

Evaluating the Impact of Sleep Disordered Breathing on Adverse Cardiovascular Outcomes After Bariatric Surgery

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Introduction

- Sleep disordered breathing (SDB) includes obstructive sleep apnea (OSA) and obesity-associated sleep hypoventilation (OASH).
- SDB has well-characterized adverse effects on the cardiovascular system and increases morbidity and mortality. Long-term impact on cardiovascular outcomes post-bariatric surgery, however, remains unclear.

Objective

We hypothesize that patients with SDB have increased frequency of major adverse cardiovascular events (MACE) post-bariatric surgery than those without.

Methods

- Patients undergoing polysomnography (PSG) prior to bariatric surgery at The Cleveland Clinic from 2011-2018 were retrospectively examined and followed up from date of last surgery to 2019, including the perioperative period.
- Primary predictors:
 - Moderate-severe OSA (MS-OSA), i.e. $AHI \geq 15$
 - OASH, i.e. $BMI \geq 30 \text{ kg/m}^2$ and either $EtCO_2 \geq 45 \text{ mmHg}$ or serum bicarbonate $\geq 27 \text{ mEq/L}$
- MACE was defined as atrial fibrillation (AF), coronary artery events, cerebrovascular events, or heart failure.
- MACE-free probability was compared using hazard ratios estimated from multivariable Cox proportional models.

Results

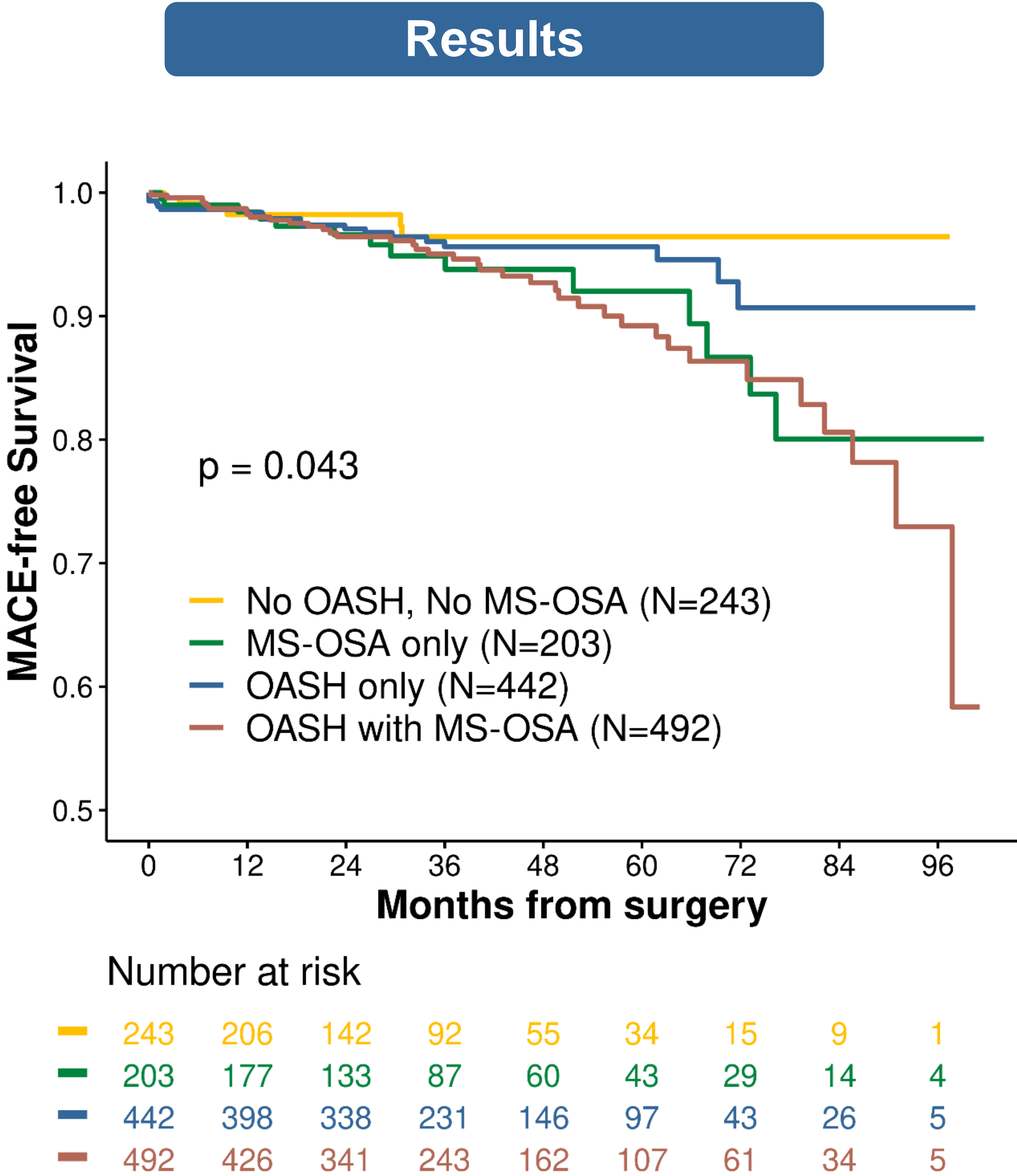


Figure 1. Kaplan-Meier curve using log rank univariable analysis.

Table 1. Subject Characteristics

Factor	Total N=1,380
Age	43.5 ± 11.5
Sex, male	244 (17.7%)
Race	
White	879 (63.7%)
Black	391 (28.3%)
Other	110 (8.0%)
BMI (before)	49.0 ± 9.1

- Risk of MACE differed across the groups ($p=0.043$, **Figure 1**), however it bordered significance in adjusted models ($p=0.051$).
- Compared to the reference group, the OASH and MS-OSA group had higher risk of MACE (**HR 2.53**, 95% CI: 1.07-6.00, $p=0.035$).
- Patients with MS-OSA had higher risk of MACE than those with $AHI < 15$ (**HR 1.94**, 95% CI: 1.20-3.13, $p=0.007$).
- Patients with severe OSA had higher risk of MACE than those with $AHI < 30$ (**HR 2.01**, 95% CI: 1.28-3.14, $p=0.002$).
- For every 5-unit AHI increase, risk of MACE increased by 6% (**HR 1.06**, 95% CI: 1.029-1.084, $p<0.001$) with slight reduction in point estimates in adjusted models.

Conclusion

- Preliminary data from this largest-to-date sample of systematically phenotyped patients with SDB undergoing bariatric surgery show significant differences in risk of MACE and MACE-free survival mitigated after consideration of obesity.
- Further investigation to elucidate effect modification by obesity and metabolic factors is needed.

Acknowledgements

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