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# Predicting Factors of Difficult Intubation in Obese Patients Undergoing Bariatric Surgeries

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**Abstract:** Although difficult endotracheal intubation is associated with increased morbidity and mortality, no consensus exists on the risk factors associated with this complication. Therefore, the aim of our study was to determine the prevalence and risk factors of difficult intubation in a large group of obese patients who had undergonelaparascopicsleeve gastrectomy. We retrospectively evaluated the records of 402 obese patients with body mass index >35 $m^2$ who had undergone the procedure. The variables of age, sex, thyromental distance (cm), jaw motion, history of sleep apnea, previous history of difficult intubation, difficult intubation during the bariatric surgery and modified Mallampathi grade were analyzed in each patient. The Mallampati grade 3 and 4 and history of previous difficult intubation were the only statistically significant variables associated with difficult intubation. Based on the results of our study, these risk factors should be highly considered in the perioperative evaluations of the obese patients.

**Key words:** Difficult, intubation, obese, bariatric, Iran

## INTRODUCTION

Airway management is one of the key responsibilities of the anesthesiologists. Difficult endotracheal intubation is associated with increased morbidity and mortality and thus many researches have addressed the risk factors associated with this complication (1-3). Modified Mallampati grade 3 or 4, thymomental distance greater than 6 cm, neck extension less than 5 cm, increased neck circumference, and morbid obesity have been have been associated with increased risk of difficult intubation in previous studies (Nasa and Kamath, 2014; Juvin *et al*., 2003; Gonzalez *et al*., 2008).

Despite all these studies, no consensus exists on which risk factors to be counted as definite predictive factors of difficult intubation, as the results of other studies contradict these findings (Brodskyman, 2002; Karkouti *et al*., 2000). Therefore, the aim of our study was to determine the prevalence and risk factors associated with difficult intubation in a large group of obese patients who underwent sleeve gastrectomy. Our research has by far included the largest number of obese patients in the studies.

## MATERIALS AND METHODS

The university ethical review board approved the study. We retrospectively evaluated the records of 402obese patients with body mass index (BMI) >35 kg/$m^2$ who underwent sleeve gastrectomy in two university affiliated surgical centers between Jan 2012 to Jan 2014. For each patient 8 variables of age, sex, thyromental distance (cm), jaw motion, history of sleep apnea, previous history of difficult intubation, difficult intubation during the bariatric surgery and modified Mallampathigrade were collected and analyzed. Difficult intubation was defined as undergoing at least three endotracheal intubation attempts. Preoperative airway assessment was performed by an anesthesiology attending.

The modified Mallampati classification assessment was made by the attending physician standing in front of the patients and directing them to open their mouth and protrude their tongue without phonation. The classification is as follows: class soft palate, fauces, uvula, and tonsillar pillars visible; class soft palate, tonsillar pillars, and uvula visible; class soft palate and base of uvula visible and class soft palate not visible (8). Grade 3 and 4 were classified as predicting difficult intubation. Categorical variables were compared by using Wilcoxon's ranked sum test and categorical variables were compared by using Pearson's Chi-square test or Fisher's exact test. The $p<0.05$ were considered significant.

## RESULTS

Four hundred and two obese patients (87 male and 315 female) with BMI> 35 kg/$m^2$ entered the study. Patients were divided according to the modified

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Table 1: Evaluation of relationship between different variables and difficult intubation among obese patients

| Variable | Percentage | p-value |
|---|---|---|
| Male sex | 21.60 | |
| Mallampati3 or 4 | 19.10 | |
| Thyromental distance6cm> | 79.90 | 0.89 |
| Jaw motion <5cm | 5.50 | 0.08 |
| History of sleep apnea | 8.50 | 0.14 |
| History of previous difficult intubation | 3.70 | 0.00 |

Mallampati classification as follows: class 1 37.1%, class 243.8%, class 317.9% and class 41.2%. The assessed variables are summarized in Table 1. The results indicate that modified Mallampati grade 3 and 4 and history of previous difficult intubation were the only statistically significant variables predicting difficult intubation. Compared to other patients, the odd's ratio of difficult intubation for patients with history of sleep apnea, history of previous difficult intubation, and grade 3 and 4 Mallampati were 6.7, 39 and 14.7, respectively. Seventeen patients (4.2%) faced difficult intubation. There was one patient in whom the intubation had failed and the operation had been postponed.

## DISCUSSION

A clinical situation in which a trained anesthesiologist confronts difficulties with mask ventilation, tracheal intubation or both is defined as difficult airway. The prevalence of difficult intubation is estimated 5.8% in general population and 15.8% in the obese patients. Numerous studies have been conducted to evaluate the predictive factors for difficult intubation with conflicting results. One recent meta-analysis has revealed that tests such as mouth opening, sternomental distance, Mallampati score and thyromental distance have moderate to poor sensitivity (62-20%) and moderate to fair specificity (82-97%) with this regard. Other analyses restricted to the obese patients; however, found that Mallampati score of 3 or 4 was a predictive factor for difficult intubation although with poor sensitivities, specificities,and predictive values (Juvin *et al*., 2003; Gonzalez *et al*., 2008; Brodskyman, 2002; Karkouti *et al*., 2000; Mallampati *et al*., 1985; Apfelbaum *et al*., 2013; Lundstrom *et al*., 2011; Bond, 1993). These researchers also found that BMI was not an independent risk factor for tracheal intubation. Our findings are in agreement with these researches. The prevalence of difficult intubation in the obese patients in our research was 4.2% which is no more than the rate previously estimated in the general population (Adnet *et al*., 2001; Benumof, 1991).

As indicated by the results of this study, the obese patients had 6.7, 39 and 14.7 times more chances of facing difficult intubation if they had history of sleep apnea, history of previous difficult intubation and grade3 and4 Mallampati respectively. The only other statistically significant risk factor for difficult intubation in our study was history of previous difficult intubation which should be considered in preoperative assessment of patients. Based on the above-mentioned results we came to thefollowing final regression model:

$$\text{diff} = \frac{1}{1+e^{-x}}$$

z = -7.245+2.688 (mallampati) + 3.665 (History of previous difficult intubation) + 0.891 (History of sleep apnea). Where we can categorize the patients based on the ease of intubation after replacing the factors in the mentioned formula.

## CONCLUSION

Based on the results of our study, Mallampati score 3 or 4 and history of previous difficult intubation were the only predictive factors for difficult intubation in the obese patients and should be considered in perioperative evaluation of these patients.

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