UPPER INCISOR PROMINENCE IS A GOOD PREDICTOR OF DIFFICULT INTUBATION

SANJA MARIČIĆ PRIJIĆ[1], ALEKSANDRA PLEĆAŠ ĐURIĆ[1,2], VLADIMIR DOLINAJ[1,2], BRANISLAVA JOROVIĆ[1] and JELENA VUKOJE[1]

[1]*Clinical Centre of Vojvodina, Department of Anesthesiology and Intensive Care Medicine, Novi Sad and* [2]*University of Novi Sad, Faculty of Medicine, Novi Sad, Serbia*

Background and aim: One of the most important goals of pre-anesthesiologic evaluation is assessment of the airway. The aim of the present study was to determine the incidence of difficult intubation in surgical patients, and to establish which external anatomic factors are the best predictors of difficult intubation. *Patients and methods:* This prospective observational cross-sectional study included 200 adult patients who were scheduled to receive general anesthesia with intubation for elective surgical procedures. *Results:* Among 200 patients, 191 (95.5%) had normal intubation and 9 (4.5%) had difficult intubation. Age, height, body mass index, upper incisor prominence and interincisor gap were independently associated with difficult intubation. With every year of increase in age, the odds ratio for difficult intubation decreased by 7%. Odds of difficult intubation increased by 1.143 with each additional centimeter of patient height. Patients with prominent upper incisors were nearly seven times more likely to have difficult intubation. The odds of difficult intubation decreased by 96% in patients with the interincisor gap greater than 3 cm. *Conclusion:* Interincisor gap of less than 3 cm is a risk factor for difficult intubation, while those patients with prominent upper incisors are seven-fold more likely to have difficult intubation.

KEY WORDS: Difficult intubation, Prominence of upper incisors, Interincisor gap, Intubation Difficulty Scale

ADDRESS FOR CORRESPONDENCE: aleksandra.plecas.djuric@gmail.com

INTRODUCTION

Difficult intubation still represents a great concern for anesthesiologists in the 21st century. It is a permanent and significant source of morbidity and mortality in the anesthesiologic practice (1). Therefore, the issue of the airway should remain the biggest concern among anesthesiologists (2).

Respiratory tract complications are the most common adverse events associated with anesthesia. The incidence of difficult intubation in the general population is 5.8% (95% CI, 4.5%-7.5%) (3). By definition of the American Society of Anesthesiologists, difficult intubation is the one that requires multiple intubation attempts in the presence or absence of tracheal pathology, whereas unsuccessful intubation is impossibility of placing endotracheal tube in spite of multiple attempts (4).

One of the most important goals of pre-anesthesiologic evaluation is assessment of the airway, i.e., identifying high-risk patients, in order to plan the strategy for dealing with difficult airway (4). There are numerous predictors, scores and guidelines for difficult intubation. The first studies on difficult intubation aimed to compare individual predictors for difficult intubation (5,6). Subsequent studies attempted to create scoring systems (7,8) or complex mathematical models (9,10). Difficult intubation is mainly associated with difficult direct laryngoscopy (11-14).

The aim of the present study was to determine the incidence of difficult intubation in surgical patients, as well as to establish which external anatomic factors are the best predictors of difficult intubation.

PATIENTS AND METHODS

This prospective observational cross-sectional study was performed at the Department of Anesthesiology and Intensive Care Medicine, Clinical Center of Vojvodina, Novi Sad, Serbia, in the period from January to September 2016. The study was approved by the Ethics Committee of the Clinical Center of Vojvodina and all subjects signed an informed consent.

The study sample included adult patients with the American Society of Anesthesiologists (ASA) physical status scores I-III who were scheduled to receive general anesthesia with intubation for the following elective surgical procedures: abdominal, urologic, vascular, neurosurgical, plastic, and orthopedic surgery. Patients with upper airway pathology (otorhinolaryngologic, maxillofacial) and those under the age of 18 years were excluded.

Before the procedure, the following data were collected on all patients: age, gender, height, body weight, ASA status, medical history of difficult intubation or tracheostomy, and body mass index (BMI). All patients underwent preoperative airway evaluation in sitting position, including: 1) visibility of the oropharyngeal structures classified according to the modified Mallampati classification (MMT) (class I – ability to see palatal arches, hypopharynx, uvula and soft palate; class II – hypopharynx, uvula and soft palate visible; class III – base of uvula, soft palate visible; and class IV – soft palate not visible at all) (5); 2) protrusion of the lower jaw (class A – patient's mandibular jaw sticks out too far; class B – the lower jaw is aligned with the upper jaw; and class C – the mandibular jaw sets back too far); 3) test of mobility in the atlantooccipital joint: whether the chin is above, aligned with or below the occipital protuberance (C-O). Then we measured patient thyreomental distance (TMD, cm), interincisor gap (IIG, cm) and neck circumference (NC, cm) at the level of cricoid cartilage, and calculated the ratio between NC and TM. Potential recessive mandible and upper incisor prominence (UIP) was recorded by close inspection. TMD was measured with fully extended neck, whereas NC and IIG were measured in neutral position of the head and neck.

Difficulty of intubation was assessed using the Intubation Difficulty Scale (IDS) (15). The scale consists of seven parts: N1 refers to the number of additional attempts; N2 refers to the number of additional operators/technicians; N3 refers to the number of alternative techniques used; N4 refers to the finding of direct laryngoscopy defined by Cormack and Lehane (16) (grade I: N4 = 0; grade II: N4 = 1; grade III: N4 = 2; and grade IV: N4 = 3); N5 refers to the force exerted during laryngoscopy (N5=0 if the force is normal, N5=1 if increased); N6 refers to external pressure on the larynx (N6=0 when not applied or only Sellik's maneuver is applied, N6=1 if applied); and N7 refers to position of vocal cords (N7=0 when in abduction, N7=1 when in adduction). Ideal conditions for intubation are when the IDS=0. When the IDS is ≥5, intubation is difficult.

Patients were positioned on the operating table with flexion of the lower cervical spine (the occiput raised by 10 cm) and extension of the atlantooccipital joint ('sniffing position'). Minimum standard monitoring in the form of electrocardiogram, pulse oximetry and noninvasive measurement of blood pressure was performed in each patient. Patients were preoxygenated using masks with 100% oxygen for at least 3 minutes. After co-induction with midazolam and fentanyl, induction of anesthesia was performed with propofol at a dose of 2 mg/kg, and muscular relaxation was achieved with rocuronium 0.6 mg/kg. The first laryngoscopy was performed using the Macintosh no. 4 blade. All tracheal intubations were performed by anesthesiologists with at least two years of relevant experience. Laryngoscopic view was graded according to Cormack and Lehane: grade I: the entire glottis visible; grade II: anterior glottis not visible (only arytenoids visible); grade III: only the epiglottis visible; and grade IV: not even the epiglottis visible. If required, additional external pressure on the larynx was applied.

STATISTICAL ANALYSIS

Numerical characteristics were described as arithmetic means, standard deviation, minimum and maximum values, while attributive characteristics were described using percentages and distribution of frequencies.

In the preliminary statistical analysis of numerical characteristics for the purpose of testing gaussian distribution, we used the Kolmogorov-Smirnov test (KS) or Shapiro-Wilk (SW) test. To assess the relationship between independent variables (age, gender, body weight, height, body mass index, neck circumference, thyreomental distance (Patil test), NC/TMD, Mallampati classification, recessive mandible, IIG, mobility of the head at the atlantooccipital joint, mandibular protrusion, UIP, and the dependent variable (IDS), we used standard parametric (analysis of variance, ANOVA) and nonparametric methods (χ^2-test, Fisher exact test), depending on the nature of data.

Predictors of difficult intubation were determined using the univariate binary logistic regression analysis. Each independent variable shown by the univariate logistic regression analysis to be a statistically significant predictor was included in the multivariate binary logistic model. Interpretation of results of the applied regression models was performed with regression coefficients, i.e. exponentials of those values – odds ratio and 95% confidence intervals. The level of statistically significance was set at $p<0.05$.

Statistical analysis of all data was performed using the software package SPSS (Statistical Package for Social Sciences) for Windows, version 21.

RESULTS

Among the 200 study patients, 191 (95.5%) had IDS <5 indicating normal intubation and 9 (4.5%) had IDS ≥5 indicating difficult intubation (Table 1).

Table 1. *The frequency of difficult intubation*

		Frequency (N)	Percent (%)
IDS*	Normal intubation (IDS < 5)	191	95.5
	Difficult intubation (IDS ≥ 5)	9	4.5
	Total	200	100

*IDS - Intubation Difficulty Scale

As regards gender, there were 54% of women and 46% of men, mean age 58.21±14.46 years. According to anthropometric measurements, study patient mean height was 169.87 cm, mean body weight 76.09 kg, and mean BMI 26.30 (Table 2). Descriptive statistics of all other variables that were used for predicting difficult intubation is presented in Table 2.

Table 2. *Descriptive statistic*

	Mean	Standard Deviation	Minimum	Maximum
Age	58.22	14.462	21	88
Height (cm)	169.87	10.177	147	195
Weight (kg)	76.09	15.782	37	125
BMI (kg/m2)	26.3039	4.29299	15.80	37.70
TMD (cm)	8.60	1.500	4	12
NC (cm)	39.01	4.758	30	53
NC/TMD	4.6932	1.09129	3.08	9.50

List of Abbreviations:BMI-Body Mass Index, TMD- thyreomental distance, NC-neck circumference, NC/TMD- ratio between NC and TMD

		Frequency (N)	Percent (%)
Gender	Male	92	46.0
	Female	108	54.00
Mallampati	I	51	25.5
	II	92	46.0
	III	49	24.5
	IV	8	4.0
IIG	>3cm	194	97.0
	<3cm	6	3.0
Mandibular protrusion	A	184	92.0
	B	14	7.0
	C	2	1.0
Chin-Occiput	C>0	179	89.5
	C=0	18	9.0
	C<0	3	1.5
UIP	yes	26	13.0
	no	174	87.0
Recessive mandible	yes	7	3.5
	no	193	96.5

List of Abbreviations:IIG- *interincisor gap, UIP- Upper incisors prominence*

According to the analysis of variance (Table 3), the mean age of patients with IDS ≥5 was statistically significantly lower compared to those with IDS <5 (43.00 *vs.* 58.93; p=0.001). On the other hand, patients with IDS ≥5 had a statistically significantly higher mean height (180.11 *vs.* 167.84; p=0.050), body weight (92.00 *vs.*75.02; p=0.002), neck circumference (NC) (42.44 *vs.* 38.66; p=0.039) and NC/TMD (5.53 *vs.* 4.63; p=0.019) compared to patients with IDS <5 (Table 3). There was no significant difference in the BMI and TMD between the two groups of patients.

Table 3. *Analysis of variance*

ANOVA		Mean	95% CI for Means		F-Value
			Lower Bound	Upper Bound	
Age	IDS < 5	58.93	56.90	60.97	10.952
	IDS ≥ 5	43.00	35.59	50.41	
BH	IDS < 5	169.39	167.96	170.83	3.895
	IDS ≥ 5	180.11	174.75	185.47	
BM	IDS < 5	75.35	73.16	77.54	9.477
	IDS ≥ 5	92.00	78.54	105.46	
BMI	IDS < 5	26.21	25.6050	26.8284	1.898
	IDS ≥ 5	28.23	24.5992	31.8674	
TMD (Patil)	IDS < 5	8.49	8.23	8.74	0.662
	IDS ≥ 5	8.00	6.91	9.09	
NC	IDS < 5	38.85	38.18	39.53	4.340
	IDS ≥ 5	42.44	38.74	46.15	
NC/ TMD	IDS < 5	4.63	4.4812	4.7900	5.616
	IDS ≥ 5	5.53	4.2785	6.7860	

List of Abbreviations: BH- body height, BM-body mass, TMD- TMD-thyreomental distance, NC-neck circumference, NC/TMD- ratio between NC and TMD

The incidence of male *vs.* female, Mallampati score, mandibular protrusion and C-O ratio were all similar between patients with difficult and normal intubation (p>0.05) (Table 4). However, there were statistically higher percentages of those who had IIG <3 (Fisher exact p=0.025) and UIP (Fisher exact p=0.002) in the group of patients with IDS ≥5 (Table 4).

Table 4. *The incidence of male vs. female, Mallampati score, mandibular protrusion and C-O ratio*

		IDS ≤ 5		IDS > 5		α^2 test	
		N	%	N	%	α^2	p
Gender	Male	85	44,50%	7	77,80%	Fisher exact 0,107	0,083
	Female	106	55,50%	2	22,20%		
Mallampati	M1	50	26.2	1	11.1	Linear-by-Linear Association 5.096	0.024
	M2	90	47.1	2	22.2		
	M3	44	23.0	5	55.6		
	M4	7	3.7	1	11.1		
IIG	>3	187	97.9	7	77.8	Fisher exact	0.025
	<3	4	2.1	2	22.2		
Mandibular protrusion	A	175	91.6	9	100.0	Likelihood ratio 1.537	0.464
	B	14	7.3	0	0.0		
	C	2	1.0	0	0.0		
Chin-Occiput	B>0	171	89.5	8	88.9	ikelihood ratio 0.320	0.852
	B=0	17	8.9	1	11.1		
	B<0	3	1.6	0	0.0		
UIP	da	21	11.0	5	55.6	Fisher exact	0.002
	ne	170	89.0	4	44.4		
Recessive mandible	da	6	3.1	1	11.1	Fisher exact	0.279
	ne	185	96.9	8	88.9		

List of Abbreviations: *IIG- Interincisor gap, UIP- Upper incisors prominence*

In order to determine the best predictors of difficult intubation, we applied the logistic regression analysis. Multivariate logistic regression analysis showed that among all the independent variables observed, only age, height, BMI, UIP and IIG were independently associated with difficult intubation (χ^2 =29.37, p <0.001) (Table 5). The model explained between 13.7% and 44.5% (Nagelkerke R2) of the variance in difficulty of intubation and correctly classified 97.0% of all cases. With every year of increase in age, the odds ratio for difficult intubation relative to normal intubation was less by 7% (95% CI: 0.880-0.989). The odds of difficult intubation increased by 1.143 (95% CI: 1.028-1.271) with each additional centimeter of patient height. Patients with UIP were nearly seven times more likely to have difficult intubation than patients without UIP (95% CI: 1.439-36.870). The odds of difficult intubation decreased by 96% in patients with IIG >3 in comparison with patients with IIG <3 (95% CI: 0.004-0.935).

Table 5. *Multivariant logistic regression*

		B	S.E.	Wald	Sig.	Exp(B)	95% CI for EXP(B)
							Lower
Step 1a	Age	-.069	.030	5.402	.020	.933	.880
	Height	.134	.054	6.055	.014	1.143	1.028
	IIG (1)	-2.778	1.383	4.035	.045	.062	.004
	UIP (1)	1.986	.827	5.759	.016	7.284	1.439
	Constant	-21.169	9.353	5.123	.024	.000	

List of Abbreviations: *IIG- Interincisor gap, UIP- Upper incisors prominence*

DISCUSSION

The incidence of difficult intubation in our study was 4.5%, which is consistent with other studies, where the incidence of difficult intubation ranged from 1.5% to 8.5% (17) and 5.8% (95% CI, 4.5-7.5%), excluding obese patients and pregnant women (3). There were no cases of impossible intubation.

The Mallampati score and thyreomental distance tests that have been most frequently studied so far, did not prove to be good predictors of difficult intubation in our study. A meta-analysis from 2005, which included 50,760 patients from 35 studies, showed that the best predictor was a combination of the values of Mallampati score and thyreomental distance. However, the values of all the tests in predicting difficult visualization of the larynx remained limited (3). Results of another meta-analysis, published in 2011, which involved 177,088 patients from 55 studies and investigated the prognostic value of the modified Mallampati score (MMT) in predicting difficult endotracheal intubation, showed that the MMT was a poorer predictor of difficult intubation than it had been found in previous meta-analyses. The authors concluded that the MMT was inadequate as an independent predictor of difficult visualization of the larynx or difficult intubation, but in combination with other predictors could play a significant role in predicting difficult endotracheal intubation (18). In 2007, Yildiz *et al.* investigated, on a sample of 1,674 patients having undergone elective surgery under general anesthesia, predictive values of various parameters, including the MMT, thyreomental and sternomental distances, etc. The incidence of difficult intubation was significantly higher in patients with MMT III-IV and in those with lower values of thyreomental and sternomental distances and interincisor gap. The greatest sensitivity in the prediction of difficult intubation was shown by the MMT score and interincisor gap (19). Our study showed that among the patients with difficult intubation there was a significantly higher percentage of those with IIG <3 (Fisher exact p=0.025) and those with UIP (Fisher exact p=0.002). Similar findings were reported by Eberhart *et al.* in 2010, who investigated the value of a simplified risk score in the prediction of difficult intubation on a sample of 3763 patients. They studied the presence of UIP, Mallampati score and the possibility of opening the mouth, and confirmed the value of those parameters and their combinations in the prediction of difficult intubation (20).

In our study, body weight and BMI did not prove to be significant predictors of difficult intubation. Similarly, Kim *et al.* concluded that body weight by itself was not a significant predictor of difficult intubation (21). On the other hand, Lavi *et al.* report that the IDS was significantly greater in patients with higher BMI (22).

Our multivariate logistic regression analysis of all the independent variables observed showed that statistically significant predictors of difficult intubation were age, height, UIP and IIG. Results of previous studies that addressed this issue showed that older age was associated with difficult intubation. Thus, in their study from 2013, Moon *et al.* concluded that people of middle and older age were more likely to have difficult intubation compared with younger patients (23). Similar results were found by El Rouby *et al.* in a large analysis of 25,040 patients (24). However, we obtained contrary results; namely, with each year of life, a chance for difficult intubation decreased by 7% (95% CI: 0880-0989). In addition, the likelihood for difficult intubation increased 1.143 times (95% CI: 1.028-1.271) for each additional centimeter of height. So far, the ratio between patient height and thyreomental distance has been described as a predictor of difficult direct laryngoscopy, with the significant values reported being those greater than 25 cm in Caucasians (25), or 21.06 cm in the Iranian population (26).

The results of our study show that intubation may be more difficult if the patient is taller and younger. In addition, patients with the interincisor gap of less than 3 cm are at a greater risk of facing difficulties during intubation, while those with prominent upper incisors are seven-fold more likely to have difficult intubation compared with patients with normal upper incisors. In conclusion, the most important predictor of difficult intubation found in our study is prominence of upper incisors. However, to validate this result, research should be carried out on a significantly larger number of patients.

REFERENCES

1. Cheney F, Posner K, Lee L *et al.* Survey of anesthesia-related death and brain damage. A closed claims analysis. Anesthesiology 2006; 105: 1081-6.
2. Peterson GN, Domino KB, Caplan RA *et al.* Management of the difficult airway: a closed claims analysis. Anesthesiology 2005; 103: 33-9.
3. Shiga T, Wajima Z, Inoue T, Sakamoto A. Predicting difficult intubation in apparently normal patients: a meta-analysis of bedside screening test performance. Anesthesiology 2005; 103: 429-37.
4. Apfelbaum JL, Hagberg CA, Caplan RA *et al.* Practice Guidelines for Management of the Difficult Airway: An Updated Report by the American Society of Anesthesiologists Task Force on Management of the Difficult Airway. Anesthesiology. 2013; 118: 251-70.
5. Mallampati SR, Gatt SP, Gugino LD *et al.* A clinical sign to predict difficult tracheal intubation: a prospective study. Can Anaesth Soc J 1985; 32(4): 429-34.
6. Samsoon GL, Young JR. Difficult tracheal intubation: a retrospective study. Anaesthesia 1987; 42(5): 487-90.
7. Wilson ME, Spiegelhalter D, Robertson JA, Lesser P. Predicting difficult intubation. Br J Anaesth 1988; 61(2): 211-6.
8. Nath G, Sekar M. Predicting difficult intubation – a comprehensive scoring system. Anaesth Intensive Care 1997; 25(5): 482-6.
9. Charters P. Analysis of mathematical model for osseous factors in difficult intubation. Can J Anaesth 1994; 41(7): 594-602.
10. Arne J, Descoins P, Fusciardi J *et al.* Preoperative assessment for difficult intubation in general and ENT surgery: predictive value of a clinical multivariate risk index. Br J Anaesth 1998; 80(2): 140-6.
11. Patil VU, Stehling LC. Predicting the difficulty of intubation utilizing an intubation guide. Anaesthesiology 1983;10: 32.
12. Khan ZH, Kashfi A, Ebrahimkhani E. A comparison of the upper lip bite test (a simple new technique) with modified Mallampati classification in predicting difficulty in endotracheal intubation: a prospective blinded study. Anesth Analg 2003; 96: 595-9.
13. el-Ganzouri AR, McCarthy RJ, Tuman KJ, Tanck EN, Ivankovich AD. Preoperative airway assessment: predictive value of a multivariate risk index. Anesth Analg 1996; 82: 1197-204.
14. Arné J, Descoins P, Fusciardi J *et al.* Preoperative assessment for difficult intubation in general and ENT surgery: predictive value of a clinical multivariate risk index. Br J Anaesth 1998; 80: 140-6.
15. Adnet F, Borron S, Racine S *et al.* The intubation difficulty scale (IDS): proposal and evaluation of a new score characterizing the complexity of endotracheal intubation. Anesthesiology 1997; 87: 1290-7.
16. Cormack RS, Lehane J. Difficult intubation in obstetrics. Anaesthesia 1984; 39: 1105-11.
17. Crosby ET, Cooper RM, Douglas MJ *et al.* The unanticipated difficult airway with recommendations for management. Can J Anaesth 1998; 45: 757-76.

18. Lundstrom LH, Vester-Andersen M, Moller AM *et al*. Poor prognostic value of the modified Mallampati score: a meta-analysis involving 177 088 patients. Br J Anaesth 2011; 107 (5): 659-67.

19. Yildiz TS, Korkmaz F, Solak M *et al*. Prediction of difficult tracheal intubation in Turkish patients: a multi-center methodological study. Eur J Anaesthesiol 2007; 24(12): 1034-40.

20. Eberhart LHJ, Arndt C, Aust HJ *et al*. A simplified risk score to predict difficult intubation: development and prospective evaluation in 3763 patients. Eur J Anaesthesiol. 2010; 27(11): 935-40.

21. Kim DS, Ryn SJ, Kim KH, Jang TH, Kim SH. Evaluation of airway assessment factors for predicting difficult intubation. Korean J Anesthesiol 1997; 32: 51-6.

22. Lavi R, Segal D, Ziser A. Predicting difficult airways using the intubation difficulty scale: a study comparing obese and non-obese patients. J Clin Anesth 2009; 21: 264-7.

23. Moon H-Y, Baek CW, Kim J-S *et al*. The causes of difficult tracheal intubation and preoperative assessments in different age groups. Korean J Anesthesiol 2013; 64(4): 308-14.

24. El Rouby S, Negmi H, Oufi Al H, Harrington P, Shoukri M. Age related incidence and complications of difficult intubation in 25,040 general anaesthetics in a tertiary hospital. Eur J Anaesthesiol 2005; 22: 73.

25. Schmitt HJ, Kirmse M, Radespiel-Troger M. Ratio of patient's height to thyromental distance improves prediction of difficult laryngoscopy. Anaesth Intensive Care 2002; 30: 763-5.

26. Safavi M, Honarmand A, Zare N. A comparison of the ratio of patient's height to thyromental distance with the modified Mallampati and the upper lip bite test in predicting difficult laryngoscopy. Saudi J Anaesth 2011; 5(3):258-63.

SAŽETAK

IZBOČENJE GORNJIH SJEKUTIĆA JE DOBAR PREDSKAZATELJ OTEŽANE INTUBACIJE

S. MARIČIĆ PRIJIĆ[1], A. PLEĆAŠ ĐURIĆ[1,2], V. DOLINAJ[1,2], B. JOROVIĆ[1] i J. VUKOJE[1]

[1]Klinički centar Vojvodine, Klinika za anesteziologiju i intenzivnu terapijsku skrb, Novi Sad i
[2]Univerzitet u Novom Sadu, Medicinski fakultet, Novi Sad, Srbija

Uvod i cilj: Jedan od najvažnijih ciljeva predanesteziološke evaluacije je ocjena dišnog puta. Cilj ove studije bio je odrediti incidenciju otežane intubacije kod kirurških pacijenata i utvrditi koji su vanjski anatomski faktori najbolji predskazatelji otežane intubacije. *Bolesnici i metode:* Ova prospektivna opservacijska presječna studija uključila je 200 odraslih pacijenata koji su bili podvrgnuti općoj anesteziji s intubacijom zbog elektivnih kirurških postupaka. *Rezultati:* Od 200 pacijenata 191 (95,5%) imao je normalnu intubaciju, a 9 (4,5%) otežanu intubaciju. Dob, visina, indeks tjelesne mase, izbočenje gornjih sjekutića i razmak između sjekutića bili su neovisno povezani s otežanom intubacijom. Sa svakom godinom povećanja dobi odnos šanse za otežanu intubaciju bio je manji od 7%. Šansa za otežanu intubaciju povećavala se za 1,143 sa svakim dodatnim centimetrom pacijentove visine. Bolesnici s izbočenjem gornjih sjekutića gotovo su 7 puta češće imali otežanu intubaciju. Šanse za otežanu intubaciju smanjivale su se za 96 % u pacijenata s razmakom između sjekutića većim od 3 cm. *Zaključak:* Razmak između sjekutića manji od 3 cm je rizični faktor za otežanu intubaciju, dok je za pacijente s izbočenjem gornjih sjekutića sedam puta vjerojatnije da će imati otežanu intubaciju.

KLJUČNE RIJEČI: otežana intubacija, izbočenje gornjih sjekutića, razmak između sjekutića, ljestvica otežane intubacije