



# American Journal of Anesthesia & Clinical Research

## Research Article

# Importance of Preoperative Videolaryngoscopic Examination for Predicting Difficult Intubation in Bariatric Surgery - @

**M Tarhun Yosunkaya<sup>1\*</sup>, B Cigdem Sahin<sup>2</sup> and Oktay Banli<sup>3</sup>**

<sup>1</sup>Department of ENT, Lokman Hekim University, Ankara, Turkey

<sup>2</sup>Department of Anesthesiology, Lokman Hekim Akay Hospital, Ankara, Turkey

<sup>3</sup>Department of General Surgery, Lokman Hekim University, Ankara, Turkey

**\*Address for Correspondence:** M Tarhun Yosunkaya, Department of ENT, Lokman Hekim University, Ankara, Turkey, Tel: +905-323-564-997; ORCID: 0000-0002-8504-5317;  
E-mail: tarhun.yosunkaya@lokmanhekim.edu.tr

**Submitted:** 15 February 2020; **Approved:** 05 March 2020; **Published:** 07 March 2020

**Cite this article:** Yosunkaya MT, Sahin BC, Banli O. Importance of Preoperative Videolaryngoscopic Examination for Predicting Difficult Intubation in Bariatric Surgery. Am J Anesth Clin Res. 2020;6(1): 011-014.

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## ABSTRACT

**Background and Aim:** One of the most common problems in the operations of obese patients is the difficulties in providing airway during general anesthesia. In our study, we aimed to evaluate the effectiveness of the videolaryngoscopic examination performed in the outpatient clinic conditions preoperatively by the specialist ear-nose-throat physician, in determining the risk of difficult intubation before bariatric surgery.

**Methods:** Retrospectively, the file records of the patients who underwent sleeve gastrectomy were examined. Demographic features, Body Mass Index (BMI), the mouth opening, Mallampati score, thyromental distance, sternomental distance, neck circumference measurements and videolaryngoscopic examination results were recorded.

**Results:** In a total of 140 consecutive patients (58 male, 82 female) were included in the study. The mean age of the study participants was  $35.40 \pm 9.78$  and the mean BMI of the patients was  $44.33 \pm 7.52 \text{ kg/m}^2$ . The mean mouth opening of the patients was  $4.82 \pm 0.54 \text{ cm}$  and the mean neck circumference was  $43.52 \pm 4.66 \text{ cm}$ . The mean thyromental distance was  $8.02 \pm 1.00 \text{ cm}$  and the mean sternomental distance was  $16.58 \pm 1.53 \text{ cm}$ . Difficult intubation was determined in 8 (5.7%) patients. In logistic regression analysis, age ( $p : 0.446$ ), gender ( $p : 0.371$ ), BMI ( $p : 0.947$ ), snoring ( $p : 0.567$ ), sleep apnea ( $p : 0.218$ ), mouth opening ( $p : 0.687$ ), thyromental distance ( $p : 0.557$ ), sternomental ( $p : 0.596$ ) and neck circumference ( $p : 0.838$ ) were not the independent predictors of difficult intubation. However, Mallampati score ( $p : 0.001$ ) and preoperative direct laryngoscopy findings ( $p : 0.037$ ) performed in outpatient clinic were the significant predictors of difficult intubation. Interestingly, all patients with grade 4 laryngoscopy findings had difficult intubation.

**Conclusion:** In candidates for bariatric surgeries, difficult intubation can be predicted in pre-surgical period, during the pre-operative preparations, with the videolaryngoscopy and Mallampati scores in order to prevent any anesthetic morbidity.

## INTRODUCTION

Obesity is a prevalent and preventable health problem that is very common in all societies. Obesity, which is considered as a complex and multifactorial disease that negatively affects health, is the second most important cause of preventable deaths after smoking today. According to the World Health Organization (WHO), the age-standardized obesity prevalence has increased three times in men and twice in women in recent years [1]. Obesity causes many chronic serious systemic diseases. As obesity is a health problem that is encountered more commonly every day, the frequency of surgical interventions for patients is increasing day by day. One of the most common problems in the operations of obese patients is the difficulties in providing airway during general anesthesia. This problem also occurs during bariatric surgery, which is becoming increasingly common [2].

Difficulties in airway, characterized by difficult mask ventilation and difficult intubation, are common in obese and morbidly obese patients. Difficult or unsuccessful endotracheal intubation is one of the most important causes of morbidity and mortality related to anesthesia [3]. Therefore, preoperative evaluation of the airway is of utmost importance for safe anesthesia induction, maintenance and termination in obese patients. Objective tests are very important in predicting intubation difficulties, as the degree of difficulty in maintaining respiratory tract is parallel with the degree of hypoxic brain injury and/or death. Predicting difficult intubation can also reduce the risk of complications, by changing the anesthesia method, preparing assistive tools, and finding an experienced person. Since the tests used to predict difficult intubation are insufficient from time to time before the operation, the search for a suitable airway preliminary assessment test, which is appropriate for use in practice, has high reliability, and is easy to apply, continues [4,5].

In our study, it was aimed to evaluate the effectiveness of the videolaryngoscopic examination performed in the outpatient clinic conditions preoperatively by the specialist ENT physician, to determine the risk of difficult intubation before bariatric surgery.

## MATERIAL AND METHOD

Retrospectively, the file records of the patients who underwent

sleeve gastrectomy in 2019 at Lokman Hekim Akay Hospital were examined. The patients with missing data were not included in the study. Patients who were previously known to have difficult airway were also excluded from the study. Age, gender and Body Mass Index (BMI) of the patients were recorded. BMI was calculated with the formula of  $\text{weight/height}^2$ . The mouth opening, Mallampati score, thyromental distance, sternomental distance, neck circumference measurements and videolaryngoscopic examination performed by the same expert ENT physician were recorded [6]. The maximum interincisal distance is defined as the maximum mouth opening. For the determination of maximum mouth opening, the patients were asked to open their mouth as wide as possible, and the distance from the incisal edge of the maxillary central incisors to the incisal edge of the mandibular central incisors was measured at the midline [7].

Videolaryngoscopic examination is an important examination method for laryngeal diseases in Ear-Nose-Throat (ENT) clinics using an angle telescope. The patient is in a sitting position, the mouth is open, and the tongue is outside, by transferring the image to the monitor with the camera. No medication is required. During the examination, the tongue, pharynx, larynx, vocal cords can be seen directly and in detail, as is the trachea [8].

In preoperative period, Videolaryngoscopy was used to examine the larynx at the outpatient clinic with more clarity and data preservation facility. VLS was performed using a Karl Storz 70° endoscope attached to an external light source and colour video camera of Maxer 1000. VLS was performed using a stroboscopic light source, a microphone of Riester, a C mount video camera of Maxer 1500, a Maxer basic highlight portable stroboscope 70° and a video recorder. Data was stored on computer in both the procedures. Videolaryngoscopy grading was similar with the Cormack-Lehane grading as: grade 1 full view of glottis, grade 2 partial view of glottis, grade 3 only epiglottis seen, none of glottis seen and grade 4 neither glottis nor epiglottis seen [9].

Anesthesia induction and intubation of the patients were performed by the same specialist doctor. Difficult intubation was defined as the presence of at least one of the following: need for > 2 laryngoscopy or intubation attempt, need for changing the blade

size, difficult or failed videolaryngoscopy, difficult or failed Awake Fiberoptic Intubation (AFOI) and using VL or awake AFOI as rescue airway techniques.

## STATISTICAL ANALYSIS

Statistical analysis was performed using IBM SPSS Statistics version 21. Descriptive statistics are performed to analyze the general features of participants. Logistic regression was used to determine the predictors of difficult intubation.  $p < 0.05$  was regarded as statistically significant.

## RESULTS

In a total of 140 consecutive patients (58 male, 82 female) who underwent bariatric surgery were included in the study. The mean age of the study participants was  $35.40 \pm 9.78$  (range 18-57) years. The mean BMI of the patients was  $44.33 \pm 7.52$  kg/m<sup>2</sup>.

Among study participants, as defined by the patient notifications, snoring was present in 104 (74.3%) patients and the diagnosis of obstructive sleep apnea syndrome was present in 50 (35.7%) patients. The Mallampati scores of the patients are summarized in table 1.

Videolaryngoscopy grades of the patients are summarized in table 2.

**Table 1:** Mallampati score of the patients.

Mallampati score	Number of patients (%)
1	12 (8.6)
2	50 (35.7)
3	72 (51.4)
4	6 (4.3)

**Table 2:** Videolaryngoscopy grades of the patients.

Videolaryngoscopy grade	Number of patients (%)
1	14 (10.0)
2	88 (62.9)
3	30 (21.4)
4	8 (5.7)

The mean mouth opening of the patients was  $4.82 \pm 0.54$  cm and the mean neck circumference was  $43.52 \pm 4.66$  cm. The mean thyromental distance was  $8.02 \pm 1.00$  cm and the mean sternomental distance was  $16.58 \pm 1.53$  cm.

Difficult intubation was determined in 8 (5.7%) patients. In logistic regression analysis, age ( $p : 0.446$ ), gender ( $p : 0.371$ ), BMI ( $p : 0.947$ ), snoring ( $p : 0.567$ ), sleep apnea ( $p : 0.218$ ), mouth opening ( $p : 0.687$ ), thyromental distance ( $p : 0.557$ ), sternomental ( $p : 0.596$ ) and neck circumference ( $p : 0.838$ ) were not the independent predictors of difficult intubation. However, Mallampati score ( $p : 0.001$ ) and preoperative direct laryngoscopy findings ( $p : 0.037$ ) performed in outpatient clinic were the significant predictors of difficult intubation.

Interestingly, all patients with grade 4 laryngoscopy findings had difficult intubation.

## DISCUSSION

Along with the increase in the incidence of obesity all over

the world, the patient group, in which anesthetists struggled with weight loss surgical techniques, increased. In this study, we analyzed the factors affecting the difficult intubation and we determined that Mallampati score and video-laryngoscopy findings were the independent predictors of difficult intubation. Video-laryngoscopy is a minimally invasive, inexpensive and highly available test and more importantly since it is performed in outpatient conditions, in preoperative period, it saves us time to make appropriate preparations for patients with the high risk of difficult intubation.

Due to the lack of a standardized definition for difficult intubation, there is a wide range of incidences reported in different studies for difficult intubation. However, in general, obese patients are known to have a higher incidence of difficult intubation [10]. Difficult intubation is associated with the serious anesthesia-related morbidity and mortality when adequate preparation is not provided. It is very important to anticipate difficult intubation and be ready for possible complications.

Difficult intubation rate in our study is found to be 5.7%. Our results were compatible with the previous literature. Shiga, et al. reported the incidence of difficult intubation as 15.8% in obese patients [11]. Montealegre-Angarita MC, et al. [12] reported the rate of difficult tracheal intubation as 9% in 166 consecutive bariatric surgery patients.

In previous literature, to predict difficult intubation, measurements such as Mallampati classification, mouth opening, thyromental distance and neck circumference were used. However to the best of our knowledge, direct videolaryngoscopy performed in outpatient conditions, was not studied before. Tuncali, et al. [13] retrospectively evaluated the peroperative findings of 329 patients who underwent laparoscopic obesity surgeries and reported the difficult intubation rate as 8.5%. They also reported that with an increase in Mallampati scores, difficult intubation rates were also increased. Ezri, et al. [14] reported the overall incidence of difficult intubation as 1.6% in 546 patients with a BMI of 35 kg/m<sup>2</sup> or higher who underwent bariatric surgery. They also reported that, age was the only significant predictor of difficult intubation. Hashim, et al. [15] reported that, in 101 patients who underwent bariatric surgery, the incidence of major difficult intubation determined by the Intubation Difficulty Score (IDS) was 3% and the incidence of moderate difficult intubation was 63.4%. They also reported a statistically significant correlation between an IDS  $> 5$  (major difficult intubation) and both neck circumference and neck circumference to thyromental distance ratio. In 539 obese patients undergoing gastric bypass, Dohrn, et al. [16] reported the difficult tracheal intubation rate as was 3.5%. They also reported that, the patients with difficult tracheal intubation were more commonly males, having higher Cormack-Lehane classification, and higher ASA scores.

Supporting our findings, high Mallampati score was determined to be a risk factor for difficult intubation in obese patients [16,17]. However, to the best of our knowledge, this is the first study in literature evaluating the role of videolaryngoscopy preformed in preoperative period, in outpatient conditions. Performing videolaryngoscopy in outpatient conditions has many advantages. With this knowledge, preoperative preparations can be completed in patients at risk of difficult intubation.

Although Cormack-Lehane rating is also an important determinant of difficult intubation, since it directly gives data

regarding the larynx appearance, we did not determine it as an independent predictor of difficult intubation in this study. Moreover, since it is evaluated after general anesthesia induction in the operating room, its contribution to difficult airway preparations is limited. The anesthetist must make the decision to quickly use the next step and assistive method after scoring the Cormack-Lehane. Time is the main problem especially in patients with difficult mask ventilation, at this point.

There are some limitations of the study that should be mentioned. The retrospective design of the study and low number of the patients are the main limitations of the study.

## CONCLUSION

In candidates for bariatric surgeries, difficult intubation can be predicted in pre-surgical period, during the pre-operative preparations, with the videolaryngoscopy and Mallampati scores in order to prevent any anesthetic morbidity. Larger, prospective studies in different patient populations are warranted to define the role of new scoring systems including the videolaryngoscopy and Mallampati scores, in predicting difficult intubation.

## AUTHOR CONTRIBUTIONS:

M Tarhun Yosunkaya: Study design, data collection, data analysis and writing of the paper; B Cigdem Sahin: Patient recruitment, data collection and data analysis; Oktay Banli: Study design, Patient recruitment, data collection and data analysis.

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