The comparision of two different types of laryngoscopes for intubation diffculty in thyroid patients

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Background

The indirect video-laryngoscopes may facilitate intubation in difficult airways than the conventional types. The Truview EVO2 which is an indirect laryngoscope was found to result in a better Cormack-Lehane (CL) score than the Macintosh type due to the indirect view it provides and its angled optical apparatus [5]. The aim of this study was to identify the factors that assess difficult intubation during thyroid surgery, and the Cormack and Lehane (CL) grades of the Truview EVO2 and Macintosh laryngoscopes that facilitate direct and indirect visualization of the glottis in thyroïd patients, was evaluated as a parameter affecting difficult intubation. We also assessed possible risk factors related to difficult intubation in patients undergoing thyroid surgery by using two different types of laryngoscopes and discussed whether conventional Macintosh laryngoscope or an optic laryngoscope Truview facilitated intubation

Methods

We prospectively collected data of 200 patients scheduled for thyroid surgery. Clinical risk factors were defined as: Mallampati score, interincisor gap, thyromental distance, sternomental distance, range of neck motion, body mass index, neck circumference, goiter, presence of radiological findings suggesting compression and thyroid weight. All intubations were performed with either a Macintosh or a Truview EVO2 laryngoscope and assessed for Cormack and Lehane (CL) classification and modified intubation difficulty scale (MIDS).

Results

Two hundred patients (84 male and 116 female) with a mean age of 41.4±13.4 years, who consented to participate in the study were analyzed. Table 2 shows the demographic features and baseline measurements of the patients included in the study. All patients (n=200) were intubated successfully. Overall 186 intubations were successful at the first attempt, 13 at the second attempt and one only at the third attempt.

The median CL score obtained by the Macintosh laryngoscope was significantly higher than that of the Truview EVO2 laryngoscope (2.0 vs. 1.0; p<0.001). The median (25to 75percentile) MIDS score was 3 (2-5; p=0.055) (Table 3) The features of the patients with a MIDS score>5 (difficult intubation) and a MIDS score ≤ 5 are presented in Table 4. It was observed that the proportion of patients with a thyroid weight 40 g, goiter, a Macintosh CL score=3-4 or a Truview CL score= 3-4, and the median Macintosh and Truview CL scores, and the mean neck circumference were significantly higher in the group with a MIDS score>5 (p=0,018, p=0,011, p<0,001, p<0,001, p<0,001, p<0,001, p=0,007, respectively). There was an acceptable degree of consistency between Macintosh and Truview CL scores (Cronbach's Alpha=0,726), and a significant positive relation between MIDS and Macintosh and Truview CL scores.

In order to determine the risk factors affecting difficult intubation, gender, age group, thyromental distance, sternomental distance, interincisor gap, neck circumference, the range of head and neck movement, presence of goiter, malignancy and compression, were entered in the multivariate regression model. As MIDS was determined by the Macintosh laryngoscope in half of the patients, and by the Truview laryngoscope in the other half, the laryngoscope used in determining MIDS was added as a factor in the multiple regression model. Thyromental distance<6.5 cm, presence of goiter and thyroid weight>40 g (measured postoperatively) were found to be the significant risk factors affecting difficult intubation in thyroid patients (p=0,046, p=0,022, p=0,031, respectively) (Table 5).

Tables

Table 1: Modified Intubation Difficulty Scale

Number of attempts: (1=1)
Number of operators: (1=1)
Alternative Techniques:
Not applied: 0
Applied: 1
Cormack and Lehane Grade
(1=0, 2=1, 3=2, 4=3)
Lifting force applied to the laryngoscope
Normal: 0
Increased: 1
External laryngeal pressure
Not applied: 0
Applied: 1
Position of the vocal cords
Abduction: 0
Adduction: 1
Difficulty in passing the endotracheal tube
Easy: 0
Difficult: 1

Table 2. Demographic and baseline characteristics of the patients

	n=200
Gender (n, %)	
Female	116 (58.0)
Male	84 (42.0)
Age (years)	41.4±13.4
BMI (kg/m ²)	26.9±4.7
Presence of malignancy (n, %)	58 (29.0)
Compression symptoms (ndiological) (n, %)	42 (21.0)
Thyromental distance (cm)	7.5±1.8
Sternomental distance (cm)	12.3±3.5
Interincisor gap (cm)	5.0±4.4
Mandibular protrusion (n, %)	15 (7.5)
Range of neck movement (n, %)	
<80	16 (8.0)
80-90	56 (28.0)
>90	128 (64.0)
Goiter (n, %)	111 (55.5)
Neck circumference (cm)	37.7±4.2
Mallampati	1.5±0.6
Duration of operation, (min) mean±SD	54.4±25.5
Thyroid weight, (g) mean±SD	48.6±39.5

Unless otherwise stated, data are expressed as mean±standard deviation

Table 3. MIDS and Cormack and Lehane Scores of Truview and Macintosh

Laryngoscopes		
Laryngoscope used in determining the MIDS score,	n (%)	p
Macintosh	100 (50.0)	
Truview	100 (50.0)	
MIDS score, median (25 th to 75 th percentile)	3 (2-5)	
Macintosh MIDS score, median (25 th to 75 th percentile)	4 (2-5)	
Truview MIDS score, median (25 th to 75 th percentile)	3 (2-5)	0.055
Macintosh CL score, median (25 th to 75 th percentile)	2 (1-3)	
Truview CL score, median (25 th to 75 th percentile)	1 (1-2)	0.001

Table 5. Results of the multivariate regression analysis showing the risk factors of difficult intubation

	p	OR	95% C.I. OR
Thyromental distance, cm (<6.5)	0.046	2.326	1.014-5.338
Goiter	0.022	2.513	1.139-5.542
Thyroid weight, g (>40)	0.031	2.232	1.075-4.636
Laryngoscope used in determining MIDS			
(Macintosh)	0.734	1.148	0.517-2.5

Table 4. The distribution of patient characteristics according to the MIDS score

	MIDS ≤5 (N=159)	MIDS>5 (N=41)	P
Gender (n, %)			
Female	92 (57.9)	24 (58.5)	
Male	67 (42.1)	17 (41.5)	0.938
Age, years	41±13.3	43.2±13.7	0.300
≤50 (n, %)	121 (76.1)	30 (73.2)	
>50 (n, %)	38 (23.9)	11 (26.8)	0.697
BMI (kg m ²)	27.2±4.7	25.7±4.4	0.085
Duration of operation (min)	54.6±23.6	53.6±32.1	0.163
Presence of malignancy (n, %)	48 (30.2)	10 (24.4)	0.466
Compression symptoms (radiological), (n, %)	30 (18.9)	12 (29.3)	0.145
Duration of intubation (sec)	23.9±23.6	28.1±36.7	0.799
Thyromental distance (cm)	7.4±1.8	7.5±1.8	0.719
<6.5 cm (n, %)	29 (18.2)	12 (29.3)	
≥6.5 cm (n, %)	130 (81.8)	29 (70.7)	0.119
Sternomental distance (cm)	12.2±3.7	12.7±2.6	0.682
<12 cm (n, %)	46 (28.9)	12 (29.3)	
≥12 cm (n, %)	113 (71.1)	29 (70.7)	0.966
Thyroid weight (g)	47.9±41.9	51.6±29.2	0.081
<40 (n, %)	91 (57.2)	15 (36.6)	
≥40 (n, %)	68 (42.8)	26 (63.4)	0.018
Interincisor gap, cm	5.1±4.9	4.8±0.8	0.396
<4 (n, %)	19 (11.9)	5 (12.2)	
≥4 (n, %)	140 (88.1)	36 (87.8)	1.000
Mandibular protrusion (n, %)	11 (6.9)	4 (9.8)	0.515
Neck motion range (n, %)			
<80	14 (8.8)	2 (4.9)	
80-90	47 (29.6)	9 (22)	0.372
>90	98 (61.6)	30 (73.2)	
Goiter, (n, %)	81 (50.9)	30 (73.2)	0.011
Neck circumference (cm)	37.3±4	39.3±4.5	0.007
<39.5 (n, %)	110 (69.6)	22 (53.7)	
≥39.5 (n, %)	48 (30.4)	19 (46.3)	0.054
Mallampati (n, %)			
1-2	152 (95.6)	37 (90.2)	
3-4	7 (4.4)	4 (9.8)	0.241
Macintosh CL score	1.9±0.9	2.7±1	<0.001
1-2 (n, %)	122 (76.7)	18 (43.9)	
3-4 (n, %)	37 (23.3)	23 (56.1)	<0.001
Truview CL score	1.3±0.6	2.1±0.9	<0.001
1-2 (n, %)	152 (95.6)	28 (70.0)	
3-4 (n, %)	7 (4.4)	12 (30.0)	<0.001
Laryngoscope used in determining the MIDS score, (n, %)			
Macintosh	77 (48.4)	23 (56.1)	0.381
Truview	82 (51.6)	18 (43.9)	

Unless otherwise stated, data are expressed as mean±standard deviation

Discussion

In our study, thyroid weight was also identified as an important risk factor. we observed a relationship between increasing thyroid weight and higher MIDS scores, which suggests that the changes observed in the airways and the surrounding tissues caused by an enlarged thyroid are proportionate to the thyroid volume and weight. The measurement of thyroid volume during the preoperative period with the use of US may differ depending on the radiologist performing the analysis. As most patients undergo total thyroidectomy, measurement of the weight and size of the thyroid gland post-surgery was thought to provide more objective results. A larger neck circumference at the level of the thyroid cartilage is especially useful for predicting intubation difficulty in obese patients. We observed that thyromental distance <6.5 cm, presence of a palpable goiter and thyroid weight >40g were associated with intubation difficulty, but radiological signs of compression were not associated with intubation difficulty in the multivariate regression model, and although better CL grades were obtained using the Truview EVO2 laryngoscope it was observed that, there was no difference in percentage of Truview and Macintosh laryngoscope usage in patients with a MIDS score>5.