

CAN INTER INCISOR DISTANCE, STERNOMENTAL DISTANCES PREDICT THE POSSIBILITY OF DIFFICULT INTUBATION IN PATIENTS POSTED FOR HEAD AND NECK ONCOSURGERIES: A PROSPECTIVE OBSERVATIONAL STUDY

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Abstract

Background and Aims: Difficult endotracheal intubation is a major challenge for the anesthesiologists. Many parameters assist to predict difficult intubation, hence inter incisor distance (IID), Sternomental distance (SMD) were used to predict the possibility of difficult intubation in patients posted for Head and Neck Oncosurgeries perioperative.

Methods:106 patients, airway was assessed who were posted for head and neck oncosurgeries especially the oral cancer patients. Using Cormack and Lehane laryngoscopic grading was assessed following laryngoscopy and graded difficult intubation as grade 3 and 4.

Results: Difficult endotracheal intubation was found in 20.75% of the said population, which was much higher than general population. Inter incisor distance less than 3 cm, Sternomental distance less than 12.5 cm were the cut off points for difficult intubation. The predicting difficult intubation by inter incisor distance was about 59% sensitivity and 77% specificity with a positive predictive value of 38% and with higher negative predictive value of 88%. The predicting difficult intubation by sternomental distance was about 24% sensitivity and 51% specificity with a positive predictive value of 10 % and with higher negative predictive value of 74% odds ratio of 5.22.

Conclusions: Inter incisor distance had high specificity with significant P value 0.007, hence was a better predictor compared to Sternomental distance in assessing airway in patients posted for head and neck oncosurgeries.

Keywords:Head and neck oncosurgeries, oral cancer surgery, difficult endotracheal intubation, anaesthesia, inter incisor distance, sternomental distance

Introduction

Head and neck cancers, especially the oral cancers are the third leading cause of cancer ^[1] after lung, cervical (females) cancers in India, which accounts for about 30% of all types of cancer ^[2] with male: female ratio of 2:1. The risk of developing oral cancer increases with age and is greatest after 45 years of age. Tobacco consumption has been the predominant factor causing oral cancer. Overall 60% to 80% of patients present with advanced disease as compared to 40% in developed countries. The incidence of difficult airway and endotracheal intubation in head and neck cancer is higher than in the general population when posted for surgery. The incidence of difficult endotracheal intubation is 3.2%^[3]. Multiple parameters/tests have been used to predict difficult intubation for patients posted for various head and neck surgeries, if assessed properly, perioperative management will reduce the morbidity and mortality risk. Even though radiological imaging with computed tomography or magnetic resonance imaging may help in determine the extent of the cancer, simple bedside parameters to assess airway will help in identifying difficult bag mask ventilation or endotracheal intubation. However there is limited information about comparing different parameters.

The main objective of the study was to compare between inter incisor distance (IID) and sternomental distance (SMD), which can predict the possibility of difficult intubation in patients posted for head and neck oncosurgeries especially oral cancer.

Methods

A prospective perioperative airway assessment of 106 patients who were posted for elective head and neck oncosurgeries mainly oral oncosurgeries was done at our institution, after clearance for the institutional ethical committee. The study was conducted for a period of 2 months (December 2018-January 2019). Informed written consent was obtained from all the patients before the surgery. Inclusion criteria: all patients with an age between

18 to 70yrs (male and female) and a weight of 45 to 60 kilograms. Exclusion criteria: age less than 18 and more than 70 years and weight less than 45kgs more than 60kgs, patient refusal. The senior anesthesiologist with minimum of three years' experience did assessment of airway.

Data was collected after the patients were shifted to Operation Theater. The possible predictive parameters like inter incisor distance and sternomental distances were noted along with other airway assessment tests. Inter incisor distance (IID) was measured with mouth fully opened without use of any accessory muscles. In edentulous patients, inter gingival distance was used as inter incisor distance. Sternomental distance (SMD) was measured along a straight line from the upper border of the manubrium to the tip of mentum, neck fully extended, mouth closed and without using accessory muscle. Minimal acceptable value- 12.5cm^[3]. Patients were advised nil per oral for 8 hours and confirmed the same, after securing intravenous cannula and attaching ASA standard monitors to the patients. Patients were pre oxygenated with 10 liters of 100% oxygen for 3 minutes, they were premedicated with injection glycopyrrolate 0.2mg and injection midazolam 1mg, injection fentanyl (1 mcg/kg) and induced with injection propofol (2 mg/kg) and after check ventilation, injection succinylcholine (2 mg/kg) was given. Laryngoscopic view was graded according to Cormack Lahene^[5] laryngoscope grading. Mallampati grades were classified as lower grade (Grade 1 & 2) and higher grade (Grade 3, 4). Cormack Lahene grading were also classified as Lower grade (Grade 1, 2) and Higher grade (grade 3, 4) respectively.

Statistical analysis:SPSS software

Results

In this study, a data from 106 patients scheduled for head and neck oncosurgeries mainly oral cancer surgeries were analyzed. Demographic profile and airway characteristics of the study population are presented in table1 and table 2.

Table 1: Qualitative Variables

Variables	Levels	Frequency	Percentage
Sex	Female	57	53.5
	Male	59	54.05
Mallampati Score	1	3	2.83
	2	47	44.34
	3	38	35.84
	4	18	16.98
Cormack Lahene Grade	1	19	17.92
	2	32	30.18
	3	46	43.39
	4	9	8.49
Mallampati Grade	Higher	52	49.06
	Lower	54	50.94
C-L Grade	Higher	51	48.11
	Lower	55	51.88

Male: female ratio was almost equal. About 38 patients (35.84%) and 18 patients (16.98%) had Mallampati grade 3 & 4 respectively.

Table 2: Quantitative variables

	Number	Mean	SD
Age	106	53.5	12.75
Weight	106	54.05	11.25
Inter incisor distance in cm	106	3.12	1.62
Sternomental distance in cm	106	14.6	2.4

The mean age and weight of the patients were 53.5+/-12.75, 54.05 +/- 11.25 respectively. Mean inter incisor distance was 3.12 +/-1.62 cm. Mean Sternomental distance was 14.6+/-2.4 cm.

Table 3: CL grade vs other predictors

CL grade vs other predictors	Group	Mean	SD	P value
Inter incisor distance in cm	High grade	2.6	0.91	0.008
Inter incisor distance in cm	Lower grade	3.3	1.73	
Sternomental distance in cm	High grade	14.6	2.4	0.254
Sternomental distance in cm	Lower grade	15.8	2.34	

Quantitative analysis in this table shows inter incisor distance of 2.60 +/-0.91 had higher grades of Cormack and

Lahene grading under direct laryngoscopy and 3.3 +/-1.73 had lower Grades of laryngoscopic findings which was found to be significant (P less than 0.008) as compared to sternomental distance.

Table 4: Epl test: CL grading vs inter incisor distance

Epl test: CL grading vs inter incisor distance	
Point estimates and 95% cls:	
Apparent prevalence	0.28 (0.20, 0.38)
True prevalence	0.18 (0.11,0.27)
Sensitivity	0.59 (0.35, 0.80)
Specificity	0.77(0.68, 0.86)
Positive predictive value	0.38(0.21,0.57)
Negative predictive value	0.88 (0.79, 0.94)

The predicting difficult intubation by inter incisor distance was about 59% sensitivity and 77% specificity with a positive predictive value of 38% and with higher negative predictive value of 88%.

Table 5: Epl test: CL grading vs Sternomental distance

Epl test: CL grading vs Sternomental distance	
Point estimates and 95% cls:	
Apparent prevalence	0.42(0.34, 0.52)
True prevalence	0.18(0.11, 0.27)
Sensitivity	0.24 (0.08, 0.48)
Specificity	0.51 (0.40, 0.62)
Positive predictive value	0.10 (0.04, 0.24)
Negative predictive value	0.74 (0.23, 1.15)

The predicting difficult intubation by sternomental distance was about 24% sensitivity and 51% specificity with a positive predictive value of 10% and with higher negative predictive value of 74%.

Discussion

Cannot intubate, cannot ventilate scenario is dreadful. Proper airway assessment of cases posted for head and neck oncosurgeries especially oral cancer surgeries will help in better management of the patients' perioperative. Based on the clinical airway assessment decisions can be made, whether awake fibro optic bronchoscopy, videolaryngoscopy or direct visualization using laryngoscope is required. Not many articles regarding airway assessment comparison have been published in recent past especially clinically assessed, definitely this will be useful for predicting difficult endotracheal intubation [3]. India has world's highest number (nearly 30%) of head and neck cancers especially in which majority are oral cases. Approximately 95% of oral cancers occur in people older than 40 years, with an average age at diagnosis of approximately 60 years [7]. The main aim of conducting these tests were to know which parameter has better sensitivity and specificity and the possibility of their usefulness as clinical bedside predictor test in patients undergoing head and neck oncosurgeries which will be beneficial for anesthesiologist to avoid the mishap perioperative. Very high sensitivity with minimal false negative is an add point.

Outcome of our study showed 20.75% (22/106) which was higher compared to studies done on general population [8,9]. This increase in percentage of difficult intubation could be due to distortion of airway either due to tumor, history of pervious surgery, radiation or due to oral sub mucosal fibrosis etc. As the Mallampati and Cormack Lahene grade increased, higher chances of difficult intubation was seen with significant p value < 0.05 and Odds ratio of 5.32 (CI of 1.765-16.049) which was significant compared to retrospective study done by Healy et [10] where the odds ratio was found to be 5.62.

The inter incisor distance < 3cm, sternomental distance < 12.5 cm were the cut off points of difficult intubation by using receiver operating characteristic analysis. Inter incisor distance < 4 cm is associated with difficult intubation [11]. The mean inter incisor distance in our study was 3.12 +/- 1.62 cm which was less compared to study done by Wilson *et al.*, [12] in who's study the mean was 3.8 +/-0.7 cm in difficult intubation cases. The sensitivity and specificity of predicting difficult intubation was 61% and & 77% with positive predictive value of 38% and negative predictive value of 90% with odds ratio of 5.22. Sensitivity to predict difficult intubation by IID was better in comparison to study done by Cattano *et al.*[13]. It was found that sensitivity, specificity and negative predictive value was similar to study done by Khan *et al.*[8]with lesser positive predictive value.Sensitivity of predicting difficult intubation by sternomental distance was 24% and specificity of 51% that was less compared to inter incisodistance. The positive predictive value was found to be only 10% and the negative predictive value was 74%. Sensitivity and specificity was less compared to other studies [3,8,14, 15].

Limitation

Other bedside parameters were not included.

Conclusion

Inter incisor distance had high specificity with significant P value 0.007, hence was a better predictor compared to sternomental distance in assessing airway in patients posted for head and neck oncosurgeries.

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