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The Impact of Metabolic Syndrome on Postoperative Pulmonary Complications: A Large Bariatric Surgical Database Analysis

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Disclosures

- None

Background & Objective

- Metabolic syndrome can be defined as the concurrent presence of obesity, dyslipidemia, hypertension and glucose intolerance/DM
- Determine the prevalence of metabolic syndrome in bariatric surgical patients
- Determine associations between metabolic syndrome and pulmonary complications following weight-loss surgery

Methods

- IRB approved data base analysis
- Prospectively collected data between 2008 and 2010
- Bariatric Outcomes Longitudinal Database (BOLD™) at the ASMBS
- Collection of data from bariatric centers of excellence
- Data included demographics, procedures, ASA status classification, metabolic syndrome co-morbidities, pulmonary complications

Methods

BOLD

Preoperative Encounter Form

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Last Name: _____ First Name: _____ Chart Number: _____

CURRENT VISIT Visit Date: mm / dd / yyyy Visit Height: _____ in cm Visit Weight: _____ lbs kgs

CO-MORBIDITIES Indicate changes in co-morbidity status for this visit

Cardiovascular Disease

Hypertension

- No history of hypertension
- Borderline, no medication
- Diagnosis of hypertension, no medication
- Treatment with single medication
- Treatment with multiple medications
- Poorly controlled by medications, organ damage or dysfunction

Congestive Heart Failure

- No history or symptoms of congestive heart failure
- Class I: Symptoms with more than ordinary activity
- Class II: Symptoms with ordinary activity
- Class III: Symptoms with minimal activity
- Class IV: Symptoms at rest

Ischemic Heart Disease

- No history of ischemic heart disease
- Abnormal ECG, no active ischemia
- History of MI or anti-ischemic medication
- PCI, CABG
- Active ischemia

Metabolic

Glucose Metabolism

- No symptoms or evidence of diabetes
- Elevated fasting glucose
- Diabetes, controlled with oral medication
- Diabetes, controlled with insulin
- Diabetes, controlled with insulin and oral medication
- Diabetes, with severe complications (retinopathy, neuropathy, renal failure, blindness)

Lipids (Dyslipidemia or Hyperlipidemia)

- Not present
- Present, no treatment required
- Controlled with lifestyle change, including Step 1 or Step 2 diet
- Controlled with single medication
- Controlled with multiple medications
- Not controlled

GOUT/Hyperuricemia

- No symptoms of gout/hyperuricemia
- Hyperuricemia, no symptoms
- Hyperuricemia, medications

Gastrointestinal

GERD

- No history of GERD
- Intermittent or variable symptoms, no medication
- Intermittent medication
- H2 blockers or low dose PPI
- High dose PPI
- Meet criteria for antireflux surgery, or prior surgery for GERD

Cholelithiasis

- No history of gallstones
- Gallstones with no symptoms
- Gallstones with intermittent symptoms
- Gallstones with severe symptoms or h/o cholecystectomy
- Gallstones with complications requiring immediate surgery prior to gastric bypass
- History of cholecystectomy with ongoing complications not resolved

Liver Disease

- No history of liver disease
- Hepatomegaly modest, normal LFT's, fatty change

Methods contd.

- BOLD™ severity classification of co-morbidities associated with metabolic syndrome
- \geq status 2 in all 3 co-morbidities defined presence of metabolic syndrome

	Severity Status					
Co-Morbidities	0	1	2	3	4	5
Hypertension	No hypertension	Borderline, no meds	Htn, no meds	Single med	Multiple meds	Poor control, end organ damage or dysfunction
Diabetes	No evidence of diabetes	Elevated fasting glucose	Diabetes, oral meds	Diabetes, insulin	Diabetes, insulin and oral meds	Diabetes, & severe complications (retinopathy, neuropathy, renal failure, blindness)
Dyslipidemia	Not present	Present, no treatment required	Lifestyle change, incl. Step 1 or 2 diet	Controlled Single med	Controlled multiple meds	Not controlled

Methods contd

- Association with postoperative pulmonary complications analyzed:
 - Atelectasis,
 - Pneumonia,
 - Respiratory failure,
 - ARDS,
 - Pleural effusion
 - Pneumothorax
 - Composite (presence of any) of the above
- Pearson Chi-Square test for analysis, a $p < 0.05$ was significant.

Results

Demographics

- N = 158,405 patients

Parameter	Result
Age (years)	45.7 ± 11.8
Gender	78.5 % women / 21.5 % men
Body Mass Index (kg/m ²)	75.4 % between 40 and 60
ASA status	65.3 % ASA III
Procedures	Gastric bypass: 52 % Gastric banding: 40 % Sleeve gastrectomy: 4 % Other: 4 %
Metabolic syndrome present	20,158 patients; 12.7 % of cohort

Results

Postoperative pulmonary complications

Relative proportion of patients with vs without metabolic syndrome and a respective adverse pulmonary event.

Pulmonary Complications	Presence of Metabolic Syndrome			Significance (p)
	No	Yes	Percentage (n/N)	
Atelectasis (n = 589)	No	12.7%	(20,058/157,816)	0.002
	Yes	17.0%	(100/589)	
Pneumonia (n = 412)	No	12.7%	(20,073/157,993)	< 0.001
	Yes	20.6%	(85/412)	
Pleural effusion (n = 233)	No	12.7%	(20,117/158,172)	0.026
	Yes	17.6%	(41/233)	
Respiratory failure (n = 275)	No	12.7%	(20,059/158,130)	< 0.001
	Yes	36.0%	(99/275)	
ARDS (n = 65)	No	12.7%	(20,142/158,340)	0.004
	Yes	24.6%	(16/65)	
Pneumothorax (n = 28)	No	12.7%	(20,156/158,377)	0.375
	Yes	7.1%	(2/28)	
Composite outcome (n = 1444)	No	12.6%	(19,848/156,961)	< 0.001
	Yes	21.5%	(310/1,444)	

Conclusion

- Metabolic syndrome prevalence of 12.7%
- Overall incidence of pulmonary complications < 1%
- MetS significantly associated with adverse pulmonary outcomes except pneumothorax
- Strongest association with respiratory failure and ARDS
- Pre-op Optimization of MetS comorbidities is important

Schumann et al. ASA 2012

Questions

- MetS as a reflection of overall reduced health status ?
or
- MetS co-morbidities particularly relevant ?
- Role of the type of surgical procedure and its duration for the development of PPC

Strength / Weaknesses

- Large cohort in the context of a rare complication
- Prospective data collection
- Reasonable definition of metabolic syndrome

- Reliability and consistency of data input ?
- Clear definition of selected outcomes ?
- Limitations of the BOLD database