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Importance of Neck Circumference to Thyromental Distance Ratio: A Preoperative Bedscreening Test Characterizing the Complexity of Endotracheal Intubation in Obese Patients.

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Abstract:-
BACKGROUND: This study is performed to assess the ability of an index: the ratio of Neck Circumference/Thyromental Distance (NC/TM), to predict difficult airways in obese patients and to develop a predictor for difficult intubation that is simple and easy to perform with high specificity and sensitivity compared with established indices.

METHODS: After receiving ethical approval hospital based observational study was conducted on 50 obese patients aged 18 to 60 years of either sex belonging to ASA grades I and II scheduled under general anaesthesia requiring endotracheal intubation in various operation theatres of Assam Medical College Dibrugarh, preoperatively with the help of performa within time frame of June 2021 to May 2022. Difficult intubation was determined using the Intubation Difficulty Scale (IDS≥5). The NC/TM ratio was calculated and its ability to predict difficult intubation in obese patients was compared with that of established predictors including high BMI, the Mallampati score, the Wilson score, NC, Sternomental Distance(SM), TM, NC/SM and a previous history of difficult intubation.

RESULTS:There was positive co-relation (r = 0.282) between NC/TM and IDS Score (p<0.05).It was found that NC/TM test had higher sensitivity 75%, higher positive predictive value 42.85% and moderative to fair specificity 91.30% and negative predictive value 97.67% compared with other established indices.Binary multivariate logistic regression(Forward-Wald) analysis in each patient to determine the independent risk factors for difficult intubation in each group, where we found NC/TM(p=0.002, odds ratio=26.77) to be more statistically significant as an independent risk factor than others.

CONCLUSION: There was positive correlation (r = 0.282) between NC/TM and IDS Score (p < 0.05).A NC/TM≥5.0 yielded a moderate-to-fair sensitivity, specificity, and a negative predictive value. Thus we can consider a preoperative value of NC/TM≥5.0 to be a good predictor of difficult intubation in obese patient.

Keywords:- *Obesity, Difficultintubation, Neck Circumference to Thyromental Distance ratio.*

I. INTRODUCTION

Difficult intubation poses a great concern for Anaesthesiologists and contributes to perioperative morbidity and mortality leading to anaesthestic complications due to inability of early recognition of an anticipated difficult airway. Prior assessment of airway as a mean to decrease complication in anaesthesia has become important since last century.[1]

Obesity is due to abnormal growth of the adipose tissue due to enlargement of fat cell size (hypertrophic obesity) or an increase in fat cell number(hyperplastic obesity) or a combination of both.[2] WHO categorized Body Mass Index (BMI) > 30 kg per square meter of body surface as Obese.

To aid the anaesthesiologists, several methods have been introduced to predict difficult airways[3,4,5]of which require some particular circumstances, and some require special equipment. Some of the risk factors associated with difficult airway in Obesity are an increased neck circumference, short neck, increased age, high Mallampati's grade, a diagnosis of an Obstructive Sleep Apnoea (OSA), Thyromental distance(also known as PATIL'S Test)[6] and the Wilson score. There are a few clinical predictors to detect the risk of a difficult airway in the patients with obesity.

Preoperative assessment is the clinical groundwork and fundamentals for guiding perioperative patient management which provides the anaesthesiologists for difficult airway management with time for necessary preparation such as selection of proper equipment, technique and recruitment of experienced workforce. Among the various test which are recommended for assessment of difficult airway and difficult laryngoscopy, generating the data will help to plan preoperatively and encourage to be prepared for any anticipated difficult airway and thereby reducing burden of mortality and morbidity caused by difficult laryngoscopy in anaesthesia. Thus, we are conducting this study to assess the Neck

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Circumference/Thyromental distance ratio in predicting the Difficult Intubation in obese patient.

We hypothesize in this study that the ratio of Neck Circumference To Thyromental Distance (NC/TM ratio) of more than or equal to five will predict a difficult laryngoscopy and intubation and will have a better statistical and clinical significance as compared to other standard indices of airway assessment among obese patients

Therefore, the primary aim of this study is to assess the correlation between the ratio of Neck Circumference/Thyromental Distance (NC/TM) and validated Intubation Difficulty Score in obese patient for predicting difficult intubation. And secondary Objective is to develop a predictor for difficult intubation that is simple and easy to perform with high specificity and sensitivity compared with established indices.

II. METHODS

This Hospital Based Observational Study was approved by Ethical Committee of the institution and informed consent taken.Patients who were satisfying clinical criteria for recruitment for the above study BMI≥30, for surgery under general anaesthesia requiring Endotracheal intubation were subjected to detailed preanaesthetic evaluation using the patient proforma which includes the Demographic data, Body mass index (BMI), ratio of NC/TM, Thyromental distance(TM), Sternomental distance (SMD) and Modified Mallampati Test (MMT). In the operating theatre, upon arrival in the operating room, patients were explained about the procedure of anaesthesia. Standard monitoring were connected [pulse oximeter, NIBP, temperature and ECG] and IV lines were secured with 18G cannula and Lactated Ringer's solution were commenced.

The ramped position (back-up position with the tragus of the ear is at the level of the suprasternal notch) for the obese patients was adopted. All patients will receive inj. Ondansetron 0.1mg/kg, inj. pantoprazole 40mg, inj. glycopyrrolate 4mcg/kg as premedication and Fentanyl 1.5mcg/kg IV just before induction. The patient waspreoxygenated for 3-5 minutes using a tight fitting anaesthetic mask with 100% oxygen at 10-12 l/min fresh gas flow via a circle system prefilled with oxygen, and all patients were to breathe normally. Anaesthesia was induced using propofol 2mg/kg body weight. Succinylcholine (1.5mg/kg) was given on the loss of eyelash reflex. The facemask was removed 60 seconds after the administration of a neuromuscular blocking drug and tracheal intubation was performed under direct laryngoscopy with an appropriate size endotracheal tube and cuff was applied. Oxygen saturation was monitored continuously using pulse oximetry. If SpO2 decreased to 90% during the intubation period, the event was recorded as a hypoxic episode.

InjCisatracurium (0.9mg/kg) loading dose was given when the effect of Succinyl Choline wears off. Maintenance of anaesthesia was done with 1:2 oxygen:nitrous oxide and inhalational sevoflurane in titrated dose and injcistracurium (maintenance dose of 0.18 mg/kg). Calculation of IDS score intraoperatively was done by anaesthetist who performed the laryngoscopy.

Division of patients into easy and difficult intubation groups was based on IDS score and comparison with TD, SMD, MMT as reliable tests for the prediction of difficult laryngoscopy with results will be done. At the end of operation, antagonism of neuromuscular blockade was done by using Inj. neostigmine 0.05mg/kg and injglycopyrrolate0.01mg/kg and extubation was carried out following gentle oro-pharyngeal suctioning when the criteria for extubation are fulfilled.

The study records of all the patients who took part in the study were kept in the custody of the principal and investigator. The completed proformas, consent forms and questionnaires were kept in the department. In this study, the patients were divided into an easy (IDS < 5) and a difficult intubation group (IDS ≥ 5)..

III. STATISTICS

The statistical analysis of data was performed using the computer progam, Stastical Package for Social Sciences (SPSS for Windows, version 20.0 Chiacago, SPSS Inc.) and Microsoft Excel 2010.Results on continuous measurements are presented as Mean ± Standard Deviation are compared using student t test.

Discrete data are expressed as number (%) and are analysed using Chi square test and Fischer's exact test. Pearson's correlation coefficient(r) was used to measure the associations among continuous variables.

First step, using a binary univariate logistics regression analysis model, significant risk factors determined. In second step, using binary multivariate logistics regression (forward Wald) model, independent risk factors for difficult intubation determined.

For all analyses, the statistical significance was fixed at 5% level (p value<0.05). The diagnostic performance of the significant risk factors was also assessed using the Receiver-Operating Characteristic (ROC) curves.

The calculations of sensitivity, specificity, positive predictive value and negative predictive value of NC/TM ratio for the prediction of a difficult intubation among these obese patients were done.

IV. RESULTS

These were the cut offs for the independent variables in this study given below: • Neck circumference > 37.5 cm, • Thyromental distance ≤ 6.5 cm • Sternomental distance ≤ 12cm

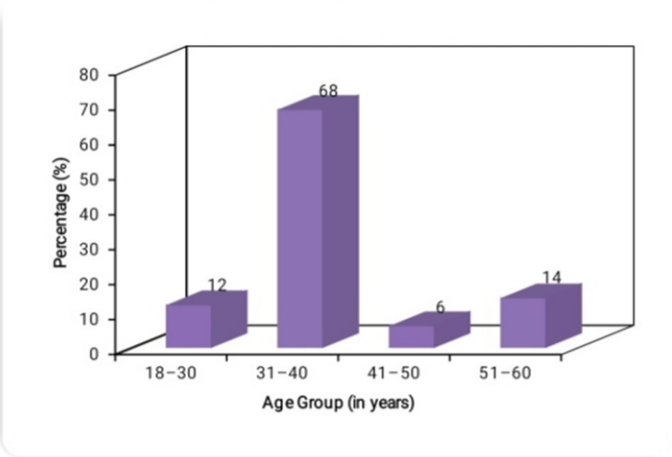

Fig. 1: Showing Age Distribution

DEMOGRAPHIC DATA

BASELINE DATA

Age Group *(in years)*	Number	Percentage
18–30	6	12.00
31–40	34	68.00
41–50	3	6.00
51–60	7	14.00
Total	50	100.00
Mean ± S.D.	*37.94 ± 9.83 years*	

Table 1: Age Distribution

Gender	Number	Percentage
Male	25	50.00
Female	25	50.00
Total	50	100.00

Table 2: Gendar Distribution

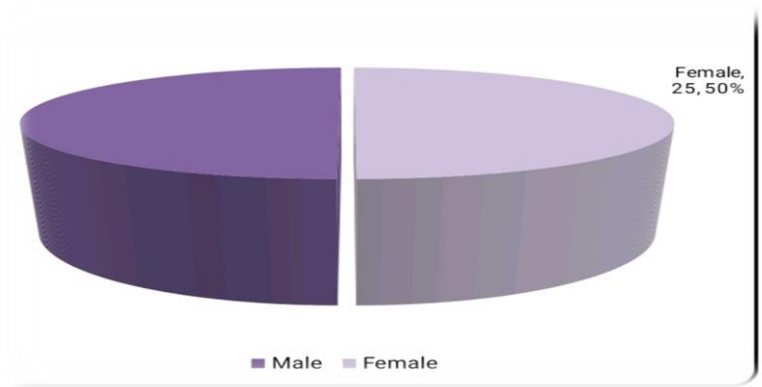

Fig. 2: Showing Gender Distributio

Body Mass Index (Kg/m^2)		Number	Percentage
Obesity Class I	30.00–34.99	43	86.00
Obesity Class II	35.00–39.99	4	8.00
Obesity Class III	≥40.00	3	6.00
Total		50	100.00

Table 3: Body Mass Index (BMI)

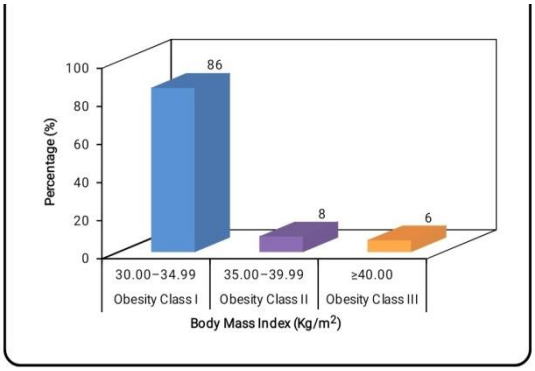

Fig. 3: Showing Body Mass Index

ASA Grade	Number	Percentage
ASA I	24	48.00
ASA II	26	52.00
Total	50	100.00

Table 4: ASA Status

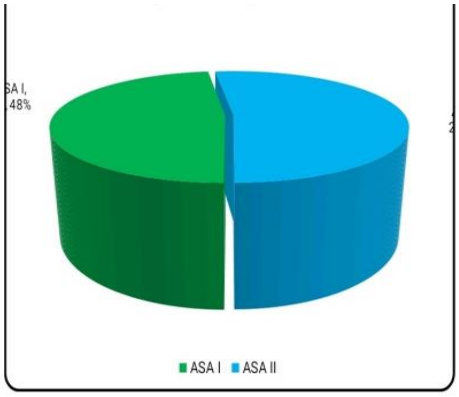

Fig. 4: Showing ASA Status

In the (table and figure) 1-4, the demographic data of the patients enrolled in this study are shown. In this study out of 50 patients, mean age group (in years) was 37+9.83.The Male/Female ratio 25/25 and ASA I/II ratio is 24/26.43 out of 50 patients fall in the BMI range of 30.00-34.99 and others fall above 35.

Variable	Mean	Standard Deviation
Mouth Opening (cm)	4.73	1.03
Neck Circumference (cm)	39.64	4.06
Sternomental Distance (cm)	15.04	2.02
Thyromental Distance (cm)	8.10	1.23

Table 5: Mean Distribution of Mouth Opening, Neck Circumference, Sternomental Distance and Thyromental Distance

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Modified Mallampati Score	Number	Percentage
Soft palate not visible (MP IV)	5	10.00
Soft palate, base of uvula visible (MP III)	7	14.00
Soft palate, fauces, uvula visible (MP II)	29	58.00
Soft palate, tonsils, fauces, uvula visible (MP I)	9	18.00
Tip of epiglottis visible (MP 0)	0	0.00
Total	50	100.00

Table 6: Modified Mallampati Score

Variable	Mean	Standard Deviation
NC/BMI	1.24	0.15
NC/SM	2.71	0.61
NC/TM	5.01	0.92

Table 7: Mean Distribution of NC/BMI, NC/SM AND NC/TM

History of Difficult Intubation	Number	Percentage
Present	7	14.00
Absent	43	86.00
Total	50	100.00

Table 8: History of Difficult Intubation

IDS Score	Number	Percentage
Difficult (≥5)	7	14.00
Easy (<5)	43	86.00
Total	50	100.00

Table 9: IDS Score

From the above tables (Table 5-9), the mean neck circumference (cm) of the patients in the study population was 39.64+4.06, between the ranges of 30 and 46. Thyromental distance (cm) mean of the patients enrolled in the study was 8.10 between the ranges of 5.5 and 9.9. The ratio of Neck circumference to Thyromental distance(NC/TM) had an average mean of 5.01, with ranges between 3.33 and 7.18.Sternomental distance(cm) mean is 15.04+2.02 and Mouth opening(cm) mean is 4.73+1.03.Out of 50, 38 had Mallampati score of 0-II and 12 had III-IV.

From Table 10 and Figure 5, There was positive correlation (r=0.282) between NC/TM and IDS Score (p < 0.05).

	NC/TM ≥ 5	
	*r value**	*p value**
IDS Score ≥5	0.282	<0.05
**Pearson Correlation; The p-value is significant at 5% level of significance.*		

Table 10: Correlation between NC/TM and IDS Score

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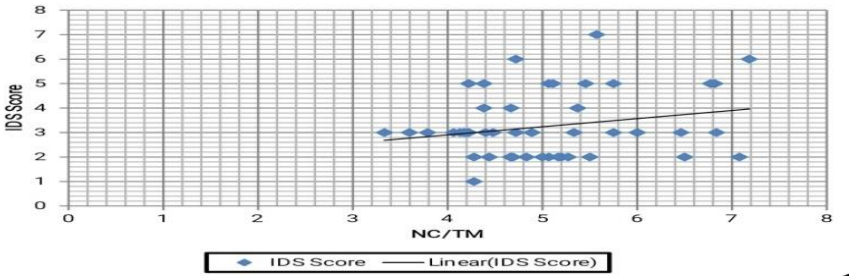

Fig. 5: Correlation between NC/TM and IDS Score

IDS>5 was considered difficult intubation. In this study 43 had easy intubation and 7 had difficult intubation. Binary univariate logistic regression analysis of predictors of difficult intubation revealed NC/TM, Mallampati Score and Wilson Score were associated with difficult intubation (Table 11).This test is used to differentiate between significant variables and non-significant variables affecting outcome. First variable was NC/TM ratio where p=0.006 and odds ratio=31.5.Second variable Mallampati score where p=0.006 and odds ratio=12.41.Third variable was Wilson score where p=0.04 and odds ratio=16.8. For more accurate result, using binary multivariate logistic regression(Forward-Wald) analysis in each patient to determine the independent risk factors for difficult intubation in each group, where NC/TM(p=0.002, odds ratio=26.77)was found to be more statistically significant as an independent risk factor than Other Table.

Variable	IDS<5		IDS≥5		*p value**	Odds Ratio (95% CI)
	n = 43	%	*n = 7*	%		
Age (in years):						
▪ ≤ 40	34	79.06	6	85.71	0.687	0.629 (0.067–5.919)
▪ > 40	9	20.94	1	14.29		
Sex:						
▪ Male	20	46.51	5	71.42	0.235	0.347 (0.060-1.993)
▪ Female	23	53.49	2	28.58		
BMI (Kg/m^2):						
▪ < 35	33	76.74	6	85.71	0.599	0.550 (0.059–5.128)
▪ ≥ 35	10	23.26	1	14.29		
NC/TM:						
▪ <5	42	97.67	4	57.15	0.006*	31.5 (2.62-377.94)
▪ ≥5	1	2.33	3	42.85		
NC/SM:						
▪ ≤2.5	17	39.53	3	42.87	0.867	0.871 (0.173-4.392)
▪ >2.5	26	60.47	4	57.13		
Sternomental Distance (cm):						
▪ ≤15	12	38.70	1	85.71	0.456	2.32 (0.252-21.37)
▪ >15	31	61.30	6	14.29		
Thyromental Distance (cm):						
▪ <8	15	34.88	3	42.86	0.684	0.713 (0.140-3.620)
▪ ≥8	28	65.12	4	57.14		
Mallampati Score:						
▪ 0–II	36	83.72	2	28.58	0.006*	12.41 (2.064-80.056)
▪ III–IV	7	16.28	5	71.42		
H/o Difficult Intubation:						
▪ Absent	37	86.02	6	54.5	0.981	1.027 (0.104-10.109)
▪ Present	6	13.98	1	45.5		
Wilson Score:						
▪ <2	42	97.67	5	71.43	0.04*	16.8 (1.2–220)
▪ ≥2	1	2.33	2	28.57		
**Chisquare/Fisher Exact Test; The p-value is significant at 5% level of significance.*						

Table 11: Binary univariate logistic regression comparing obese patients with an IDS Score≤5 and obese patients with an IDS SCORE ≥5

Variable	p-value	Odds Ratio	95% CI (Lower–Upper)
Wilson Score	0.003*	30.391	(3.577-216.436)
Mallampati Score	0.039*	10.30	(1.02-75.37)
NC/TM	0.002*	26.77	(2.86-210.32)

Table 12: Binary Multivariate Logistic Regression (Forward-Wald) Analysis Performed in Each Patient Group to Determine Independent Risk Factors for Difficult Intubation in Each Population

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Test	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	Diagnostic Accuracy (%)
TM<6.5cm	66.67	88.64	42.44	95.12	86.00
SM <12.5 cm	33.33	79.55	18.18	89.74	74.00
NC/TM ≥5.0 cm	75.00	91.30	42.85	97.67	90.00
NC/SM≥3cm	71.43	69.77	27.78	93.75	70.00
Mallampati Score III or IV	57.14	83.72	36.36	92.31	80.00
History of Difficult Intubation	71.43	72.09	29.41	93.94	72.00
Wilson Score ≥2	66.67	89.36	28.57	97.67	88.00

Table 13: Tests for difficult intubation

In the above mentioned table 13, it seen that NC/TM has more sensitivity compared to Thyromental distance, history of difficult intubation, Mallampati Score III or IV, Sternomental distance, NC/SM and Wilson Score. NC/TM has more specificity, higher PPVand more NPV.

It was found from this analysis that the NC/TM ratio had a higher (0.719) AUC on the ROC curve when compared to the other parameters in comparison for prediction of a difficult intubation.

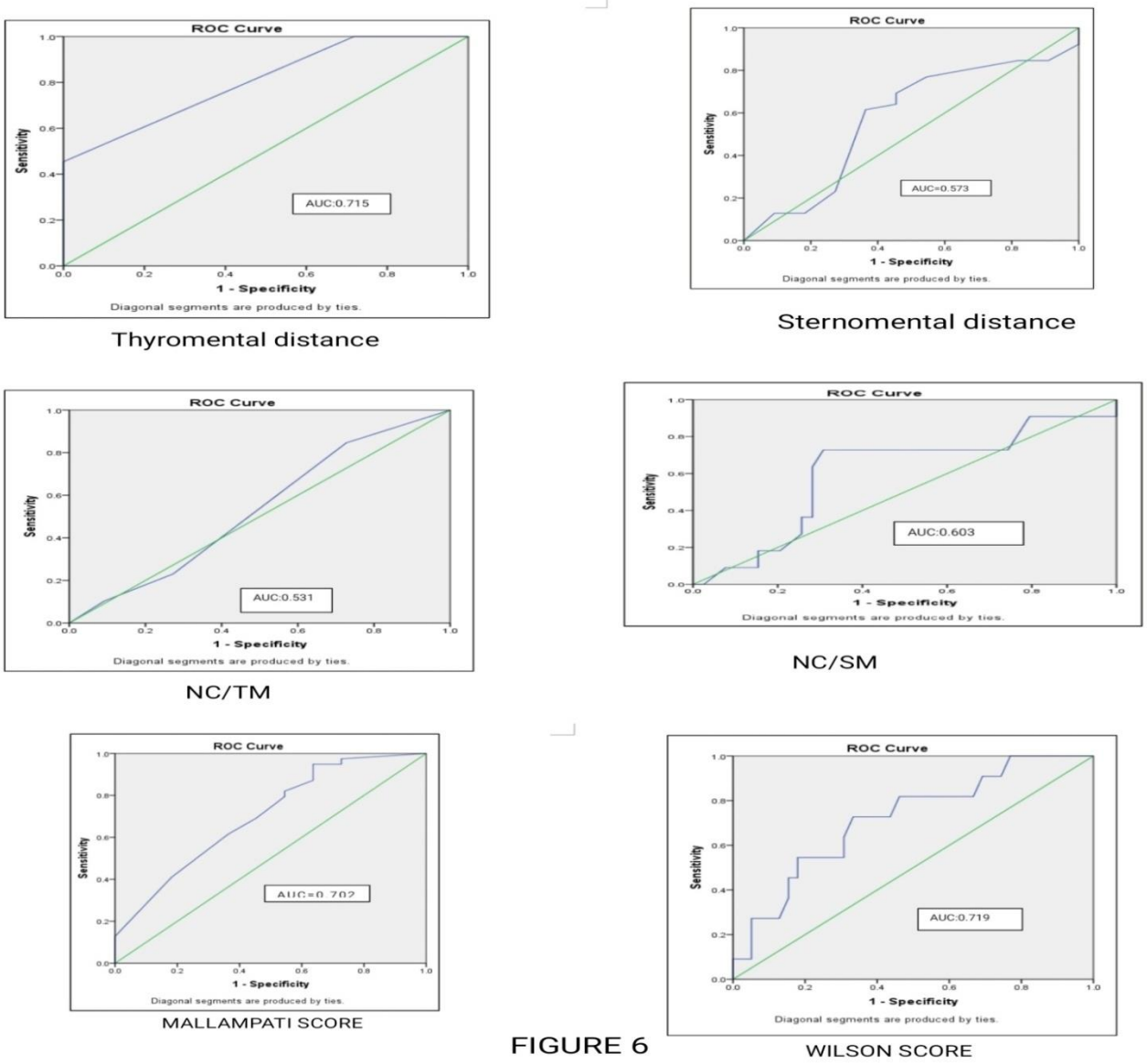

FIGURE 6

Fig. 6: ROC Curve Analysis

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V. DISCUSSION

The aim was to assess the ability of a new index: the ratio of Neck Circumference/Thyromental Distance (NC/TM), to predict difficult intubation in obese patients. To reduce morbidity and mortality, anaesthesiologists and intensivists must identify the likelihood of an unexpectedly difficult intubation.An airway predictor test must provide rapid and reliable test.

Although there are several predictors of difficult intubation and clinical tests like Modified Mallampati test, Thyromental distance, Sternomental distance, Hyomental distance, inter-incisor gap etc, for prediction of difficult intubation. An ideal predictor should have high sensitivity, high specificity and positive predictive value.A high sensitivity is important to predict maximum number of patients with difficult intubation and high specificity is important to predict easy intubation.A low false negative result with high sensitivity is important to reduce the incidence of unexpected difficult intubation.

Difficult airway in the obese population has been attributed to the increased amount of soft tissue in the neck and submandibular space and the presence of a short neck that can be represented by the ratio of NC/TM. Thyromental distance has been described to predict difficult laryngoscopy and it could be a surrogate for anthropometric measures such as the amount of mandibular protrusion, dimensions of submandibular space and anterior position of the larynx. No special equipment was required in this test and it can be performed rapidly. This study was conducted to assess the ability of NC/TM for prediction of difficult intubation.

In this observational study 50 patients of both sexes between 18-60 years of age belonging to ASA I and II grade were included. In this study 7 out of 50 had difficult intubation (14%) when graded according to IDS score. There was no failed intubation in our study. There was positive co-relation (r = 0.282) between NC/TM and IDS Score $p<0.05$ to be a good predictor of difficult intubation in obese patients. This test has higher negative predictive value of more than 90% which means it has better predictors of easy intubation than difficult intubation.

Although difficult intubation have low incidence its prediction is crucial for anaesthesiologists. Even one difficult intubation missed to be predicted as difficult before induction of anaesthesia can prove fatal.A proper mask ventilation comes to the rescue in such scenario. Mask ventilation can also be difficult in some cases. Therefore, a reliable bedside predictor test bears a very important role in preventing a catastrophic event.

W.H Kim[7]did a study on 123 obese patient of BMI>27 and 125 non-obese patients and found incidence of difficult intubation(13.8% vs 4.8%) respectively. Neck Circumference, high BMI, Mallampati score, Wilson score, width of mouth opening, sternomental distance, TM, NC/TM and a previous history of difficult intubation were considered predictors of difficult intubation. Difficult intubation was determined by IDS>5.They found NC/TM>5 yielded a moderate to fair sensitivity, specificity and a negative predictive value. Their sensitivity of NC/TM was 88.2% ,specificity was 83%, the PPV was 45.5 % ,the NPV was 97.8%.

Abdel Naim et al[8] did a study on 50 obese patients of either sex between aged 18-60 years with Obstructive Sleep Apnea and performed a trial to find a suitable bedside examination tool in predicting difficult intubation and used BMI, NC, Mallampati score >3 and TM as predictors.They also measured the correlation between difficult intubation determined using IDS>5 and NC/TM ratio. In their study NC/TM Sensitivity was 100%, Specificity was 82.4%,NPV was 82%. The ROC of NC/TM was 0.95.The NC/TM, p value in their study was 0.004 Odds ratio was 37.5. NC/TM statistically correlated to difficult intubation using IDS>5 which showed a p value 0.01, where n=26, mean + SD was6.45+1.34, p=0.0001 and OR=2.558, AUC=0.710 on the ROC curve and prevalence 13% of difficult intubation .

Mohammad M Hashim[9] did a study to determine the prevalence of difficult intubation in obese patient receiving bariatric surgery and risk factors to identify difficult intubation in 40 males and 61 female patients. They found that NC/TM Sensitivity was 89.1% and p=0.014.

Manayaliul[1] did prospective observational study on 250 obese patients to assess the ability of NC/TM for predicting difficult intubation coming for surgery under general anaesthesia. He found that NC/TM showed significant independence as variable of $p<0.001$ and OR=23.680(10.638-52.713) and had higher specificity 89.4% and PPV 65.6%and larger AUC of 0.850 on an ROC curve compared to neck circumference, thyromental distance, modified Mallampatiscore.They found that 14.5% obese patient experienced difficult intubation and in our case it is 14% which is comparable. In their study, NC/TM sensitivity was 91.7%,specificity was 95.1% ,PPV was 75.9%,NPV was 98.10%.

Razal et al[10] did a cross-sectional study on 250 patients to determine the diagnostic accuracy of ratio of Neck Circumference To Thyromental Distance to predict the difficult intubation in obese patients by using Intubation Difficulty Scale as gold standard. There were 59.2% males and 40.8% females with mean age of patients was 37.13+11.64 years.19.2% patients showed difficult intubation and 80.8% easy In their study, Sensitivity of NC/TM was 89.58% and Specificity 72.77% with positive predictive value of 43.88 %,negative predictive value of 96.71%.

Ankalwaret al[11] did a study on 60 patients to predict difficult intubation in obese patients of either sex and used MMT, NC/TM as parameters. They found that NC/TM has higher sensitivity 92.31%, specificity 31.91%, PPV:27.27%, NPV of 93.75%, OR=1.34 and AUC=0.73 on the ROC curve, p=0.045.

Cassai et al[12] studied on 500 patients >18 years difficult intubation prediction in thyroid surgery and used Mallampati score>3,NC>40cm, NC/TM>5 as predictors. They found NC/TM, AUC=0.103 and p=0.

Yadavet al[13], studied on 121 patients between aged 18 to 72 years who were scheduled for elective surgery under general anaesthesia using IDS>5 difficulty of intubation was predicted. They used weight, BMI, Mouth opening, NC, TM, NC/TM as risk factors for difficult intubation. In their study, NC/TM sensitivity was 85.6% specificity 88.2% , PPV was 97.8% ,NPV was 50.8%

PradeepS et al[14], did a prospective observational research on the assessment of TM, NC, Sternomental distance, NC/TM for identifying problematic airways in 100 obese and non-obese adult patients undergoing elective procedures under General Anaesthesia and orotrachealintubation.IDS>5 was used to measures intubation difficulty. In their study, they found NC/TM Sensitivity to be 94.74%, specificity was 73.73% ,PPV was 81.82% ,NPV was 91.67%, NC/TM, AUC=0.912 and p=0 and This study was done on 50 patients with obesity undergoing elective surgery under general anaesthesia while the other studies were done on more number of patients. This study revealed that the incidence of a difficult intubation was more among the male patients (71.42%). All the studies mentioned above found out that the NC/TM ratio was statistically significant ($p < 0.05$). This study found that there was positive correlation ($r = 0.282$) between NC/TM and IDS Score ($p < 0.05$).NC/TM ratio [(p value = 0.002) and odds ratio 26.77 was an independent risk factor of a difficult intubation which was in correlation with the other studies.

However, this study recorded values of both sensitivity and specificity as compared with the other studies and also had a negative predictive value in comparison with the above. The positive predictive value of our study was comparable to the other studies. The p value was comparable with other studies. This study to develop a predictor for difficult intubation that is simple and easy to perform with high specificity and sensitivity compared with established indices

In pre anaesthesia clinic, the most common and routinely used predictive tests used preoperatively for assessment of difficult intubation are in the order of modified Mallampati test, Thyromental distance and followed neck circumference.

As per literature, as mentioned earlier, none of these above mentioned parameters fulfill and assure all the features of a good screening test namely a high sensitivity, high specificity and a high PPV. In this study, the NC/TM ratio showed a comparable sensitivity and specificity when compared with neck circumference alone but showed a higher positive predictive value. The other parameters analysed in the study such as Wilson score and Mallampati score were also associated with independent risk factors for a difficult intubation but the NC/TM have a better predictive value.

Hence, this study recommends the measurements of NC/TM ratio as a difficult airway predictors since these these parameters can independently predict a difficult intubation in an obese patient. An increase in the NC/TM ratio which corresponds to greater IDS scores is attributed either to the increase in neck circumference or decrease in thyromental distance. In this study it has been noted that the false positives with increased neck circumference might be due to a corresponding increase in thyromental distance and the false positives with decreased thyromental height due to a proportionate decrease in the neck circumference.

VI. LIMITATION

A bedside predictor test can be only be used alone when both sensitivity and specificity of the test is 100%.The NC/TM have low sensitivity in my study. Therefore a difficult intubation may be predicted as easy which can be disastrous. Thus, the test is not 100% reliable. First, it was not blinded completely.If the anaesthetist was aware of the study's purpose, the IDS score could have been deliberately raised.Accordingly, the anaesthetists who perform the intubation were unaware of the purpose of this study to evaluate the ratio of NC/TM. Nevertheless, as the anaesthetist could recognize the patients' characteristics in the operating theatre, it was impossible to maintain complete blindness to this study. Secondly, the patient's initial position may have played a role in the prevalence of difficult intubation. In addition, for the first laryngoscopy a Macintosh No. 3 laryngoscopic blade was used in each case; it may be inappropriate for some patients as a first choice. The size of the blade should have been chosen by the operator case by case.

VII. CONCLUSION

In this study shows that there was positive correlation ($r = 0.282$) between NC/TM and IDS Score ($p < 0.05$). NC/TM performed better than other established indicators in predicting difficult intubation. However, more studies are required to reach at a final conclusion. We can say that it is simple, bedside screening test for difficult intubation. We should not forget that no single test should be used to predict difficult intubation but a number of tests together will more accurately predict difficult intubation. In conclusion, difficult intubations defined by IDS scores in obese patients were independently associated with a Mallampati score of III or IV, Wilson score ≥2, and NC/TM≥5.0. A NC/TM≥5.0 resulted a moderate-to-fair sensitivity, specificity, and a negative predictive value. Thus a preoperative value of NC/TM≥5.0 can be considered to be a good predictor of difficult intubation in obese patients.

REFERENCES

[1.] Manayaliul BP. The Importance of Neck Circumference to Thyromental Distance Ratio (NC/TM Distance Ratio) as a Predictor of Difficult Intubation in Obese Patients Coming for Elective Surgery under General Anaesthesia in a Teritatry Care Hospital - A Prospective Observati. J Anesth Intensive Care Med. 2017;4(1):001–0010.
[2.] Park K. Epidemiology of chronic non-communicable diseases and conditions. In: Park K, editor. Park's Textbook of Preventive and Social Medicine. 25th ed. New Delhi: Bhanot; 2019; 426–9.
[3.] King TA AA. Failed tracheal intubation. Br J Anaesth. 1990;65:400–14.

[4.] Mathea M, Hanna LS AJ. Preoperative indices to anticipate difficult tracheal intubation. AnaesthAnalg. 1989;68:51–7.
[5.] Mc Donald JS, Copta B CR. Proposed methods for predicting difficult intubation:Prospective evaluation of 1501 patients. Anaesthesiology. 1992;77:A1125.
[6.] Ilper H, Grossbach A, Franz-Jager C, Byhahn C, Klages M, Ackermann HH, Zacharowski K, Kunz T.Thyromental distance("Patil") revosted:Knowledge and performance of a basic airway screening tool among European Anaesthesists.Der Anaesthesists.2018 Feb 01;67(3):198- 203
[7.] Kim WH, Ahn HJ, Lee CJ, Shin BS, Ko JS, Choi SJ. Neck circumference to thyromental distance ratio: A new predictor of difficult intubation in obese patients. Br J Anaesth. 2011;106(5):743–8.
[8.] Naim HEA, Mohamed SAR, Mohamed SAR, This person is not on ResearchGate or hasn't claimed this research yet.,Soaida SM, University C. The importance of neck circumference to thyromental distance ratio (NC/TM) as a predictor of difficult intubation in obstructive sleep apnea (OSA) patients. Egypt J Anaesth.2014; 30(3):219–25.
[9.] Mohamed M Hashim. Difficult tracheal intubation in bariatric surgery patients, a myth or reality?2016; BJA Br J Anaesth. 115.
[10.] Raza1 S, Ali L, AsifNadeem. Intubation in Obese patients;Diagnostic accuracy of neck circumference to thyromental distance ratio for difficult intubation in obese patients. Prof Med J. 2018;25(7):1108–11.
[11.] Vrishali R. Ankalwar, Manish Patel NGT. Neck circumference to thyromental distance ratio: Is a reliable predictor of difficult intubation in obese patients? Indian J ClinAnaesth. 2019;6(1):152–6.
[12.] Cassai DA, Papaccio F, Betteto G, Schiavolin C, Iacobone M CM. Prediction of difficult tracheal intubations in surgery.Predictivevalue of neck circumference to thyromenal distance ratio. Minerva Anestesiol. 2019;14(2).
[13.] Bharat BhushanYadav, Vinayak Mishra, JaishriBogra, ArchanaAgarwal SR, Prakash A. Evaluation of Modified Mallampati Score with Neck Circumference and Thyromental Distance to Predict Difficult Intubation in Nonobese Patients. Int J Contemp Med Res.2019; 6(3):C16-20.
[14.] Pradeep S S. Evaluation of the neck circumference to thyromental distance ratio as a predictor of difficulty intubation-A prospective observational study. Indian J Anaesth.2022; 66(1):79–80.