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Predictors of difficult intubation defined by the intubation difficulty scale (IDS): predictive value of 7 airway assessment factors

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Background: The intubation difficulty scale (IDS) has been used as a validated difficulty score to define difficult intubation (DI). The purpose of this study is to identify airway assessment factors and total airway score (TAS) for predicting DI defined by the IDS.

Methods: There were 305 ASA physical status 1−2 patients, aged 19−70 years, who underwent elective surgery with endotracheal intubation. During the pre-anesthetic visit, we evaluated patients by 7 preoperative airway assessment factors, including the following: Mallampati classification, thyromental distance, head & neck movement, body mass index (BMI), buck teeth, inter-incisor gap, and upper lip bite test (ULBT). After endotracheal intubation, patients were divided into 2 groups based on their IDS score estimated with 7 variables: normal (IDS $<$ 5) and DI (IDS ≥ 5) groups. The incidence of TAS ($>$ 6) and high score of each airway assessment factor was compared in two groups: odds ratio, confidence interval (CI) of 95%, with a significant P value ≤ 0.05.

Results: The odds ratio of TAS ($>$ 6), ULBT (class III), head & neck movement ($< 90^o$), inter-incisor gap ($<$ 4 cm), BMI (≥ 25 kg/m^2) and Mallampati classification (≥ class III) were respectively 13.57 (95% CI = 2.99−61.54, P $<$ 0.05), 12.48 (95% CI = 2.50−62.21, P $<$ 0.05), 3.11 (95% CI = 0.87−11.13), 2.32 (95% CI = 0.75−7.19), 2.22 (95% CI = 0.81−6.06), and 1.22 (95% CI = 0.38−3.89).

Conclusions: We suggest that TAS ($>$ 6) and ULBT (class III) are the most useful factors predicting DI. (Korean J Anesthesiol 2012; 63: 491-497)

Key Words: Anesthesia, Evaluation studies, Intubation.

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Introduction

Difficult endotracheal intubation under general anesthesia can cause intubation delay or failure, which can bring on fatal results. Thus, there have been many studies that have reported on various criteria for airway assessment to predict difficult endotracheal intubation before anesthesia [1-9]. There may be various definitions for difficult intubation. Among them, Benumof reported on many cases where difficult endotracheal intubation occurred in 1−4% of cases, and intubation failure occurred 0.05−0.35% of cases [5]. Benumof defined difficult endotracheal intubation as Cormack and Lehan grade III with several attempts made and defined intubation failure as Cormack and Lehan grade III or IV with failure [5]. The American Society of Anesthesiologists (ASA) defines difficult endotracheal intubation as 3 attempts at endotracheal intubation when an average laryngoscope is used or when endotracheal intubation takes 10 min or more [10]. However, with the above criteria, the incidence of difficult endotracheal intubation is low and the sample size is too small to make an experimental group for predicting the difficulty of endotracheal intubation. Also, although ASA's definition of difficult endotracheal intubation can tell whether the intubation is difficult or not, but difficult intubation is very subjective and it is difficult to measure the degree of difficulty. Thus, Adnet et al. created an intubation difficulty scale (IDS) that has objective categories on difficulty of an endotracheal intubation was after it was performed: easy endotracheal intubation, slightly difficult endotracheal intubation, and very difficult endotracheal intubation [11]. There have not yet been any studies in Korea on assessing the difficulty of intubation using IDS, so the authors have used IDS to objectively assess and quantify the difficulty of endotracheal intubation.

Normally to predict difficult endotracheal intubation before anesthesia, the criteria that assess physical characteristics, such as the Wilson score and the LEMON method, have been used to make airway assessments, but depending on the author and research method, the results have been very different [3,6-9]. The authors here have come up with 7 factors for airway evaluation to use for predicting difficult endotracheal intubation; they include some of the Wilson score, body mass index (BMI), and the upper lip bite test (ULBT) [12].

The purpose of the present study was that patients were divided by their IDS score into the difficult intubation (DI) group and the normal (N) group, and the 7 airway assessment factors and their total airway score (TAS), which is the sum of the all the factors, were compared in the 2 groups so that a method that effectively predicts difficult endotracheal intubation could be provided.

Materials and Methods

After passing the Institutional Review Board, the study was performed at the hospital on 305 ASA I and II patients between the ages 19 years and 70 years, who were scheduled for surgery under general anesthesia. Patients were excluded from the study if their teeth were incomplete, if the patient had limited head and neck movement, had impairment of the temporomandibular joint, or had oral or laryngeal tumor. After the purpose of airway assessment was explained to patients, their consent was obtained. Two second-year anesthesiology residents visited the patients before their surgeries to evaluate the airway assessment factors and to record them on a separate piece of paper. The 7 airway assessment factors were the following: Mallampati classification, the thyromental distance, the head & neck movement, BMI, the severity of buck teeth, the inter-incisor gap, and the ULBT. Each factor was given a 0, 1, or 2 points (for BMI, 0 or 1 point), and the total score was tallied and recorded as TAS (Table 1).

The study methodology for the airway assessment factors was as follows: first, the Mallampati classification provided up to class III. Level IV was added from Samsoon and Young's classification (1987) [2]. The patient was put in the sitting position with the head in the neutral position, and the mouth was opened, as widely as possible. The patient stuck his/her tongue out of his/her mouth if possible. The observer used a penlight to observe the pharyngeal structure. After the patient relaxed, observation was made again to decide upon the score [6]. Second, the thyromental distance was measured when the patient extended his neck, the distance from the thyroid notch to the end of the chin was measured using 3 knuckles (approximately 6−6.5 cm). Third, the head and neck movement range was measured by making the patient extend their neck as much as possible. Then, while holding a pen vertically to the patient's forehead, a notepad has held against the side of the patient's face next to the pen. Then, the patient's neck was flexed as much as possible. If the pencil was parallel to the bottom side of the notepad, it was recorded as 90°. If the pencil

Table 1. Rules for Evaluating Airway Score

Airway factors	Score		
	0	1	2
Mallampati classification	Class I	Class II	Class III−IV
Thyromental distance (cm)	> 6.5	6−6.5	< 6
Head & neck movement (°)	> 90	90	< 90
BMI (kg/m^2)	< 25	≥ 25	-
Buck teeth	No	Mild	Severe
Inter-incisor gap (cm)	> 5	4−5	< 4
ULBT	Class I	Class II	Class III

BMI: body mass index, ULBT: upper lip bite test.

was lower than the bottom side of the notepad, it was recorded as more than 90° [6]. Fourth, if BMI was 25 kg/m^2 or more, 1 point was given; if BMI was below 25 kg/m^2, 0 points were given. Fifth, the severity of buck teeth was considered normal if the patient put his teeth together, and the upper teeth closed on the lower teeth without space. If the upper teeth protruded 0−0.5 cm more than the lower teeth, it was considered moderate. If the upper teeth protruded more than 0.5 cm compared to the lower teeth, it was considered severe. Sixth, the inter-incisor gap was measured by taking the distance between the upper and lower teeth when the mouth was opened as widely as possible. Lastly, the ULBT was done in the upright sitting position with the jaw protruded, and the ability of the lower teeth to bite the upper lip was recorded as 3 classes. Class I was when the lower teeth was able to bite the upper vermillion line and completely cover the upper lip membrane. Class II was when the lower teeth bit below the upper vermillion line so that only some of the membrane was covered. Class III was when the lower teeth could not bite the upper lip [13].

In addition to the previous parameters mentioned, the prevalence of hypertension and diabetes was studied to see the effects of chronic diseases on the difficulty of endotracheal intubation.

After arriving at the operating theatre, ASA standard monitoring devices were attached to start monitoring the patient. Before anesthetic induction, for oxygenation 100% oxygen (FiO_2 1.0) was administered and for a minimum 3 min, the patient was made to breathe voluntarily. For premedication, 0.2 mg glycopyrrolate was administered intravenously, for anesthetic induction the patient was administered 0.05 mg/kg midazolam, 1 mg/kg propofol intravenously, and 0.2 ug/kg/min remifentanil by continuous IV. After checking for loss of consciousness, 0.8 mg/kg rocuronium was administered intravenously. After checking full muscle relaxation, the patient was put into the sniffing position, and endotracheal intubation was performed. For laryngoscopy, a Macintosh blade 3−5 was chosen depending on the body frame, and an intubation introducer was used routinely for intubation. Intubation time was the time it took from when the mask was removed and the patient's mouth was opened to when the patient was intubated and the first capnography waveforms appeared. During intubation, the lowest SpO_2 value was measured and recorded. The whole intubation process was scored by using 7 measuring variables of the IDS (Table 2).

Table 2. Rules for Calculating IDS Score

	Calculating method
N_1	Every additional attempt adds 1 point
N_2	Each additional operator adds 1 point
N_3	Each alternative technique adds 1 point: repositioning of the patient, change of materials (blade, ET tube, addition of a stylette), change in approach (nasotracheal/orotracheal) or use of another technique (fibroscopy, intubation through a laryngeal mask)
N_4	Apply Cormack grade for 1st oral attempt. For successful blind intubation: $N_4 = 0$
N_5	Increased lifting force during laryngoscopy adds 1 point. For normal lifting force: $N_5 = 0$
N_6	External laryngeal pressure to improve glottic exposure adds 1 point
N_7	Position of vocal cords during laryngoscopy (abduction: $N_7 =$ 0, adduction: $N_7 = 1$)

ET: endotracheal, IDS: intubation difficulty scale (IDS = 0: easy, 0 < IDS ≤ 5: slight difficulty, IDS > 5: moderate to severe difficulty).

The 7 measuring variables of the IDS (N_1−N_7) consist of the number of intubation attempts, the number of additional procedures, the use of different intubation skills, Cormack and Lehane's classification of laryngeal view, the lifting force when laryngoscopy is used, external laryngeal pressure maneuver, and the location of the vocal cord under laryngoscopic view [11]. The evaluation method for IDS was as follows: for N_1, if intubation was successful on the first time, 0 points were given, and 1 point was added with additional intubation attempts. For N_2, 1 point was added with the increase of the number of doctors for endotracheal intubation. For N_3, 1 point was added with the repositioning of patients or with a change in intubation technique, such as a blade or a tube change. For N_4, grade 1 in Cormack and Lehane's classification on laryngeal view was 0 points, and 1 point was given with the increase in classification grade. For N_5, if the lifting force was normal with the use of laryngoscopy, 0 points were given. If a lot of force was needed, 1 point was added. For N_6, if external laryngeal pressure maneuver was needed to see the glottis better, 1 point was added. For N_7, if the vocal cord under laryngoscopic view was abducted, 0 points were given. If the vocal cord was adducted, 1 point was added. The 3 classifications (Table 2) were as follows: if the IDS sum of the 7 measuring variables was 0 points, then it was considered an easy endotracheal intubation. If the score was 1−5 points, it was a slightly difficult intubation. More than 5 points was considered moderate-to-difficult intubation.

There are 3 groups with IDS. However in the present study, to see the relevance of preoperative airway assessment score, an IDS score of 5 points or more was considered to belong to the difficult endotracheal intubation group. Below 5 points was slightly difficult intubation, and these patients were put into the contrast group. In the airway assessment point system, if TAS was over 6 points, it was considered that difficult endotracheal intubation was predicted. The 7 airway assessment factors (each factor was worth 2 points; BMI was worth 1 point) and TAS more than 6 points of the two groups were compared to find P-value and the odd ratio. The differences in the prevalence of hypertension, diabetes, the intubation time, and the lowest

SpO_2 value during intubation were also studied.

For statistical analysis, SPSS (Version 18.0) was used. The comparison of the TAS and airway assessment factors were done by calculating the P value using the chi-square test. Age, sex, the prevalence of hypertension and diabetes, intubation time, and the lowest SpO_2 value were compared by finding P value using student's t-test or chi-square test. TAS and the airway assessment factors, which showed a significant difference in the chi-square test, were again analyzed to find the odds ratio (OR), 95% confidence interval, and P value by a multivariate logistic regression analysis. A P < 0.05 was considered statistically significant.

Results

Among the total 305 patients, in the difficult intubation (DI) group, which had an IDS > 5, there were 36 patients (11.8%); in the normal (N) group, which had IDS ≤ 5, there were 269 patients (88.2%). There were no failures of intubation. TAS ranged from 1−11 points. The mean TAS was 6.47 ± 1.26 in the DI group, and 2.50 ± 1.89 in the N group. There was a significant difference between the 2 groups (P < 0.001) (Table 3). In the DI group there were 25 patients (69.4%) with TAS over 6 points, and there were 7 patients (2.6%) in the N group. The DI group had a significantly greater number of patients with TAS over 6 points (P < 0.001) (Table 4). The odds ratio of TAS > 6 points compared to TAS ≤ 6 points was 13.57 (95% CI = 2.99−61.54, P < 0.05). The probability of difficult intubation was 13.57 times as great (Table 5).

The authors compared the 2 groups' airway assessment factors, which were each worth 2 points (or 1 point for BMI), and found the following: the Mallampati classification(≥ class III, the N group: 17.5% vs. the DI group: 58.3%) and head and neck movement range (< 90°, the N group: 5.6% vs. the DI group: 25.0%), BMI (≥ 25 kg/m^2, the N group: 34.9% vs. the DI group: 66.7%), the inter-incisor gap (< 4 cm, the N group: 10.4% vs. the DI group: 50.0%), and the ULBT (class III, the N group: 1.5% vs. the DI group: 33.3%). The 5 factors were significantly greater in the DI group (P < 0.05) (Table 4). The 5 airway assessment factors were significantly different, and their odds ratio for ULBT (class III) was 12.48 (95% CI = 2.50−62.21, P < 0.05). For the head and neck movement range (< 90°), inter-incisor gap (< 4 cm), BMI (≥ 25 kg/m^2), and Mallampati classification (≥ class III) were respectively 3.11 (95% CI = 0.87−11.13, P = 0.081), 2.32 (95% CI = 0.75−7.19, P = 0.144), 2.22 (95% CI = 0.81−6.06, P = 0.120), 1.22 (95% CI = 0.38−3.89, P = 737)(Table 5).

The mean age in the DI group was 53, which was significantly greater than the N group's age, which was 47 (P < 0.05). The endotracheal intubation time for the DI group was 72.08 ± 10.03 s, which was longer than the endotracheal intubation time in the N group, which was 40.65 ± 12.20 s. During extubation, the lowest SpO_2 value was 95.17 ± 3.72% in the DI group. The N group showed a statistically significant difference (99.55 ± 1.17%). Sex, the prevalence of hypertension, and diabetes were not statistically significantly different between the 2 groups (Table 3).

Table 3. Characteristics of Patients in the Normal and DI Groups

	N (IDS = 5)	DI (IDS > 5)	P value
Number of patients (%)	269 (88.2)	36 (11.8)	-
Age (yr)	47.1 ± 15.7	53.2 ± 10.6	0.004
Gender (M/F)	126/143	22/14	0.108
Patients of hypertension (%)	60 (22.3)	11 (30.6)	0.271
Patients of diabetes (%)	40 (14.9)	9 (25.0)	0.120
Intubation duration (sec)	40.65 ± 12.20	72.08 ± 10.03	< 0.001
Lowest SaO2 level (%)	99.55 ± 1.17	95.17 ± 3.72	< 0.001
TAS (1−11)	2.50 ± 1.89	6.47 ± 1.26	< 0.001

TAS: total airway score, N: normal, DI: difficult intubation.

Table 4. A Comparison of Airway Factors between the Normal and Difficult Intubation Groups

Airway factors	N (n = 269)	DI (n = 36)	P value
TAS (> 6)	7 (2.6 %)	25 (69.4%)	< 0.001
Mallampati classification (≥ Class III)	47 (17.5%)	21 (58.3%)	< 0.001
Thyromental distance (< 6 cm)	9 (3.3%)	4 (11.1%)	0.054
Head & neck movement (< 90°)	15 (5.6%)	9 (25.0%)	0.001
BMI (≥ 25 kg/m^2)	94 (34.9%)	24 (66.7%)	< 0.001
Buck teeth (> 0.5 cm)	13 (4.8%)	6 (16.7%)	0.063
Inter-incisor gap (< 4 cm)	28 (10.4%)	18 (50.0%)	< 0.001
ULBT (= Class III)	4 (1.5 %)	12 (33.3%)	< 0.001

TAS: total airway score, BMI: body mass index, ULBT: upper lip bite test, N: normal, DI: difficult intubation.

Discussion

In the results of the presented study, if TAS of the airway assessment factor was more than 6 points or if the ULBT was

Table 5. Airway Factors for Difficult Intubation by Multivariate Logistic Regression Analysis

Airway factors	P value	Odd ratio	95% CI
TAS (> 6)	0.001	13.57	2.99−61.54
ULBT (Class III)	0.002	12.48	2.50−62.21
Head & neck movement (< 90°)	0.081	3.11	0.87−11.13
Inter-incisor gap (< 4 cm)	0.144	2.32	0.75−7.19
BMI (≥ 25 kg/m^2)	0.120	2.22	0.81−6.06
Mallampati classification (≥ Class III)	0.737	1.22	0.38−3.89

TAS: total airway score, ULBT: upper lip bite test, BMI: body mass index, CI: confidence interval.

class III, the prediction of difficult endotracheal intubation was possible. There have been many methods that have attempted to predict difficult endotracheal intubation. Among them, the Wilson score and the LEMON method are commonly used. The Wilson score rates and gives the total score of 5 physical characteristics [3,4], which are weight, head and neck movement, jaw movement, receding mandible, and protruding maxillary anterior teeth. Each factor is given 0, 1, or 2 points, and the total score for the 5 can predict difficult endotracheal intubation [3,4]. The LEMON method stands for the 5 following parameters: Look (facial impairment, large front teeth, large tongue, beard/moustache), Evaluate (3-3-2 rule: inter-incisor gap, mental-hyoid distance, hyoid-thyroid distance), the Mallampati score, Obstruction, and Neck mobility [8,9]. The LEMON method can be used in emergency situations for simple and prompt difficult endotracheal intubation by looking and using fingers to measure lengths without using special tools.

Kim et al. [6] came up with a total airway score of 7 airway assessment factors by adding the Mallampati classification, thyromental distance, and a past history of difficult endotracheal intubation to the Wilson score. They stated that the 4 following factors were significant: TAS, the Mallampati classification, the thyromental distance, the head and neck movement, and the past history of difficult endotracheal intubation. In the present study, the past history of difficult endotracheal intubation was excluded and the ULBT was added, and weight was replaced with BMI in the 7 factors determined by Kim et al. As a result, out of TAS and the seven factors, the point where the Mallampati classification and the head and heck movement had significance coincided, but unlike Kim et al., BMI, the inter-incisor gap, and the ULBT showed a significant difference ($P < 0.05$).

TAS was the most significant predictor of difficult endotracheal intubation. If TAS was greater than 6 points, the risk of difficult endotracheal intubation was 13.57 times as great (95% CI = 2.99−61.54, $P < 0.05$, Table 5). TAS 6 points became the basis for predicting the risk of difficult endotracheal intubation because the odds ratio was highest at 6 points among TAS 5, 6, and 7 points. TAS is the sum of all the airway assessment factors, so compared to separate factors, TAS was more useful in predicting the DI group. However, the drawback is that when all 7 factors could not be found, TAS could not be calculated either.

In the present study, the odds ratio of the ULBT (class III) was 12.48, which is high and similar to TAS (95% CI = 2.50−2.21, $P < 0.05$, Table 5). This signifies that when the ULBT was class III, the odds of difficult endotracheal intubation increased 12.48 times compared to when the ULBT was class II. Therefore, the ULBT can stand alone as a single factor for airway assessment and can be useful for predicting difficult endotracheal intubation.

The ULBT is divided into 3 grades on the ability of the lower teeth to bite the upper teeth [12]. If the patient had a receding mandible, if the patient had buck teeth, or if the patient could not open his/her mouth very well, the ULBT class appeared high. With buck teeth, it is difficult to pull down the upper lip, and if the patient has a receding mandible the movement of the jaw is difficult. Thus, the ULBT class appears high. The ULBT is considered the best method for prediction as it also checks 3 of the airway assessment factors. It is a simple testing method for assessing endotracheal intubation difficulty that can be done quickly, and it is used especially in emergency patients where airway evaluation cannot be done prior to surgery in the operating room before anesthesia. Khan et al. [12] stated that the ULBT can be used as a reliable single test and is highly trusted, because it can predict difficult endotracheal intubation better and has clearer defined classes than the Mallampati classification. However, the ULBT is not possible when the patient has dentures. In addition, individual differences in the length of the philtrum and the sucking movement of the upper lip into the oral space lead to differences in ULBT classes [13]. The authors also experienced changes in classification, because patients did not know the exact method of the ULBT. Before the patients were evaluated, clear explanations and demonstrations were provided. After this occurred, there were hardly any grading changes.

Kim et al. [6] stated that weight (kg) is not a significant predictor of difficult endotracheal intubation. Lavi et al. [14] had normal and obese patients classified according to their BMI to compare the difficulty of intubation, and they found that the IDS was significantly higher in obese patients. Thus, the authors added BMI instead of weight (kg) to the Wilson score and compared the DI group to the N group. The results in the chi-square test showed that BMI was significantly different between the two groups. In the multi regression analysis, the odds ratio of BMI was 2.22. Difficult intubation for BMI ≥ 25 kg/m^2 was twice as great as BMI < 25 kg/m^2. But the multiple regression analysis did not have a significant P value and a 95% confidence interval, so it cannot alone be used a predictor (Table 4 and 5). Usually obese patients commonly have hypertension and diabetes, but they did not appear significantly different in the 2 groups presented (Table 3). However, Lavi et al. [14] stated that they showed a significant difference in the obese group compared to the normal group. Such differences may be due to the fact that Lavi et al's study was based on an obesity standard set for Western patients. The WHO defines obesity as a BMI = 30 kg/m^2 or more [15]. But the present study was based on Asia's obesity standard, which is a BMI = 25 kg/m^2 [16].

The Mallampati classification has been used for a long time for predicting difficult endotracheal intubation. It was reported that Mallampati class III and IV have a significant correlation with predicting difficult endotracheal intubation [17]. However, the patients' compliance in positioning and phonation, as well as the evaluator's assessment of the oral structure can produce different results [18]. The present study found a significant difference in the Mallampati classification between the 2 groups when using the chi-square test. However, with the multiple regression analysis, the odds ratio was 1.22, and P value was not significant. The 95% confidence rate was 0.38−3.89, so it had low confidence. Thus, it cannot stand alone as a single predictor of difficult endotracheal intubation. Iohom et al. [19] also stated that rather than using the Mallampati classification alone, using other airway evaluation tests together is more useful in predicting difficult intubation.

The 2 groups showed a significant difference in the chi-square test when the inter-incisor gap and head and neck movement were compared (Table 4); on multiple regression analysis, the odds ratio was 3.11 in the head and neck movement, and 2.32 in the inter-incisor gap. Their odds ratio was higher than the Mallampati classification's odds ratio, but their P value on multiple regression analysis was not significant. In addition, the 95% confidence interval was 0.87−11.13 in the head and neck movement, and 0.75−7.19 in the inter-incisor gap, which means low confidence. So it could not be used alone as a predictor of difficult endotracheal intubation (Table 5).

The thyromental distance (< 6 cm) was not significantly different between the 2 groups (Table 4). However, in the other studies [6,7] the thyromental distance was significant in predicting difficult intubation. The authors found during the study process that many patients with small body frames compared to patients with larger frames had relatively short thyromental distances. Therefore, rather than using absolute values and the same standard for all patients, a relative standard based on the Korean mean height should be used for more accurate predictions. The severity of buck teeth (> 0.5 cm) was also not significantly different between the two groups (Table 4). In many cases, there was no difficulty in intubation even if the upper teeth protruded, as long as the mouth could be opened wide.

IDS is made up of 7 measuring variables. The number of intubation attempts, additional procedures performed, and the use of other intubation methods were assessed by the observer. The performer assessed Cormack and Lehane's classification on laryngeal view, the lifting force during laryngoscopy, external laryngeal pressure maneuver, and the location of the vocal cord under laryngoscopic view [14]. This is a mutually complementing system based on an objective standard, where the observer and performer make evaluations together. The measuring variables for IDS are made up of objective questions that are quantifiable so the evaluation can be performed simply in a short time. It is considered far better in specificity than VAS (visual analogue scale), categorical classification, and time [11]. Furthermore, numbers alone can easily be used to judge the difficulty of intubation. So it may be useful for comparative studies on difficult endotracheal intubation. The present study wanted to test the reliability of IDS in assessing the difficulty of intubation, so intubation time and the lowest SpO_2 values were taken as additional objective markers. In the DI group, intubation time was significantly longer and the lowest SpO_2 value was lower. A high IDS actually signifies a difficult endotracheal intubation. However, when using IDS to study difficult endotracheal intubation, the intubation conditions must be standardized or there must be a great sample size for multiple regression analysis to be possible [11].

In conclusion, using many airway assessment factors and finding TAS > 6 is a better method than using just one factor when trying to predict difficult intubation. When TAS cannot be found, the ULBT (class III) is a very useful stand-alone test for predicting difficult endotracheal intubation.

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