CORRELATION OF NECK CIRCUMFERENCE WITH DIFFICULT MASK VENTILATION AND DIFFICULT LARYNGOSCOPY IN MORBIDLY OBESE TURKISH PATIENTS: A PROSPECTIVE CLINICAL TRIAL

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Abstract: Mask ventilation and laryngoscopy can be challenging in morbidly obese patients because of excessive fat tissue. There are studies suggesting that neck circumference is associated with difficult mask ventilation, difficult laryngoscopy and difficult intubation. The aim of our study is to evaluate predictive values of neck circumference, Mallampati scores, neck movements, dentition, upper lip bite test, breast, thorax, waist, hip circumferences, mouth opening, sternomental and thyromental distances for difficult mask ventilation and difficult laryngoscopy in female and male Turkish morbidly obese patients. Two hundred and twenty (37 male and 83 female) patients were included in our study. 120 (37 male, 83 female) patients were included to study. Difficult mask ventilation was more frequent in males (21,6%) compared to females (2,4%). Difficult laryngoscopy was more frequent in male (10,8%) than female (3,6%) patients. Mouth opening lower than 6,5cm was found as a significant predictor for difficult mask ventilation in male patients. Mallampati scores III and IV were found as a significant predictors for difficult laryngoscopy in female patients. Neck circumference was not found a statistically significant predictor for difficult mask ventilation and difficult laryngoscopy.

Keywords: morbid obesity, neck circumference, difficult mask ventilation, difficult laryngoscopy

Background and Goal of Study:

Because of the excessive adipose tissue in morbidly obese patients, general anesthesia and airway management is special. Studies show the increased risk of difficult mask ventilation, difficult laryngoscopy and difficult intubation in morbidly obese patients. During preanesthetic evaluation, various tests are used to determine the ventilation and intubation difficulty. Therefore, morbidly obese patients must necessarily be evaluated as they have additional traits such as shorter and stout necks, large tongues, and excessive laryngeal soft tissue. These additional factors further complicate mask ventilation and intubation. There are studies evaluating the relation between neck circumference and difficult mask ventilation, laryngoscopy and/or intubation in morbidly obese patients however their results differ.

The aim of our study is to evaluate predictive values of neck circumference, Mallampati scores, neck movements, dentition, upper lip bite test, breast, thorax, waist, hip circumferences, mouth opening, sternomental and thyromental distances for difficult mask ventilation and difficult laryngoscopy in female and male Turkish morbidly obese patients.

Materials and Methods:

This observational, prospective, clinical study was conducted in one center, in the general surgery operation rooms of Istanbul University Cerrahpasa Medical Faculty. One hundred and twenty 18-65 year old patients with body mass index (BMI) $\geq 40\text{kg/cm}^2$ and ASA status I-III were included in the study. Patients with maxillofacial fractures or tumors, masses on neck or mediastinum, scar in the neck and facial area, history of neck and head radiotherapy, cervical vertebrae anomalies or operation history, and patients who needed rapid sequence intubation were excluded from the study. During the preoperative evolution, history of difficult airway was questioned and measurements below were recorded: modified Mallampati scores, cervical flexion, cervical extension, dentition, upper lip bite test (ULBT), mouth opening, sternomental distance, thyromental distance; neck, breast, thorax, waist and hip circumferences. Difficult mask ventilation (DMV) was evaluated as Grade 3 and Grade 4 according to Han's Grading Scale¹. Patients with Cormack-Lehane scores III and IV were accepted as "difficult laryngoscopy" (DL).

Statistics: SPSS Statistics 21 (IBM, USA) was used for statistical analysis. Student's t test was used for normally distributed continuous variables and the Mann-Whitney U test was used for data that were not normally distributed. Fisher's exact test or Chi-square test was used for non-continuous variables. All variables at *p* value less than 0,05 were defined as statistically significant.

Results:

120 (37 male, 83 female) patients were included to study. Difficult mask ventilation was more frequent in males (21,6%) compared to females (2,4%). Mouth opening lower than 6,5cm was found as a significant predictor for difficult mask ventilation in male patients with a 62,5% specificity and 100% sensitivity. Difficult laryngoscopy was more frequent in male (10,8%) than female (3,6%) patients. Mallampati scores III and IV were found as a significant predictors for difficult laryngoscopy in female patients with a 92,54% specificity and 75% sensitivity. Neck circumference was not found a statistically significant predictor for difficult mask ventilation and difficult laryngoscopy.

Discussion:

Shailaja et al² showed that Mallampati scores III and IV are predictive for DL in obese patients. In our study, we have found that Mallampati scores III and IV are predictive for DL for female patients.

Both Neligan et al³ and Ezri et al⁴ evaluating neck circumference and DL correlation showed that it is predictive for DL. Ezri et al⁴ stated that neck circumference above 50 cm is strongly predictive for DL. In our study we found that neck circumference has no predictive value for DL in both genders.

Leoni et al⁵ stated that neck circumference above 46 cm, Riad et al⁶ found that neck circumference above 43 cm is a predictive factor for DMV. In our study we found that neck circumference has no predictive value for DMV in both genders.

Conclusion:

Neck circumference is not a predictive marker for difficult mask ventilation or difficult laryngoscopy for both genders in Turkish morbidly obese patients.

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