

METABOLIC SYNDROME AND BARIATRIC SURGERY

AN ENDOCRINE PERSPECTIVE

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20th October 2016

- Problem - an endocrine view
- Role of endocrinologist
- Shared challenges and opportunities

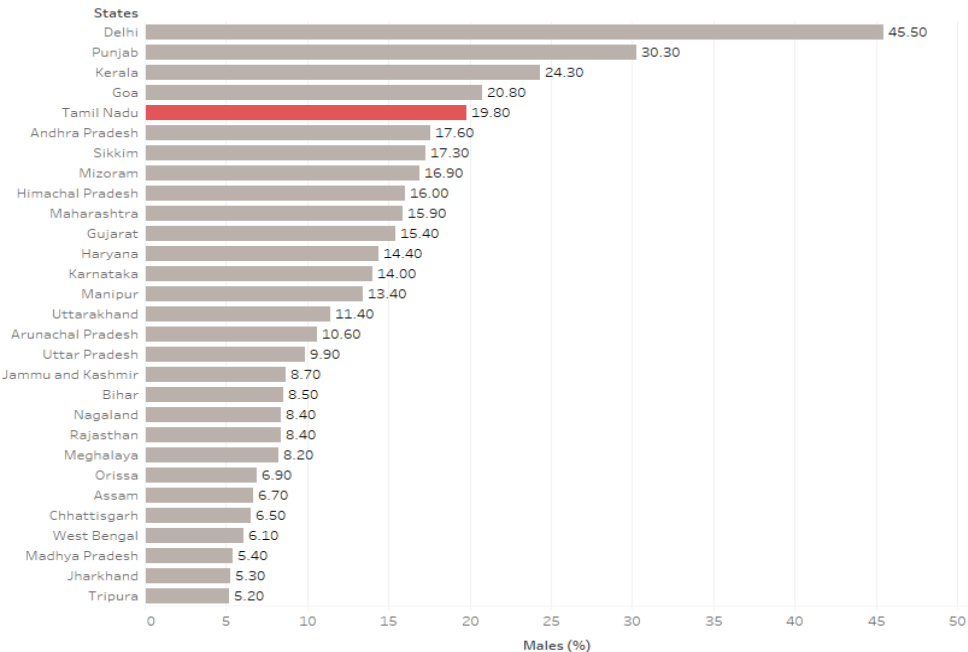
PROBLEM

DEFINING METABOLIC SYNDROME

| Criteria | WHO (1998) | NCEP ATP III (2001) | Modified NCEP ATP III (2004) | IDF (2005) | Possible definition for South Asians* |
|-------------------------|---|---|---|--|--|
| Fasting glucose (mg/dl) | DM, IGT, IFG or insulin resistance with ≥ 2 of the following: | ≥ 3 of the following: ≥ 110 | ≥ 3 of the following: ≥ 100 , or T2DM or treatment | Central obesity (see below) and ≥ 2 of the following: ≥ 100 or T2DM diagnosis | Fasting hyperinsulinemia and ≥ 2 of the following: IFG, IGT, T2DM or treatment |
| Obesity | Central obesity (WHR > 0.90 in males or > 0.85 in females) and/or BMI > 30 kg/m ² | Waist circumference > 102 cm in males or > 88 cm in females | Waist circumference > 102 cm in males or > 88 cm in females | Waist circumference > 90 cm in males or > 80 cm in females | Waist circumference > 87 cm in males or > 82 cm in females and/or BMI > 23 kg/m ² |
| BP (mm of Hg) | $\geq 140/90$ | $\geq 130/85$, or treatment | $\geq 130/85$, or treatment | $\geq 130/85$, or treatment | $\geq 130/85$, or treatment |
| Triglyceride (mg/dl) | ≥ 150 And / or | ≥ 150 , or treatment | ≥ 150 , or treatment | ≥ 150 , or treatment | ≥ 150 , or treatment |
| HDL (mg/dl) | < 35 in males or < 39 in females | < 40 in males & < 50 in females | < 40 in males & < 50 in females | < 40 in males & < 50 in females, or treatment | < 40 in males & < 50 in females, or treatment |
| Others | Microalbuminuria (urinary albumin excretion rate ≥ 20 mg/min or albumin:creatinine ratio ≥ 30 mg/g) | | | | Non-alcoholic fatty liver disease Subscapular skinfold thickness > 18 mm |

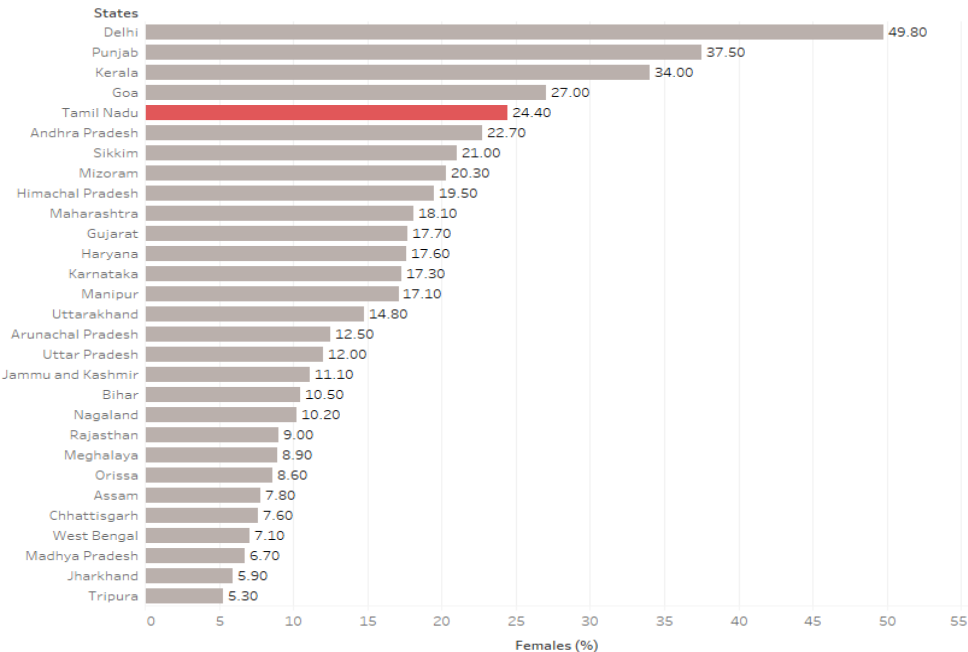
* Lower cut-offs may be probably necessary for BP and lipid levels than that mentioned for South Asians which requires further studies to be defined

Male obesity by state



Sum of Males (%) for each States. Color shows details about States.

Female obesity -by state

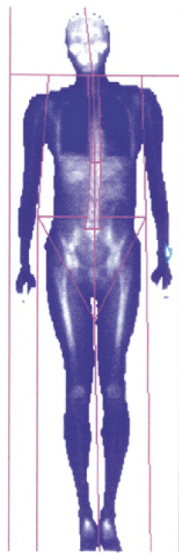
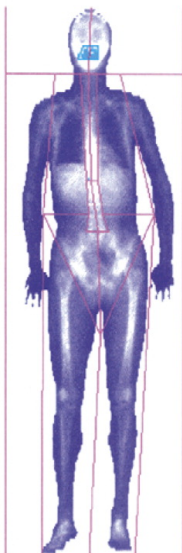


Sum of Females (%) for each States. Color shows details about States.

BMI

22.3

22.3



Body fat

9.1%

21.2%

In the USA alone, it is estimated that it would take 5500 surgeons doing 400 cases per year, each for 10 years to treat the 22 million obese Americans¹.

¹Marina S. Kurian, Bruce M. Wolfe, and Sayeed Ikramuddin, eds. *Metabolic syndrome and diabetes: Medical and surgical management*. New York: Springer, 2016.



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CLINICAL DECISIONS

Obesity and Management of Weight Loss

James S. Yeh, M.D., M.P.H., Robert F. Kushner, M.D., and Gordon D. Schiff, M.D.

N Engl J Med 2016; 375:1187-1189 | [September 22, 2016](#) | DOI: | [10.1056/NEJMcide1515935](#) |



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CASE VIGNETTE

A Woman Considering Medication for Weight Loss

TREATMENT OPTIONS

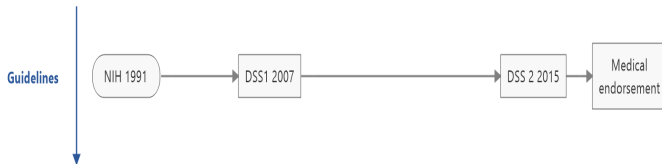
Which of the following treatment options would you recommend for this patient?

1. Start lifestyle modification and therapy with an FDA-approved drug.
2. Maximize lifestyle modification and nonpharmacologic therapies.

To aid in your decision making, each of these approaches is defended in a short essay by an expert in the field. Given your knowledge of the patient and the points made by the experts, which option would you choose? Factor into your decision the indications for pharmacologic therapies for weight loss, differences among the various weight-loss medications, concerns about their long-term efficacy and safety, and the role of adjuvant lifestyle and nonpharmacologic therapies in promoting and maintaining weight loss.

GUIDELINES

Evolution of guidelines



- Baros = weight
- Metabolic surgery - done with the intent of treating some metabolic disorder
- Increasing shift -American society of bariatric surgery has changed its name to reflect this

- ⊕ Surgery should be *considered* for patients with type2 DM and a BMI of 30 – 34.9kg/m², if hyperglycemia is inadequately controlled despite optimal medical therapy
- ⊕ These thresholds should be reduced by 2.5kg/m² for Asians²

²Francesco Rubino et al. “Metabolic Surgery in the Treatment Algorithm for Type 2 Diabetes: A Joint Statement by International Diabetes Organizations”. In: *Diabetes care* 39.6 (2016), pp. 861–877.

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 - Changes in gut hormones (incretins and decretins,FGF19)
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- Long term data on safety

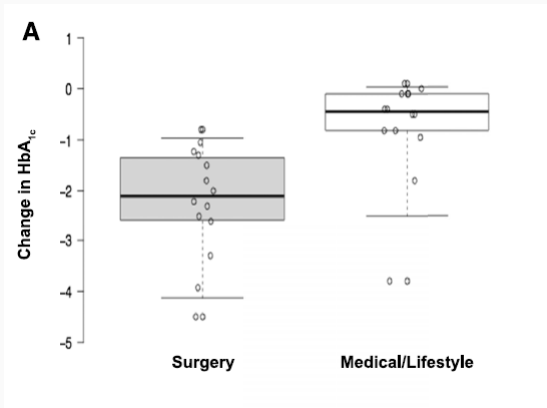


Figure 1: Overall change in HbA_{1c} in 11 RCTs³

³Francesco Rubino et al. "Metabolic Surgery in the Treatment Algorithm for Type 2 Diabetes: A Joint Statement by International Diabetes Organizations". In: *Diabetes care* 39.6 (2016), pp. 861–877.

EVIDENCE ACROSS BMI CATEGORIES

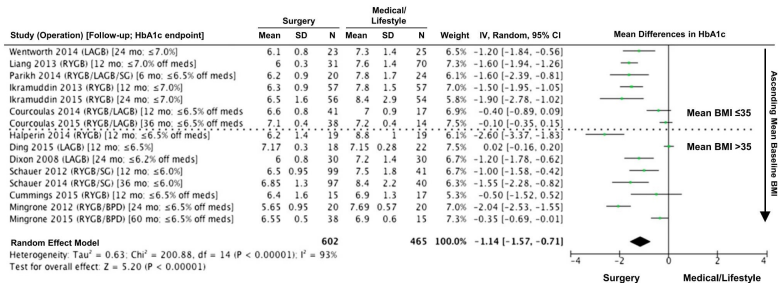
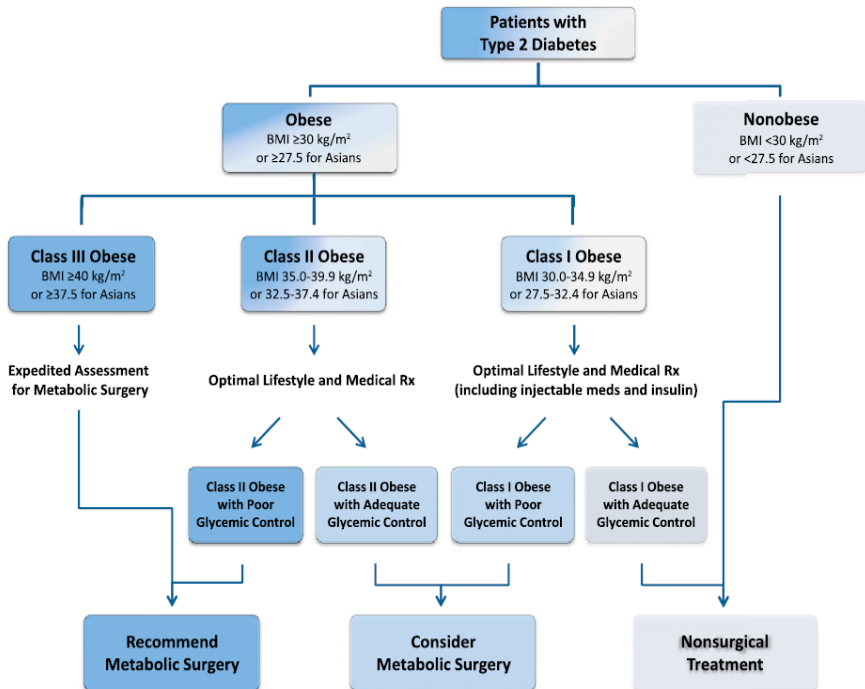


Figure 2: Bariatric surgery across BMI categories⁴

⁴David E. Cummings and Ricardo V. Cohen. "Bariatric/Metabolic Surgery to Treat Type 2 Diabetes in Patients With a BMI < 35 kg/m²". In: *Diabetes care* 39.6 (2016), pp. 924–933.

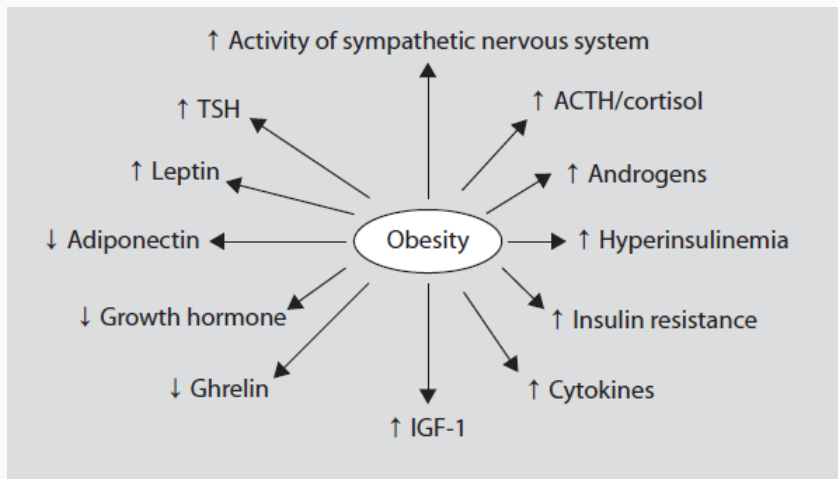
WHERE DOES METABOLIC SURGERY STAND IN THE MANAGEMENT OF DIABETES?

- No current treatment algorithm includes a role for surgical intervention
- Role is being increasingly recognized
- Shifting eligibility criteria and international ratification by medical bodies



MEDICAL / ENDOCRINE MANAGEMENT

OBESITY - EFFECTS



- Subclinical hypothyroidism
- Polycystic ovarian disease
- Pseudocushing's syndrome
- Vitamin D deficiency
- Secondary hyperparathyroidism
- Insulin resistance → Acromegaloid appearance
- Hyperuricemia

LAB MONITORING

| | Pre-operative | 1 month | 3 months | 6 months | 12 months | 18 months | 24 months | Annually |
|---|---------------|---------|----------|----------------|----------------|----------------|----------------|----------------|
| Complete blood count | X | X | X | X | X | X | X | X |
| LFTs | X | X | X | X | X | X | X | X |
| Glucose | X | X | X | X | X | X | X | X |
| Creatinine | X | X | X | X | X | X | X | X |
| Electrolytes | X | X | X | X | X | X | X | X |
| Iron/ferritin | X | | | X ^a | X ^a | X ^a | X ^a | X ^a |
| Vitamin B12 | X | | | X ^a | X ^a | X ^a | X ^a | X ^a |
| Folate | X | | | X ^a | X ^a | X ^a | X ^a | X ^a |
| Calcium | X | | | X ^a | X ^a | X ^a | X ^a | X ^a |
| Intact PTH | X | | | X ^a | X ^a | X ^a | X ^a | X ^a |
| 25-D | X | | | X ^a | X ^a | X ^a | X ^a | X ^a |
| Albumin/prealbumin | X | | | X ^a | X ^a | X ^a | X ^a | X ^a |
| Vitamin A | X | | | | | | Optional | Optional |
| Zinc | X | | | Optional | Optional | | Optional | Optional |
| Bone mineral density and body composition | X | | | | X ^a | | X ^a | X ^a |
| Vitamin B1 | | | Optional | Optional | Optional | Optional | Optional | Optional |

- Routine supplementation after 6 months
- 1200 mg/d
- Calcium citrate preferred as it doesn't require acid

- Initiation within 6 months
- Optimal dosing not known
- Oral dosing of 350 mcg/day maintains normal levels

- Routine supplementation after 6 months
- 400 mcg/day

- Interaction with calcium
- Poor meat intake contributes
- Deficiency can be prolonged

- Vitamin D as RDA- 60000 IU every two months orally.
- Vitamin K not routinely needed. Supplement if INR > 1.4
- Vitamin B1 supplementation in patients with intractable vomiting

- HbA1c < 7 % goal
- FBS <110 mg/dl
- PPBS <180 mg/dl

- Better avoided for 12 to 18 months⁵
- Important in PCOD patients

⁵Kathryn A. Martin, ed. *Compendium of Clinical Practice Guidelines*. The Endocrine Society, 2013.

- Managed as per NCEP ATP III guidelines
- Frequent monitoring required

- Higher risk if BMI >40
- Rapid fall in uric acid levels contribute
- Prophylactic therapy may be needed depending on uric acid levels

- Rapid passage of stomach contents into small intestine
- Non pharmacological measures
 - Small frequent meals
 - Avoiding ingestion of liquids within half an hour of solid meal
 - Avoiding simple sugars
 - Increasing protein intake
- If unsuccessful, octreotide 30 min before food

- May present 2 - 9 years after RYGB
- Nesidioblastosis vs inappropriate insulin kinetics

MEDICAL MANAGEMENT IN A NUTSHELL

| Deficiency | Symptoms and signs | Confirmation | Treatment first phase | Treatment second phase |
|----------------------|--|--|--|---|
| Protein malnutrition | Weakness, decreased muscle mass, brittle hair, generalized edema | Serum albumin and prealbumin levels, serum creatinine | Protein supplements | Enteral or parenteral nutrition; reversal of surgical procedure |
| Calcium/vitamin D | Hypocalcemia, tetany, tingling, cramping, metabolic bone disease | Total and ionized calcium levels, intact PTH, 25-D, urinary N-telopeptide, bone densitometry | Calcium citrate, 1,200–2,000 mg, oral vitamin D, 50,000 IU/d | Calcitriol oral vitamin D 1,000 IU/d |
| Vitamin B12 | Pernicious anemia, tingling in fingers and toes, depression, dementia | Blood cell count, vitamin B12 levels | Oral crystalline B12, 350 µg/d | 1,000 –2,000 µg/2–3 months im |
| Folic acid | Macrocytic anemia, palpitations, fatigue, neural tube defects | Cell blood count, folic acid levels, homocysteine | Oral folate, 400 mg/d (included in multivitamin) | Oral folate, 1,000 µg/d |
| Iron | Decreased work ability, palpitations, fatigue, koilonychia, pica, brittle hair, anemia | Blood cell count, serum iron, iron binding capacity, ferritin | Ferrous sulfate 300 mg 2–3 times/d, taken with vitamin C | Parenteral iron administration |
| Vitamin A | Xerophthalmia, loss of nocturnal vision, decreased immunity | Vitamin A levels | Oral vitamin A, 5,000–10,000 IU/d | Oral vitamin A, 50,000 IU/d |

WHAT DO WE DO?

- Frank discussion with the patient on the limits of therapies on their costs
- Stress that bariatric surgery is not a replacement for culinary discipline
- Provide appropriate medical care (and avoid unnecessary medication) for any hormonal disorders

CHALLENGES AND OPPORTUNITIES

- Going bold like BOLD

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- Frugal innovation to bring down the cost

WHAT CAN WE DO TOGETHER

- Going bold like BOLD
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- Education and awareness

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- Rethinking cut offs
- Rebranding as metabolic surgery
- Mentorship and training programmes - regional/national leadership

Thank You