

# Child With Suspected Obesity and Metabolic Syndrome

Suggestive history and physical findings	Initial laboratory and/or radiologic work-up can include:	When to refer	Items useful for consultation	Additional information
<p><b>Symptoms/Signs:</b></p> <ul style="list-style-type: none"> <li>• <u>Overweight (BMI &gt; 85 %ile for age and sex) or obese (BMI &gt; 95<sup>th</sup> %ile for age and sex)</u></li> <li>• Normal/tall stature</li> <li>• Normotensive/hypertensive</li> <li>• Acanthosis nigricans, striae</li> <li>• Joint tenderness</li> <li>• Early pubarche, gynecomastia in boys, hirsutism in girls</li> </ul> <p><b>Past history:</b> History of low birth weight, abnormal weight gain for many years</p> <p><b>Family history:</b> Obesity, bariatric surgery in other family members</p> <p><u>Differential Diagnosis</u></p>	<p><b>Blood tests:</b></p> <ul style="list-style-type: none"> <li>• Fasting blood glucose</li> <li>• Complete metabolic panel including liver function tests</li> <li>• Fasting lipid panel</li> </ul> <p><u>Other tests to consider:</u></p> <ul style="list-style-type: none"> <li>• Hemoglobin A1c and two-hour oral glucose tolerance test if diabetes is suspected</li> <li>• TSH and T4 only if hypothyroidism is suspected</li> </ul>	<p><b>Routine:</b> May be referred to a specialized weight management center if there is no improvement in z-BMI/ weight after 3-6 months of healthy eating and increased exercise (family based counseling).</p> <p>Patient may be referred as needed for comorbidities: Hyperglycemia/Impaired glucose tolerance test, menstrual irregularity, Cushing disease, thyroid disorder</p> <p>Find a Pediatric Endocrinologist</p>	<p>Previous growth data/growth charts</p> <p>Pertinent medical records</p> <p>Recent laboratory and radiologic studies</p>	<p><u>Additional Information</u></p> <p><u>References</u></p>

### Differential diagnosis for child with obesity includes:

- Exogenous obesity: **associated with normal growth and tall stature.**
- Endocrine disorders: Cushing disease, hypothyroidism, Pseudohypoparathyroidism: **associated with short stature/slow growth velocity**
- Genetic disorders: Melanocortin-4 receptor mutation, Prader-Willi syndrome, Bardet-Biedl syndrome, other monogenic obesity syndromes

### Additional Information:

#### Additional History:

- Abnormal weight gain along with normal height gain (tall stature or taller than expected stature for family)
- Irregular dietary habits -skipping major meals, snacking, binge eating, stress eating, eating out
- Consumption of sugar sweetened beverages
- Decreased physical activity/ increased screen time.

#### Associated problems:

- Joint pain
- Shortness of breath, snoring at night
- Daytime sleepiness, headache
- Vision changes
- Acanthosis
- Menstrual irregularity
- Poor self-esteem, depression, history of bullying

#### Laboratory Abnormalities:

- Pre-diabetes is defined as fasting blood glucose: 100-125 mg/ dl, or 2 hours post prandial glucose: 140-200 mg/dl after glucose load of 1 gm/ kg (maximum dose: 75 gm), or HbA1c 5.7-6.5%.

- Liver enzymes may be abnormal (secondary to fatty liver or Non-alcoholic steato-hepatitis (NASH))
- Fasting lipid panel may show multiple abnormalities: elevation of triglycerides and LDL cholesterol and decreased HDL cholesterol concentrations.
- 24 hour urinary free cortisol or midnight salivary cortisol if Cushing disease suspected
- Polysomnogram if obstructive sleep apnea (OSA) is suspected.

Management of obesity and metabolic syndrome: A family based lifestyle modification is the cornerstone of management. It involves:

#### Nutritional therapy

- Decreasing/eliminating sugar-sweetened beverages, regular meals daily, including breakfast, controlling portion size, consumption of 5 servings of fruits and vegetables per day, limiting consumption of fast-food intake and “eating out”, removing junk food from the household, having healthy food readily available.

#### Physical activity/ avoidance of inactivity:

- Encouraging  $\geq 60$  min of moderate to vigorous physical activity/day to be incorporated in the daily routine.
- Limiting screen viewing, including computer use and video games to  $< 2$  h per day and removal of TV from the bedrooms.

#### Treatment for comorbidities if present

- Hyperlipidemia: Lifestyle modification, statins as needed based on LDL level and level of risk factors.
- NASH: Life style modification, metformin and thiazolidinediones, consider referral to gastroenterologist.
- Sleep apnea: Referral to sleep specialist/ENT. Tonsillectomy and adenoidectomy and use of CPAP device.
- Hypertension: Lifestyle modifications, DASH diet and antihypertensive medication as needed, consider referral to cardiologist/nephrologist.
- Menstrual irregularity/ polycystic ovarian syndrome: Metformin, Oral contraceptive pills.
- Joint pain: Appropriate x-rays, consider referral to orthopedic specialist.
- Depression: Referral to mental health provider.

Bariatric surgery: Indicated in very select patients who have been followed at a multidisciplinary weight management center and have BMI  $\geq 35$  with severe comorbidities or BMI  $\geq 40$  with less severe comorbidities.

### Suggested References and Additional Reading:

- National Heart Lung and Blood Institute: Integrated Guidelines for Cardiovascular Health and Risk Reduction in Children and Adolescents- 2011. Available from: [http://www.nhlbi.nih.gov/guidelines/cvd\\_ped/index.htm](http://www.nhlbi.nih.gov/guidelines/cvd_ped/index.htm).
- Cook S, Auinger P, Li C, Ford ES. Metabolic syndrome rates in United States adolescents, from the National Health and Nutrition Examination Survey, 1999-2002. J Pediatr. 2008;152(2):165-70. Epub 2008/01/22. doi: 10.1016/j.jpeds.2007.06.004. PubMed PMID: 18206683.
- Pratt JS, Lenders CM, Dionne EA, Hoppin AG, Hsu GL, Inge TH, et al. Best practice updates for pediatric/adolescent weight loss surgery. Obesity (Silver Spring, Md). 2009;17(5):901-10. Epub 2009/04/28. doi: 10.1038/oby.2008.577. PubMed PMID: 19396070; PubMed Central PMCID: PMC3235623.

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