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Aim: Aim of our study is to evaluate the predictive value of ultrasonographic (USG) measurement of thyroidoid distance for difficult intubation and determination of optimal endotracheal tube size by using USG in paediatric patients undergoing elective surgery.

Method: After ethics committee approval and parental consent were obtained, 119 patients undergoing genitourinary surgery or inguinal hernia repair under general anesthesia, were included in study. Patients with head or neck anomalies, syndromic patients, patients undergoing emergency surgery and patients with a history of difficult airway were excluded from the study. Patients were grouped according to their ages; Group I (1-2 years, n=38), Group II (3-5 years, n=46) and Group III (6-8 years, n=35). USG measurements were performed following sevoflurane induction in groups I and II. In group III, USG measurements were performed following premedication with intravenous midazolam 0.05 mg/kg. Thyroidoid distance, glottic and subglottic diameters were measured with ultrasonography. The size of the endotracheal tube according to Bae's formula (internal diameter of ETT = 0.705 x subglottic diameter - 0.091) was calculated and recorded. Before intubation, ETT (cuffed/uncuffed) was selected using age-related formulas. In group II, anaesthesia induction was achieved with propofol 2 mg/kg. In all groups, endotracheal intubation was achieved with fentanyl 2 µg/kg and rocuronium 0.6 mg/kg. We considered ETT size optimal when a leak was detected at 20-30 cmH₂O inflation pressures. If a resistance was felt in the subglottic region, the tube was exchanged with a smaller and was exchanged with a larger (0.5 mm) size if a leak occurred at inflation pressures lower than 20 cmH₂O. Intubation duration, Cormack-Lehane scores and Intubation Difficulty Scale scores were recorded. For comparison of age related formula and Bae's formula, we only evaluated the patients who were intubated with uncuffed ETT.

Fig 1. Sagittal view through thyroidoid membrane using a linear transducer. The scan shows hyoid bone, posterior surface of epiglottis and thyroidoid membrane.

Fig 2. Transvers view at level of cricoid cartilage using a linear transducer.

Table 1. Relation between thyroidoid distance and IDS

Group I			
	Easy (n:23)	Slight difficult (n:14)	P value
Thyroidoid Distance (mm) Mean±SD	14.55±3.61	12.78±2.90	0.10
Group II			
	Easy (n:38)	Slight difficult (n:8)	P value
Thyroidoid Distance (mm) Mean±SD	16.23±4.35	16.51±3.79	0.91
Group III			
	Easy (n:26)	Slight difficult (n:9)	P value
Thyroidoid Distance (mm) Mean±SD	20.90±4.96	17.33±4.84	0,033

Table 2. Comparison of optimal and calculated tube sizes

		Bae's formula N (%)	Age related formulas N (%)
Optimal ETT size smaller than calculated ETT	0.5 mm	7 (%11.5)	2 (%3.2)
	1 mm	7 (%11.5)	0 (%0)
	>1 mm	11 (%18)	0 (%0)
Optimal ETT size larger than calculated ETT	0.5 mm	4 (%6.5)	25 (%41.1)
	1 mm	0 (%0)	21 (%34.4)
	>1 mm	0 (%0)	1 (%1.6)
Optimal ETT size same with the calculated ETT		32 (% 52.5)*	12 (% 19.7)

Results and discussion: No significant difference was found between groups regarding gender, age, weight and height distributions. 5% of patients were below the 3rd percentile. Mallampati scores were recorded as I in 106 (89,1%) patients and II in 13 (10,9%) patients. Cormack-Lehane scores were I, II and III in 101 (84,8%), 17 (14,2%) and III 1 (0,008%) patients respectively. Based on the IDS; in group I, 23 (60,5%) cases were easy, 14 (36,8%) cases were slight difficult, 1 (0,02) case was moderate/major difficult; in group II 38 (82,6%) cases were easy, 8 (17,4%) cases were slight difficult; in group III 26 (74,3%) cases were easy, 9 (25,7%) cases were slight difficult. No significant difference was observed in terms of thyroidoid distances in Group I and II between the easy and slightly difficult cases, in contrast to Group III where a significant difference was observed. Cut-off value for thyroid distance in group III was 20.45 mm. ETT size was predicted correct with Bae's formula in 52.5% and with age related formulas in 19.7% of cases.

Conclusion: Thyroidoid distance measured by USG might be used to predict difficult intubation in children between 6-8 years and USG measurement of subglottic diameter predicted correct tube size better than age related formula.