Preoperative Predictors of Difficult Intubation

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ABSTRACT:

BACKGROUND:

Because a difficult intubation may occur unexpectedly, airway examination is the most critical component of anesthetic practice. Prior to surgery, all of the patients' airway parameters were examined. Parameters included age, body mass index, neck circumference, head movement, mouth opening space, mandibular length, sternomental and thyromental distance, dental deformities, as well as a history of medical, surgical, and difficult intubation were all taken into consideration with thyroid related factors (tracheal deviation and retrosternal goiter).In respect to the preoperative parameters, all patients were categorized intraoperative, using the Cormack and Lehane laryngoscopic View. Clinical data from each test was collected, and analyzed to establish its relevance, positive predictive value, and negative predictive value.

AIM OF THIS STUDY:

The effectiveness of airway characteristics in predicting difficult intubation was compared in a prospective research to enhance airway management especially in those with difficult intubation to prevent post operative morbidity and mortality airways complication.

METHODS:

From January 1 to June 30, 2021, a cross-sectional study was conducted on 72 patients their age range between 25-70 years old both genders .They were admitted to the Baghdad Medical City Teaching Hospital for a variety of elective procedures. The patients were collected and examined preoperatively involving the age, gender, weight and length with special evaluation of upper airway assessment including neck movement is assessed by extending the head at the atlanto-occipital joint and performing the cervical flexion-rotation test manually.

RESULT:

The findings revealed a 13.9 percent incidence of problematic intubation among the 72 patients studied. Higher prevalence of difficult intubation noticed significantly among patients with past medical history (44.4%) , patients with abnormal dentation (36.4%) also Prevalence of difficult intubation was increasing with aging to reach (30%)in patients aged ≥ 50 years. Difficult neck movement before surgery was significantly associated with difficult intubation (P= 0.001). In this study, means of mouth opening and sternomental distance were significantly ($P < 0.05$) lower in patients with difficult intubation than those with easy intubation. No statistically significant correlation ($P \geq 0.05$) % between Cormack-Lehane grading system and any of the other characteristic.

CONCLUSION:

In this study we discovered that patients with a positive past medical history like history of diabetes mellitus and those with abnormal dentation are highly significant preoperative Intubation difficulty predictors. The risk of difficult intubation also increases in patients over the age of 50, difficult neck movement, and in patients with limited mouth opening, as well as short sternomental distance.

KEY WORDS: difficult intubation, difficult laryngoscopy, patent airway, airway management

INTRODUCTION:

The predictive efficacy of preoperative testing in detecting difficult intubations has been investigated in numerous studies and meta-analyses [(1)].

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Maintaining proper gas exchange through a patent airway is an anesthesiologist's primary job. Failure to keep a patent airway open for more than a few minutes causes brain damage or death. In a patient with a difficult airway, anesthesia can cause direct airway injuries as well as morbidity from hypoxia and hypercarbia[(2)].

Anesthesiologists are concerned about unexpected difficult intubations because of the potentially fatal sequelae of unsuccessful endotracheal intubations [3]. One of the most typical obstacles that an experienced anesthesiologist faces is difficult airway intubation, which can take two to three trials or more than 10 minutes to complete, that cause delay in lung ventilation and oxygenation for several minutes, culminating in life threatening condition and even death[4].

Direct laryngoscopy (DL) is a procedure that uses direct inspection to assess laryngeal structures such as the glottis and voice cords [5].Difficult laryngoscopy is described as the inability to visualize the glottis opening with a traditional curve blade laryngoscope, corresponding to a Cormack and Lehane III or IV grade view, in which only the epiglottis or only the pharynx and tongue can be seen respectively [6].

The anesthetist's primary responsibility throughout this procedure is to ensure proper ventilation. A safe and patent airway is a prerequisite for adequate ventilation[7]. Before the surgery, a range of tests are conducted to assess for a potentially difficult intubation [8].

PATIENTS AND METHOD:

From January 1 to June 30, 2021, a cross-sectional study was conducted on 72 patients their age range between 25-70 years old both genders, they were admitted to the Baghdad Medical City Teaching Hospital for a variety of elective procedures. The patients were collected and examined preoperatively involving the age, gender, weight and length with special evaluation of upper airway assessment including neck movement is assessed by extending the head at the atlanto-occipital joint and performing the cervical flexion-rotation test manually.

By using measuring tape for the neck circumference, mandibular length, sternomental and thyromental distance. When the mouth is fully open, the distance between the upper and lower incisors is also measured. Dental anomalies, the presence or absence of a long beard or mustache, past medical history including hypertension and diabetes, past surgical history related to neck surgery or abnormality all these were considered in this study.The patients were classified according to the cormack and lehane laryngoscopic view under full set of monitoring and all instruments for difficult intubation were prepared including laryngoscope, C-mack video laryngoscope, fibro optic laryngoscope, gum elastic buogi, stellate, various sizes of endotracheal tubes, suction catheter, ambubag,i-gel (4,5) and emergency medications. All procedures done under general anesthesia including ketamine, propofol , esmerone muscle relaxant and inhaled anesthetic (sevofluran,isoflurain) with variable doses according to the patients weight and duration of operation. All patients recovered well and discharged to the recovery unit.

RESULT:

In this study, mean age of study patients was 40.7 ± 13.9 years. The highest proportion of study patients was graded 1 by Cormack-Lehane grading scale (69.4%) as shown in table (1).

Table 1: Distribution of study patients by Cormack-Lehane grading scale.

Cormack-Lehane grading scale	No. (n= 72)	Percentage (%)
G1	50	69.4
G2	12	16.7
G3	7	9.7
G4	3	4.2

Concerning patients underwent thyroid surgeries, we noticed that 61.3% of them complained from thyroid illness for period between 1 – 5 years, 22.6% of them had retrosternal deviation, and 48.4% of them showed tracheal deviation.

Table 2: Distribution of study patients by characteristics of thyroid surgeries.

Characteristics of thyroid surgeries	No. (n= 31)	Percentage (%)
Duration of illness (Year)		
< 1	7	22.6
1 – 5	19	61.3
> 5	5	16.1
Retrosternal extension		
Yes	7	22.6
No	24	77.4
Tracheal deviation		
Yes	15	48.4
No	16	51.6

Prevalence of difficult intubation was increasing with aging to reach 30% in patients aged ≥ 50 years, higher prevalence also noticed significantly among patients with past medical history (44.4%, P= 0.004) and among those with abnormal dentation (36.4%, P= 0.019). No statistical significant association (P ≥ 0.05) between Cormack-Lehane grading scale and all other characteristics as shown in table (3).

Table 3: Association between intubation difficulty and certain characteristics.

Variable	Cormack-Lehane grading scale		Total (%) n= 72	P - value
	G3 and G4 (%) n= 10	G1 and G2 (%) n= 62		
Age (Year)				
< 30	1 (4.2)	23 (95.8)	24 (33.3)	0.039
30 – 49	3 (10.7)	25 (89.3)	28 (38.9)	
≥ 50	6 (30.0)	14 (70.0)	20 (27.8)	
Gender				
Male	2 (15.4)	11 (84.6)	13 (18.1)	0.863
Female	8 (13.6)	51 (86.4)	59 (81.9)	
BMI level				
Normal	2 (12.5)	14 (87.5)	16 (22.2)	0.975
Overweight	2 (13.3)	13 (86.7)	15 (20.8)	
Obese	6 (14.6)	35 (85.4)	41 (56.9)	
Type of surgery				
Thyroid	4 (12.9)	27 (87.1)	31 (43.1)	0.835
Others	6 (14.6)	35 (85.4)	41 (56.9)	
History of difficult intubation				
Yes	1 (16.7)	5 (83.3)	6 (8.3)	0.837
No	9 (13.6)	57 (86.4)	66 (91.7)	
Past Medical history				
Yes	4 (44.4)	5 (55.6)	9 (12.5)	0.004
No	6 (9.5)	57 (90.5)	63 (87.5)	
State of dentation				
Normal	6 (9.8)	55 (90.2)	61 (84.7)	0.019
Abnormal	4 (36.4)	7 (63.6)	11 (15.3)	
Beard and mustache				
Present	1 (14.3)	6 (85.7)	7 (9.7)	0.974
Not present	9 (13.8)	56 (86.2)	65 (90.3)	

In this study, difficult neck movement before surgery was significantly associated with difficult intubation (P= 0.001). Means of mouth opening and sternomental distance were significantly (P < 0.05) lower in patients with difficult intubation than that in those with easy intubation as shown in table (4).

Table 4: Comparison in clinical parameters by Cormack-Lehane grading scale.

Variable	Cormack-Lehane grading scale		P – Value
	G3 and G4 (%) n= 10	G1 and G2 (%) n= 62	
Neck movement before surgery			
Easy	8 (11.4)	62 (88.6)	0.001
Difficult	2 (100.0)	0 (0)	
Mean ± SD	Mean ± SD		
Mouth opening (mm)	48.0 ± 8.2	54.46 ± 8.7	0.04
Mandibular length (mm)	120.0 ± 9.4	125.72 ± 14.7	0.122
Thyromental distance (mm)	77.5 ± 20.2	86.2 ± 20.3	0.229
Sternomental distance (mm)	137.5 ± 24.6	154.91 ± 24.6	0.042

DISCUSSION:

It is critical to forecast a potentially difficult intubation prior to surgery so that necessary preparations may be made and an appropriate intubation technique can be planned [9]. With seemingly normal patients, the ability to recognize patients at risk of difficult intubation is critical due to increased morbidity and mortality. If risk factors are detected during the preoperative appointment, the anesthetist will be alerted and alternative means of airway securing can be performed .

According to the Cormack–lehane grading scale, there was a significant incidence of difficult intubation in this study (13.9 percent). The significant of preoperative predictors of difficult intubation was increased among patients with past medical history (44.4%) regarding hypertension and diabetes .Among those with abnormal dentation are (36.4%) , also predictors of difficult intubation was increasing with aging to reach (30%)in patients aged ≥ 50 years. Difficult neck movement before surgery in this study was significantly associated with difficult intubation (P= 0.001). Means of mouth opening and sternomental distance were significantly (P < 0.05) lower in patients with difficult intubation than that in those with easy intubation. There was no statistically significant correlation (P ≥ 0.05) % between Cormack-Lehane grading scale and all other characteristics like gender, BMI, type of surgery, history of difficult intubation, presence of beard, mandibular length as well as thyromental distance.

In comparison with other studies:

1- "A prospective observational study of predictors of difficult intubation in Indian patients" [10]

The parameters were used in this study are p-value of body weight (0.033), height (0.033), sternocricoid distance (0.020), interincisor gap (0.005) ,neck movement (0.001), while in our study the matching points with this study are p-value of BMI(0.975) , sternomental distance (0.042) , mouth opening (0.04),

neck movement (0.001).we agree with results of this study that showed the most significant with neck movement and other different results may be related to the sample size of study.

2- Another comparison with study "a prediction formula for difficult endotracheal intubation in the emergency department" [11]. In this study the incidence of difficult intubation was (35.5%), p-value of BMI (0.05), while thyromental distance p-value (0.014). in our study the incidence of difficult intubation was (13.9%), BMI p-value (0.975) while thyromental distance (0.229).

The differences between our and this study may be due to large sample size or related to the emergency cases that operated on in this study while in our study is made for well-prepared and elective patients**.** To make suitable preparations and design an acceptable intubation approach, it is necessary to forecast a potentially difficult intubation prior to surgery [(12)]

CONCLUSION:

This prospective study assessed the efficacy of various parameters as preoperative predictors of difficult intubation in relation with direct laryngoscopy which is the good standard for tracheal intubation.

We discovered that patients with a positive past medical history like history of diabetes mellitus and those with abnormal dentation are highly significant preoperative Intubation difficulty predictors. The risk of difficult intubation also increases in patients over the age of 50, difficult neck movement, and in patients with limited mouth opening, as well as short sternomental distance.

Recommendation:

We recommend enrolling a larger number of individuals in order to obtain greater outcomes and we recommend that all instruments of difficult intubation should be present in the theater.

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