# Metabolic syndrome as a predictor of perioperative outcomes in primary bariatric surgery, a MBSAQIP survey

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## BACKGROUND:

Among bariatric surgery patients, body mass index (BMI) does not fully capture the severity of obesity and it may be complicated to stratify patients at higher risk of peri-operative complications. In our study, we surveyed the MBSAQIP database to determine whether bariatric patients with metabolic syndrome (MetS) are at higher risk for peri-operative complications.

## METHODS:

- MBSAQIP data from 2015-2018
- **Inclusion criteria:** patients ≥ 18 years old undergoing primary bariatric surgery. We modified the International Diabetes Federation (IDF) definition of MetS based on the parameters available in MBSAQIP database (Table 1)
- **Exclusion criteria:** natural orifice transluminal endoscopic surgery (NOTES) or bariatric procedures performed by gastroenterology or interventional radiology
- **Statistics:** Univariate analysis with t-test/$\chi^2$ test used to compare baseline demographics, operative characteristics and postop outcomes between patients with and without MetS. Multivariate logistic regression performed for statistically significant outcome parameters ($p<.05$) and odds ratios (OR) were reported with 95% CI.

**Table 1. Defining metabolic syndrome**

| IDF criteria for metabolic syndrome | Modified criteria used in our study |
|---|---|
| Central obesity (as defined by ethnicity-specific waist circumference or BMI >30)<br><br>***PLUS** any 2 of the following:* | Central obesity defined by BMI >30<br><br>***PLUS** 2 or more of the following:* |
| Systolic BP ≥ 130 or diastolic BP ≥85<br>**OR** treatment of previously diagnosed HTN | HTN requiring medication |
| Elevated fasting plasma glucose ≥100 mg/dL<br>**OR** previously diagnosed DM | DM requiring medication |
| Elevated triglycerides ≥150 mg/dL<br>**OR** specific treatment for this lipid abnormality | HLD requiring medication |
| Reduced HDL cholesterol <40 mg/dL (males) or <50 mg/dL (females)<br>**OR** specific treatment for this lipid abnormality | |

Adapted from Table 1, "IDF Consensus Worldwide Definition of the Metabolic Syndrome." (2006, updated 7/26/2020)
***Key:*** IDF International Diabetes Federation, BMI body mass index, BP blood pressure, HTN hypertension, DM diabetes mellitus, HLD hyperlipidemia, HDL high-density lipoprotein.

## RESULTS:

- A total of 760,076 bariatric operations were identified and 670,935 met criteria for analysis. 190,239 patients (28.4%) were identified as having metabolic syndrome (MetS).
- **Demographics:** Most patients were female (79.9%) and white (72.6%). The MetS group had a significantly higher incidence of medical comorbidities including preoperative diabetes (72.6% vs. 7.1%, p<.001), hypertension (93.6% vs. 29.6%, p<.001), hyperlipidemia (72.7% vs. 4.2%, p<.001), prior myocardial infarction (3.67% vs. 0.31%, p<.001), COPD (3.39% vs. 0.96%, p<.001), and sleep apnea (51.78% vs. 31.55%, p<.001).
- **Operative characteristics:** Sleeve gastrectomy was the most common operation performed (69.4%), followed by gastric bypass (27.7%), lap adjustable gastric band (1.7%) and biliopancreatic diversion with duodenal switch (1.1%). MetS patients more frequently underwent gastric bypass (34.0% vs. 25.3%, p<.001). The average operative length was significantly longer in the MetS group (95.2 minutes [95% CI 94.9-95.4] vs. 86.3 minutes [95% CI 86.1-86.4], p<.001).

## RESULTS (continued) :

- **Outcomes:** On multivariate logistic regression of perioperative outcomes (Table 2), patients with MetS undergoing bariatric surgery were found to have significantly higher odds of death (OR 2.32; 95% CI 1.97-2.72) and were also at greater risk for nearly every other recorded complication, including surgical site infection (SSI) (OR 1.39; 95% CI 1.31-1.48), perioperative MI (OR 4.70; 95% CI 3.42-6.45), stroke (OR 3.30; 95% CI 2.08-5.24), acute renal failure (OR 3.04; 95% CI 2.48-3.72), and transfusion requirement (OR 1.30; 95% CI 1.33-1.39).

**Table 2. Perioperative outcomes of patients with and without metabolic syndrome (MetS)**

| | Total, n(%) | No MetS, n(%) | MetS, n(%) | OR (95% CI) |
|---|---|---|---|---|
| Death intraop or within 30 days | 642 (0.10) | 293 (0.06) | 349 (0.18) | 2.32 (1.97-2.72) |
| Length of stay of 2 or more days | 70961 (10.58) | 45602 (9.49) | 25359 (13.33) | 1.43 (1.41-1.45) |
| Reoperation within 30 days of OR | 8699 (1.30) | 5820 (1.21) | 2879 (1.51) | 0.96 (0.91-1.00) |
| MI intraop or within 30 days | 195 (0.03) | 55 (0.01) | 140 (0.07) | 4.70 (3.42-6.45) |
| Stroke/CVA | 78 (0.01) | 30 (0.01) | 48 (0.03) | 3.30 (2.08-5.24) |
| Organ, Superficial or Deep Space SSI | 4911 (0.73) | 3058 (0.64) | 1853 (0.97) | 1.39 (1.31-1.48) |
| Transfusion within 72 hours of OR | 4548 (0.68) | 2687 (0.56) | 1861 (0.98) | 1.30 (1.22-1.39) |
| Acute renal failure | 431 (0.06) | 154 (0.03) | 277 (0.15) | 3.04 (2.48-3.72) |

***Key:*** MetS metabolic syndrome, OR odds ratio, CI confidence interval, MI myocardial infarction, CVA cerebrovascular accident, SSI surgical site infection

## CONCLUSIONS:

- Patients with metabolic syndrome have greater odds of mortality and multiple other postoperative complications following bariatric surgery.
- The incidence of serious complications observed in the metabolic syndrome group was still overall quite small. Therefore, these results should not significantly affect the recommendation for bariatric surgery for this patient population that potentially stands to gain the most long-term benefit from these procedures.
- These results provide practical data to inform risk and benefit discussions for patients with metabolic syndrome who are being evaluated for bariatric surgery and should raise attention to performing appropriate preoperative cardiopulmonary workup and medical optimization in this group.