PCOS & The Bariatric Surgery Patient

Melissa Majumdar, MS, RD, CGOWM, LDN, CPT
Senior Bariatric Dietitian
Brigham and Women’s Center for Metabolic and Bariatric Surgery
mmajumdar@bwh.harvard.edu
@melissard_eatfitlive

Case Study - HF
44 yo F, BMI 47.9
PMH - s/p band with failure to lose weight, PCOS 2009, sleep apnea, migraines
Psychiatric: Methylphenidate, Omega-3, Levoxine, vitamin A 10,000 IU, vitamin D 3,000 IU
C/o - not eating a lot but can’t lose weight, including with the band
Eating habits - High CHO meals and snacks, doesn’t cook, tried vegetarian diet in the past

Counseling nuggets:
1) Collaborate with outside dietitian
2) Minimize supplementation
3) Act as the expert to build trust
4) Easy to prepare meals balanced with CHO + PRO

Objectives
1) Define diagnostic criteria for polycystic ovary syndrome (PCOS)
2) Describe characteristics of PCOS patients
3) State the medical nutrition therapy goals in treating PCOS
4) Describe how bariatric surgery influences treatment of PCOS

What is PCOS?
• Compilation of symptoms
• Specific molecular mechanism unknown
• Polygenic
• Phosphoglycan D-chiro-inositol
• Insulin receptor phosphorylation pathway
• Increase in GHRH and LH, decrease in FSH

What is PCOS?
• Metabolic syndrome
• Type 2 diabetes
• Hypertension
• Hyperlipidemia
• Cardiovascular risks including stroke and coronary heart disease
• Sleep apnea
• Endometrial and uterine carcinoma
• Female infertility
• Postpartum complications

Cycle of Obesity with PCOS
Insulin – insulin resistance → increased insulin production → weight gain
Leptin – overweight → fat cells produce leptin → feel hungrier → weight gain
Ghrelin – higher than normal levels → feel hungrier, not satisfied as much → increase portions → weight gain

Health Risks of PCOS
• Metabolic syndrome
• Type 2 diabetes
• Hypertension
• Hyperlipidemia
• Cardiovascular risks including stroke and coronary heart disease
• Sleep apnea
• Endometrial and uterine carcinoma
• Female infertility
• Postpartum complications

https://courses.washington.edu/conj/bess/reproductive/pcos.htm
Health Statistics

- 3x the risk of diabetes, stroke, and heart disease
- 2x the risk of anxiety, depression, and drug use
- 2x the risk of hospitalization for any cause
- 10x the risk of infertility
- 4 billion dollars spent annually in US

Who has PCOS?

- ~10% of women have been diagnosed with PCOS
- ~70% of cases are not diagnosed or treated
- 60% of patients diagnosed with PCOS are obese
- More likely in patients reporting obesity before 18 yo

- Bariatric Specific Population:
  - 13% of bariatric patients have been diagnosed with PCOS
  - Likely underdiagnosed
  - ~42% of bariatric patients report history of infertility

Diagnostic Criteria

Rotterdam Criteria (2 of the following):

Hyperandrogenism
- Clinical examination: Hirsutism, acne, androgenetic alopexia, and acanthosis nigricans
- Laboratory values: high circulating levels of testosterone and androstenedione

Menstrual Irregularity
- Clinical examination: oligomenorrhea or amenorrhea
- Laboratory values: high circulating levels of lutinizing hormone

Polycystic Ovaries on Ultrasonography
- >= 12 follicles in each ovary
- Follicle size between 2 and 9 mm +/- >10 ml ovarian volume

Clinical Presentation

- Hirsutism
- Hair thinning & loss
- Acne
- Skin tags
- Acanthosis nigricans
- Menstrual irregularities
- Central adiposity
- Eating behaviors
- Depression/mood disorders

Laboratory Values

<table>
<thead>
<tr>
<th>Elevate</th>
<th>Depressed</th>
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<tbody>
<tr>
<td>Testosterone</td>
<td>Not</td>
</tr>
<tr>
<td>LH</td>
<td>HDL</td>
</tr>
<tr>
<td>DHEA sulfate</td>
<td></td>
</tr>
<tr>
<td>Fasting glucose</td>
<td></td>
</tr>
<tr>
<td>Fasting insulin</td>
<td></td>
</tr>
<tr>
<td>TSH, thyroid peroxidase</td>
<td></td>
</tr>
<tr>
<td>C-reactive protein</td>
<td></td>
</tr>
<tr>
<td>Triglycerides</td>
<td></td>
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</tbody>
</table>

Medical Treatment

- Hormonal contraceptive 2nd line intervention
- Metformin
- Insulin sensitizers

- Menstrual abnormalities
- Hirsutism
- Acne
- T2DM or IGT who fail lifestyle modifications
- Menstrual irregularities who cannot take HC
- Not recommended for obesity only

- Inositol
- Thiazolidinediones
Patient Perspective

“All I knew was that I couldn’t lose the weight on my own. I had tried... I mean, I had REALLY tried. And it was impossible. I was hungry all the time, I mean ALL THE TIME. I wasn't losing weight no matter how little I ate, when I was on a diet it took over my life, my thoughts and my whole being. I couldn’t do it. And then I felt weak and like a failure... those who know me will tell you that failing is my least favorite thing, I have to be the best at everything and I have to win. Well, I wasn’t winning... no matter the effort. And as my failing meant that I was becoming dangerously obese, I had to do something, and this was the reason I came to the realization that surgery was an option I simply had to look into.”

Medical Nutrition Therapy Goals

- Reduce body weight if overweight
- Maintain weight loss after weight reduction
- Obtain knowledge and skills to support behavior changes
- Resolve metabolic syndrome
- Reduce risk factors for T2D and CVD
- Improve fertility

Systematic Review – Dietary Composition in the Treatment of PCOS

- Inclusion – not taking anti-obesity medication
- 6 studies, 137 women
- Results: “Subtle differences between diets”
- Weight loss improved PCOS regardless of dietary composition

High MUFA vs. ADA Healthy Diet vs. LOW CHO

- n=11, cross-over nonrandomized controlled
- 16 day acute weight maintenance intervention
- Food provision
- Continue with previous exercise
- Compared three diets:
  1. MUFA enriched
  2. Conventional healthy diet modeled after ADA guidelines
  3. Low CHO diet
- Findings of interest
  - Anthropometrics – low CHO showed greater weight loss than MUFA

Low Glycemic Index

- n=49, parallel nonrandomized controlled
- 12 mo weight loss
- 1571 kcal - 50% CHO, 23% protein, 27% fat
- Dietary counseling weekly to monthly
- 30 min exercise, aim for 10k steps
- Ad libitum intervention
- Compared two diets:
  - Low GI
  - Conventional healthy diet
- Findings of interest
  - Better menstrual regularity (95 vs. 63%)
  - Better insulin sensitivity
  - Lower body fat (2x)
  - Better quality of life
- Counseling nugget – No “free-floating” carbohydrates

Get off the blood sugar rollercoaster!

- Foods with simple carbohydrates (like sugar) but no protein
- Foods with complex carbohydrates (like fiber) but no protein
- Protein foods with fiber or healthy fat
High Protein

- n=28
  - 5-mo weight loss followed by 1-mo weight maintenance
  - 1489-1834 calories
  - Energy restriction
  - Exercise 3x/wk + exercise class
  - Monthly counseling
  - Compared two diets:
    - High protein – 43/27/28
    - Standard protein – 57/16/27

- Findings of interest:
  - Improvements in menstrual regularity independent of diet composition – 44% having improvement
  - Galletly – improvement in depression and self-esteem for high protein

CHO Restricted vs. Fat Restricted

- n=23, parallel randomized controlled
  - 6-mo weight maintenance
  - 1429 calories
  - Counseling biweekly to monthly
  - Semi-ad libitum
  - 8000 steps/day goal
  - Compared two diets:
    - CHO restricted/counting
    - Fat restricted/counting

- Findings of interest:
  - Improvements in menstrual regularity independent of diet composition – 57% having improvement
  - Improvements in quality of life independent of diet composition

Counseling nugget – How do you feel with the diet changes?

Walnuts vs. Almonds

- 31 PCOS women
  - 6 weeks, randomized control
  - 31 g fat from walnuts (PUFAs) vs almonds (MUFAs)

- Findings of Interest:
  - No significant differences
  - Reduction in WC, FBS, OGTT insulin, TC, LDL

- Counseling nugget – Include nuts in our patients’ meal plans

DASH Diet

- Randomized-controlled study
  - 48 women with PCOS, followed for 8 wks
  - Both DASH and controlled – 52% CHO, 18% pro, 30% fat

- Findings of Interest:
  - Reduced insulin
  - No change in fasting glucose
  - Reduced CRP
  - Reduced waist & hip circumference

Counseling nugget – Include nuts in our patients’ meal plans
Anti-Inflammatory

- 100 overweight and obese PCOS women x 12 wks
- Reduced calorie (~500 kcal), 5 small meals
  - 50% CHO, 25% pro, 25% fat
  - Fish 2x/wk
  - Legumes
  - LF dairy
  - 5 c green tea daily
  - Limited chicken & red meat

Counseling nugget – Add foods to diet instead of taking away

Conclusions

- Energy restriction independent of dietary composition
- Improvements in weight, insulin resistance, menstrual regularity, waist circumference, etc.
- Possible greater quality of life with low GI/high protein

“Ideal Diet”? • Higher protein • Lower GI • Add green tea • Fish and lean meats • Fruits/vegetables • Meal timing and distribution

Lifestyle Factors

- Sleep health
- Stress management
- Eating patterns
- Exercise

The Role of Exercise

- Increases expression of GLUT 4 transporters
- Improves glucose uptake
- Improves insulin action
- Lowers LDL

Counseling nugget - Reframe why they are exercising, non-scale victories

Anti-Inflammatory Diet - Results

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Reduction After Following Anti-Inflammatory Diet</th>
</tr>
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<tbody>
<tr>
<td>Mean weight loss</td>
<td>7.2% (0.3 kg)</td>
</tr>
<tr>
<td>Waist circumference</td>
<td>6.8%</td>
</tr>
<tr>
<td>Body fat percent</td>
<td>9.2%</td>
</tr>
<tr>
<td>Total cholesterol</td>
<td>8.9%</td>
</tr>
<tr>
<td>Fasting blood glucose</td>
<td>5.15%</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>4.3/2.7 mmHg</td>
</tr>
<tr>
<td>CRP</td>
<td>51%</td>
</tr>
<tr>
<td>SAA</td>
<td>38.25%</td>
</tr>
<tr>
<td>Menstrual cyclicity</td>
<td>63%</td>
</tr>
<tr>
<td>Pregnancy rate</td>
<td>12%</td>
</tr>
</tbody>
</table>

Types of Exercise

- Weight lifting
  - 2-3 days per week on non-consecutive days
  - Major muscle groups
  - High intensity – 3d-10
  - Continue to increase in difficulty

- HIIT
  - University of California San Francisco study
    - 60 min vigorous exercise/week decreased woman’s likelihood of developing met syn by 22%
  - 10-20-30 workout
  - The Little Method
  - Tabata

Supplements

- Fish oil: 1-4g/day
- N-acetyl cysteine: 1.6-3g/day
- Inositol: MYO: 2-4g/d, DCI: 50-100mg/d, 40:1 ratio, Ovasitol

Vitamin D: 1000mg/day calcium + 50,000 IU/wk

12: Metformin + PPIs

Surgical Intervention

- Hirsutism resolution
- DM resolution
- Menstrual function
- Conception

Counseling nugget – Patient communication

Effective Treatment of PCOS with Roux-en-Y Gastric Bypass (RYGB)

- 24 women with PCOS had RYGB
- Measured – mean EWL, hirsutism (52%), regular menstruation, conception rate after surgery, comorbidities

Results
- 5 women (previously infertile) who wanted to conceive were able to do so after surgery without the use of clomiphene
- Other – resolution of T2D, decreased number of pts with HTN and hyperlipidemia, improvement of PCOS-associated symptoms

PCOS – Is It an Indication for Bariatric Surgery?

- 3 women with PCOS
- Laparoscopic adjustable gastric band (LAGB)
- Outcomes measured - %EWL, glucose levels, conception rate

Results
- 1 pt conceived postoperatively
- EWL: 49, 67, 41% at +8 yrs
- Normalized glucose

In Vitro Fertilization after Bariatric Surgery

- 2 females with infertility secondary to PCOS
- RYGB, LAGB
- Outcomes measured – conception and pregnancy

Results
- Following IVF/ICSI, both women became pregnant and had uncomplicated deliveries

RYGB Ameliorates PCOS and Dramatically Improves Conception Rates: A 9-year Analysis

- 20 with PCOS and infertility had RYGB
- Outcomes measured – pre- and post-surgery conception rate (5/6 who wanted to conceive did not need hormone therapy), weight loss, hirsutism (29%), menstrual dysfunction (82%), comorbidities (T2D – 77.8%)

Results
- 100% postoperative conception rate in infertile patients with PCOS who desired pregnancy
- Improvement in glycemic control, PCOS-associated symptoms, HTN, depression, GERD, urinary incontinence
Role of Excessive Weight Loss in Treatment of Infertility (Abstract)

- 69 premenopausal married females
- Gastric plication or RYGB
- Results measured – regularity of menstruation and conception rate
- Results
  - 71% of women who were previously infertile preoperative became pregnant one year postoperatively

Resolution of Gynecological Issues after Bariatric Surgery (Abstract)

- 156 women
  - 67 had radiological features of PCOS
  - 11 were infertile
  - Laparoscopic sleeve gastrectomy (LSG)
- Outcomes measured – hirsutism, stress urinary incontinence, menstrual dysfunction, infertility
- Results
  - 4 pts conceived (36%)
  - Hirsutism and radiological evidence of PCOS improved in 80%
  - Menstrual dysfunction improved in 100%
  - Urinary incontinence resolved or improved in 42%

### Pregnancy Outcomes & Management

- Fertility knowledge
- When do they plan to get pregnant?
  - ASMBS recommends waiting 12-18 mo
- Maximize weight loss and optimize fertility
  - Protein intake
  - Fluid intake
  - Quality vitamins
  - Target weight gain – 15#

### Case Study – HF post-op

2/6/18 (11 mo post-op, surgery 3/17)
179.5#, 51.7% EWL, 22% TWL

Vitamins – Celebrate Multi-Complete 60 capsule, Celebrate Multi-Complete 500 tablets
Nutrition related labs – B12 217 (8/17)
Typical eating pattern – eating 2x/d
C/o – stopped vitamins, “off track”

Counseling nuggets:
1) Resume vitamins
2) Keep easy to prepare protein based foods and shakes on hand
3) Consider f/u with bariatric psychologist

### Case Study - KN

37 yo F, BMI 46
PMH – PCOS (dx 2014), h/o Qsymia/Phentermine
Labs – TG 245, HbA1C 5.7

C/o - knows that she eats more than she should but doesn’t know why she is overweight
Eating style - eats out frequently, “it doesn’t usually get dessert except at Cheesecake Factory,” 35a/wk

Counseling nuggets:
1) Order side salad out to eat
2) Decrease sugar sweetened beverages
3) Eat protein first
4) Exercise – patient driven
Case Study – KN post-op

2/15/18 (10 mg post-op, surgery 4/25/17)
15/6, BMI 2.8, 84% et loss, 82.5% EWL, 34.6% TWL.

Vitamins – Flintstones 2x, no B12, Wellesse 1 Thp 2x/d

Nutrition related labs – B12 462, all others WNL.

Typical eating pattern – 80-90g protein, 45g 1x/d, 64+ 1x fluid, cheese at snacks

Exercise – walking 15,000 steps + Insanity workouts 3-4 days per week

C/O – constipation


Patient Perspective

“...but let me tell you something real: I feel the difference. I feel normal. I have now lost that constant hunger that meant I was either thinking about food, thinking about my weight, thinking about my failing health... or eating and getting on with what I had to do. I am now on the night track to becoming healthy again.

I still have about 45 kg left to lose, but what a relief to know that I WILL lose them in the next year or two, I have been given the tools to do so.”

References


Questions???

Melissa Majumdar, MS, RD, CSDWM, LDN, CPT
mmajumdar@bwh.harvard.edu
@melissaeattlive

• Noakes MJ, Proietti E. The combined dietary and myo-inositol supplementation reduces the risk of metabolic disease in PCOS overweight patients compared to myo-inositol alone. Nutr Res. 2010;30(8):560-566.


