The Difficult Airway: Incidence and Predictors in Lean vs. Obese Patients

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Introduction

As the incidence of morbid obesity continues to rise, anesthesiologists are increasingly concerned with the possible association between morbid obesity and difficult intubation. Current literature exploring the association between the morbidly obese and difficult intubation is contradictory[1-6]. Moreover, "difficult intubation" lacks standardization with studies variably utilizing the Intubation Difficulty Scale[2,3,5,7], the Cormack-Lehane grade[8,9], or institutional or investigator preference[1,4,6]. Overall, results remain uncertain despite best attempts to aggregate past data[10].

Methods

A cohort of 127 morbidly obese individuals (BMI≥40) and 739 non-morbidly obese individuals (BMI<40) consented to participate in the study. Individuals were preoperatively assessed for obstructive sleep apnea (OSA), neck range of motion (ROM), neck circumference (NC), thyromental distance (TM), sternomental distance (SM), interincisor distance (IID), upper lip bite test (ULBT), and Mallampati score. Following intubation, the laryngoscopist was asked to assess difficulty using the validated Intubation Difficulty Scale (IDS)[11]. Difficult endotracheal intubation, difficult laryngoscopy, and difficult mask ventilation were defined as an IDS score ≥6, a Cormack-Lehane grade of 3 or 4, and by designation of the provider, respectively.

Results:

The incidence of difficult endotracheal intubation, difficult laryngoscopy and difficult mask ventilation was determined to be 4.7%, 9.5% and 6.3% in the morbidly obese cohort as compared to 4.7%, 6.8% and, 2.4% in the non-morbidly obese cohort. BMI is not associated with difficult intubation (p=0.995); however, gender (p=0.037), OSA (p=0.006), IID (p=0.034), ULBT (p=0.020), and Mallampati (p=0.006) are associated.

BMI and Intubation Difficulty		
BMI	IDS<6, n (%)	IDS≥6, n (%)
<40	704 (95.2)	35 (4.8)
≥40	121 (95.2)	6 (4.8)

Risk Factors for Difficult Intubation		
-	Odds Ratio	95% Confidence Interval
Gender (Female: Male)	0.496	[0.257, 0.958]
OSA	2.604	[1.203, 5.637]
Mallampati III-IV	1.983	[1.030, 3.819]
ULBT Grade 3	5.79	[1.446, 23.191]
Interincisor Distance (per 1cm increase)	0.575	[0.342, 0.967]

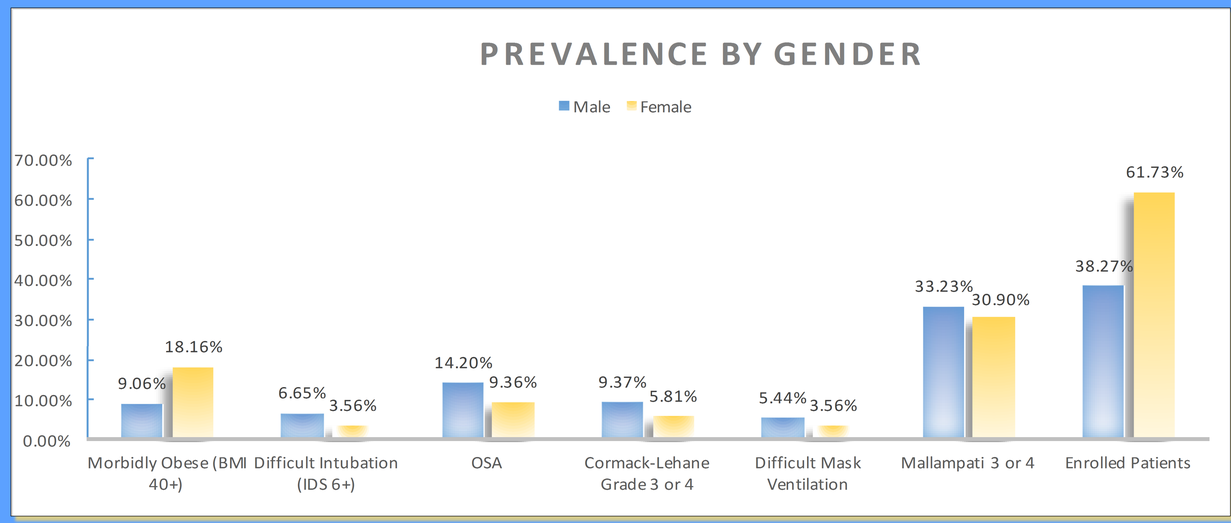
BMI is also not associated with difficult laryngoscopy (p=0.279); however, gender (p=0.048), OSA (p=0.011), neck ROM (p=0.028), NC (p=0.002), TM (p=0.017), SM (p=0.001), ULBT (p=0.036) and Mallampati (p=0.014) are.

BMI and Cormack-Lehane Grade		
BMI	Grade 1 or 2, n (%)	Grade 3 or 4, n (%)
<40	689 (93.2)	50 (6.8)
≥40	115 (90.5)	12 (9.5)

Risk Factors for Difficult Laryngoscopy (Cormack-Lehane Grade 3 or 4)		
	Odds Ratio Estimate	95% Confidence Interval
Gender (Female: Male)	0.46	[0.267, 0.792]
OSA	2.019	[1.041, 3.915]
Sternomental Distance (per 1cm increase)	0.761	[0.662, 0.875]

BMI is associated with difficult mask ventilation (p=<0.001).

BMI and Mask Ventilation			
BMI	Not Attempted, n (%)	Easy, n (%)	Difficult, n (%)
<40	74 (10.0)	647 (87.5)	18 (2.5)
≥40	30 (23.6)	89 (70.0)	8 (6.4)



Conclusion

BMI is **not** associated with difficult intubation or laryngoscopy, only difficult mask ventilation. Thus, a high BMI by itself does not predict difficult intubation. Other factors such as gender, Mallampati classification, and presence of OSA may be more suitable in predicting intubation difficulty.

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