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Anesthesiology

A COMPARATIVE STUDY OF MODIFIED MALLAMPATI CLASSIFICATION WITH NECK CIRCUMFERENCE ALONG WITH UPPER LIP BITE TEST IN MORBIDLY OBESE PATIENTS

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ABSTRACT

INTRODUCTION: Anaesthesia in morbidly obese patients can present many challenges. The overriding concern of most anaesthesiologists is airway management, as obese patients have been thought to be at greater risk of difficult airway and/or difficult intubation, when compared with the general population.

The term 'difficult airway' has been defined by the American Society of Anaesthesiologists (ASA) taskforce as the clinical situation in which a conventionally trained anaesthesiologist experiences problems with mask ventilation or tracheal intubation or both.

AIMS AND OBJECTIVES- To assess the positive predictive value,sensitivity and specificity of MMPC, NC along with ULBT and compare it with Cormack Lehane grading intraoperatively.

MATERIALS AND METHOD- Preoperative airway assessment of 200 patients posted for surgery under general anaesthesia was carried out to evaluate the usefulness of multiple screening tests in predicting the ease or difficulty of laryngoscopy in obese patients undergoing laparoscopic bariatric surgery.

Modified Mallampati test grade III or IV, Upper Lip Bite test grade III, Neck Circumference >40cm were considered as predictors of difficult laryngoscopy.

Laryngoscopy was considered difficult if the view on laryngoscopy was Cormack and Lehane grade III or IV. The results were evaluated on the basis of sensitivity, specificity, positive and negative predictive value and accuracy of these tests.

RESULT- Group A (ULBT+MMPC) identified 65% of the patients with difficult intubation (sensitivity of 92.86 % & specificity of 33.3 %), whereas Group B (ULBT+NC) identified 75% of the patients with difficult airway (sensitivity 93.75% & specificity of 25%). Pearson Correlation analysis was applied to know the correlation between the various tests and the Cormack Lehane Classification, both the groups had p value of 0.001 , which was highly significant.

CONCLUSION-When multiple predictors are taken into consideration there was a considerable reduction in false negatives with significant improvement in accuracy of test and hence prediction of difficult laryngoscopy was made easy. Application of multiple predictors in combination can reduce the frequency of unanticipated difficulty and unnecessary interventions related to over prediction of airway difficulty.

KEYWORDS :

INTRODUCTION

Intubation difficulties are determined by several variables, such as the differences in physical characteristics among patients (oral opening, thyroid to chin length, mobility of the neck and Mallampati score), as well as the operating physician's experience and the instrument used for the procedure.

Reduced neck mobility and oral opening are often the cause of most difficulties faced when intubating these patients. Other factors are neck circumference greater than 40 cm, short neck, and alterations or pathologies such as sleep apnea, hypercapnia, alveolar hypoventilation syndrome, snoring and diabetes mellitus. This study was designed to compare and evaluate various airway assessment tests in combination to predict difficult intubation in obese patients posted for laparoscopic bariatric surgery.

Cormack and Lehane in 1984 described a classification of the laryngeal view to denote the degree of difficulty with intubation. They graded laryngeal view into 4 grades depending on the exposure of larynx at laryngoscopy.

Grade I: Whole of the vocal cords visible. Grade II: Only posterior commissure visible. Grade III: Only epiglottis visible.
Grade IV: None of the above visible.

MATERIALS AND METHOD

Study design : A prospective observational study Study Setting: OT Complex, SAIMS

Duration of Study: 1 year (October 2015- March 2016)
Study Population: 200 Patients undergoing elective bariatric surgeries at OT complex, SAIMS

Inclusion Criteria:
Age 16-60 years
Both males and females
In patients with mouth opening > 3 fingers ASA grade I/II/III
BMI more than 40 kg/m2

Scheduled for elective morbid obesity surgery under general anaesthesia Exclusion criteria:Undergoing emergency surgeries With gross anatomical abnormality in head and neck. Unable to sit.

Unable to open mouth.
Radiation induced scarring or post burn contracture of peri-oral region or neck. Physiological impediment (example oedema of head and neck region) Laryngeal mass.

Limitation of the movement at the cervical spine. Edentulous patients.

OBSERVATIONS AND RESULT

Results were expressed as mean and standard deviation (SD). Analysis of data between the groups were performed using student 't' test for difference of two sample means. p values < 0.05 were considered to indicate statistical significance. Pearson Correlation analysis was applied to know the correlation between the various tests and the Cormack Lehane Classification in obese patients.

Table No 1: Group Distribution

	Group A	Group B
Case Number	ULBT+MMPC	ULBT+NC
	100	100

Table No. 2: Demographic Profile

	Group A	Group B	*p* value
Age (year) Height (cm) Weight (kg) BMI (kg/m2) ULBT	42.30±16.51	46.01±33.05	0.317
	161.82±9.14	162.64±9.52	0.536
	113.94±25.88	130.20±28.57	0.000
	47.31±4.93	47.40±5.69	0.905
	2.44±0.70	2.17±0.69	0.007

Table No. 3: Distribution of Patients According to MMPC

MMPC Grade	Number (%)
1	0
2	20(20%)
3	43(43%)
4	37(37%)
Total	100

Table No. 4: Distribution of Patients According to NC

Neck Circumference (NC)	Number (%)

< 40 cm	60(60%)
> 40 cm	40(40%)
TOTAL	**100**

In the present study, MMPC identified 45% true positive patients. In 10 patients it could not identify difficult intubation (10% false negative). It had a sensitivity of 81.82 %. 30 patients had easy intubation (30% false positive) and hence its positive predictive value was low 60%. In 10 patients actually had easy intubation (10% true negative). It had a specificity of 25 % with negative predictive value of 50%.

NC identified 68% true positive patients. In 5 patients it could not identify difficult intubation (5% false negative). It had a sensitivity of 93.15%. In fact 5 patients had easy Intubation (5% false positive) and hence its positive predictive value was 77.27%. 10 patients actually had easy intubation (20% true negative). It had a specificity of 20 % with negative predictive value of 50%.

ULBT identified 50% true positive patients. In 10 patients it could not identify difficult intubation (10% false negative). It had a sensitivity of 83.33%. In 25 patients had easy Intubation (25% false positive) and hence its positive predictive value was 66.66%. 15 patients actually had easy intubation (15%true negative). It had a specificity of 37.5 % with negative predictive value of 60%.

Table No 5: Various tests for prediction of easy and difficult on CLGrading

	TP	TN	FP	FN	Sens (%)	Spec (%)	PPV (%)	NPV (%)	Accurac y (%)
MMPC	45	10	30	10	81.82	25	60	50	57.89
NC	68	20	5	5	93.15	20	77.27	50	74.0
ULBT	50	15	25	10	83.33	37.5	66.66	60	65.0

In the present study, Group A identified 65% true positive patients. In 5 patients it could not identify difficult intubation (5% false negative). It had a sensitivity of 92.86 %. 20 patients had easy intubation (20% false positive) and hence its positive predictive value was low 76.4%. 10 patients actually had easy intubation (10% true negative). It had a specificity of 33.3 % with negative predictive value of 75%. In multiple regression correlation of ULBT+MMPT the R square was 0.331, F=48.51, P value =0.001, df =1and Partial Correlation was 0.575.

Group B identified 75% true positive patients. In 5 patients it could not identify difficult intubation (5% false negative). It had a sensitivity of 93.75%. In fact 15 patients had easy intubation (15% false positive) and hence its positive predictive value was 83.33%. 10 patientsactually had easy intubation (20% true negative). It had a specificity of 25 % with negative predictive value of 80%. In multiple regression correlation of ULBT+NC the R square was 0.129, F=14.526, P value =0.001, df =1and Partial Correlation was 0.359.

DISCUSSION

This study was conducted in the Department of Anaesthesiology and Critical Care, Sri Aurobindo Medical College and Post Graduate Institute, Indore from October 2015 to June 2017. A total of 200 patients, 100 patients in each group- Group A(ULBT+MMPC) and Group B(ULBT+NC) were included in the study. Sensitivity, specificity, positive predictive value, negative predictive value and accuracy of the tests in combinations were calculated using the standard formulae. The possibility of a correlation between difficult laryngoscopy and an assessed variable in obese patient was explored.

Group A identified 65% of the patients with difficult intubation, with sensitivity of 92.86 % and specificity of 33.3 %, whereas Group B identified 75% of the patients with difficult airway. It had a sensitivity of 93.75 and specificity of 25 %.

P value obtained was 0.001 in both the groups A & B, which is highly significant showing that with increasing ULBT+MMPC value there is significant increase in the difficult laryngoscopy and similarly with the increasing value of ULBT+ NC, so it was concluded that both the combinations provided the best prediction of difficult laryngoscopy with a significant association with CL Grade (P value =0.001).

It is believed that airway access is more difficult in obese than in non-obese patients due to the anatomic changes resulting from excess weight. In obese patients, there is a reversed relationship between weight and pharyngeal area due to fat deposition on cervical structures

Failure in managing the airway is the most significant cause of morbidity and mortality in anaesthetized patients. Preoperative evaluation is important to predict difficult airway for the purpose of which several airway assessment tests have been described. However, which test(s) are the best predictors are still debated.

Thus, we thought it worthwhile to determine the ability to predict difficult laryngoscopy from the following airway assessment tests in combination.

Muscle relaxation was achieved by the use of IV suxamethonium 1mg/kg, (a prior defasciculating dose of atracurium 10 mg IV was also given) following which laryngoscopy was performed after 60 seconds. 'Stacking' was achieved by placing 2 or 3 or 4 sponge pillows under the lower neck & head, depending on the body weight.

In nonobese patients, the "sniffing position" is often achieved with head elevation and neck extension. In these cases, elevating the head, neck, and upper body of morbidly obese patients with sheets or pads to obtain "ear to sternal notch" positioning has been shown to improve laryngoscopic view during intubation.

Laryngoscopy was performed using an appropriate size macintosh blade, by an experienced anaesthesiologist (minimum 1 year experience). Glottic visualization was assessed using Cormack & Lehane Classification, without the use of any external laryngeal manipulation or change of laryngoscope blade, as per the demand of the situation, was permitted. . However,for the purpose of the study, the best CL grade without external laryngeal manipulation was recorded. The maneuvers used to facilitate laryngoscopy were also noted.

Since none of tests in isolation have a high discriminative power for prediction of difficult laryngoscopy, numerous investigators have attempted to formulate various airway assessment test combinations to add some incremental diagnostic value in comparison to the value of each test alone.

In the context of airway management, the consequences of a false negative result, i.e., an unanticipated difficult laryngoscopy may be deleterious and endanger life. Therefore, decreasing false negative prediction takes precedence over decreasing false positive prediction (i.e. a patient is labelled as a likely case of difficult laryngoscopy when infact he is not). Hence, sensitivity is far more important than specificity as regards airway assessment tests.

A limitation of our study is that our sample size is not very large. In addition, we followed a standardized protocol of induction of anaesthesia and laryngoscopy. Although, this methodology is useful for scientific comparision, it does not take into account the heterogeneity of clinical practice. Another drawback was that the operator was aware of the preoperative airway assessment results. Other lacunae may be lack of uniformity in describing or grading laryngeal views.

CONCLUSION

The preoperative airway assessment of morbidly obese patients, planned for laparoscopic bariatric surgery was conducted using multiple screening tests in combination, to evaluate the usefulness in predicting difficulty in laryngoscopy. Among them Modified Mallampati test grade III or IV, Upper lip bite test grade II & III, Neck circumference >40cm were considered as predictors of difficult laryngoscopy. Cormack and Lehane grade III or IV laryngoscopic view confirmed difficult laryngoscopy. The results were evaluated on the basis of sensitivity, specificity, positive or negative predictive value and accuracy of these tests.

Combination of tests increased the accuracy and hence a better prediction of difficult laryngoscopy.

Based on our findings, we suggest that-

Simple and easy airway assessment tests in combination of ULBT along with MMT and NC may prove useful in predicting difficult laryngoscopy in morbidly obese patients undergoing laparoscopic bariatric surgery.

Combination of tests increased the accuracy and hence a better prediction of difficult laryngoscopy In summary, the morbidly obese patient requiring intubation may present challenges.

A comprehensive pre-intubation airway assessment may identify "anatomic predictors" associated with a difficult intubation. Preparation, including having access to alternative airway and rescue devices, proper patient positioning, and optimizing preoxygenation, is necessary to facilitate successful intubation in this group of patients.

REFERENCES

1. Ebert TJ, Shankar H, Haake RM. Perioperative considerations for patients with morbid obesity.AnesthesiolClin. 2001;24:621-36.
2. Practice guidelines for management of the difficult airway. A report by the American Society of Anesthesiologists Task Force on Management of the Difficult Airway.Anesthesiology 1993;78:597-602.
3. WorldHealthOrganizationWebsiteupdatedMarch2011. Available from:http:// www.who.int/ mediacentre /factsheets/fs311/es/ .
4. Gaszynski T. Standard clinical tests for predicting difficult intubation are not useful among morbidly obese patients. AnesthAnalg. 2004;99:956.
5. Williamson JA, Webb RK, Szekely S, Gillies ER, Dreosti AV. The Australian Incident Monitoring Study. Difficult intubation: an analysis of 2,000 incident reports. AnaesthIntens Care. 1993;21:602-7.
6. González H, Minville V, Delanoue K, Mazerolles M, Concina D, Fourcade O. The importance of increased neck circumference to intubation difficulties in obese patients.AnesthAnalg. 2008;106:1132-6.
7. Brodsky JB, Lemmens HJ, Brock-Utne JG, Vierra M, Saidman LJ.Morbid obesity and tracheal intubation.AnesthAnalg. 2002;94:732-6.
8. Ellis H, Feldman S. The respiratory pathway.Anatomy for anesthetists.6thedition. Oxford Blackwell Scientific 1993.
9. Gal JT. Airway management. Miller's Anesthesia.6th edition Elsevier - Churchill Livingstone 2005.
10. Patil VU. Fundamentals of Airway Management Techniques.ISBN 2003.
11. Bannister HL. Respiratory system.Gray's anatomy.38th edition. ELBS - Churchill Livingstone 1995.
12. El Ganzouri Abdel R , McCarthy Robert J , Tuman Kenneth J , Tanck Erik N, Ivancovich Anthony D. Preoperative Airway Assessment :Predictive Value of Multivariate Risk Index. AnesthAnalg. 1996; 82: 1197-204.
13. Van der Linde JC, Roelofse SA, Steenkamp EC.Anatomical factors relating to difficult intubation.S Afr Med J 1983; 63: 976-7.