Lower levels in PCOS, because of the androgens and oestrogens
- Decreases with high insulin levels
- Obese girls likely to have an earlier menarche due to the lower SHBG levels

**Review Article**


**Sex hormone binding globulin: origin, function and clinical significance**

Colin Selby

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What is PCOS?

- 8 – 13 % of all women
- Increased prevalence as BMI increases
- 2 of the 3 Rotterdam criteria are required for diagnosis
  - Polycystic ovaries
    - 12 or more follicles measuring 2-9mm in diameter, or increased ovarian volume
  - Oligomenorrhea / anovulation
    - Reduced periods / failure to release eggs
  - Hyperandrogenism
    - Clinically
    - Biochemically

Anovulation
Hyperandrogenism
Polycystic ovaries
What causes it?

• Strong family history
  – Genetics?
  – Studies still in their infancy
Management – multidisciplinary approach

• Hyperandrogenism
• Metabolic
  – ↑ risk of cardiovascular disease, T2D, abnormal lipids, obstructive sleep apnoea
• Reproductive -
  – Oral contraceptive pill
    • Reduce ovarian androgen production by suppressing GnRH
    • Oestrogens increase the SHBG levels
• Psychological
  – ↑ depression
  – Anxiety
  – Psychosexual dysfunction
  – Disordered eating
  – Feminine identity challenged
• Cognitive behavioural therapy, psychotherapy, support groups
Where next for Polly?

• No Metformin
• Discharge back to the General Practitioner, but keep under review
• Refer to adult obesity clinic in 6 months

Thoughts?
Conclusion

- PCOS management – complex
- Education
- Support