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AIRWAY CLASSIFICATION; COMPARISON OF STANDARD BLADE VERSUS ENGLISH BLADE OF MACINTOSH LARYNGOSCOPE.

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ABSTRACT... Introduction: The optimal way for airway management is endotracheal intubation. Anesthesiologists use different kinds of laryngoscopes for tracheal intubation, but the most common laryngoscope is Macintosh laryngoscope with two blades; standard blade and English blade. **Objective:** Comparison of standard blade and English blade of Macintosh laryngoscope in airway classification of elective surgical patients. **Materials and Methods:** It was a prospective, single blind; clinical trial study that was done on seventy patients's scheduled for elective surgery. They randomly classified into two groups (I, II). After induction of anesthesia and neuromuscular block in group I laryngoscopy was done at first with standard blade and then with English blade and in group II laryngoscopy was done at first with English blade and then standard blade inserted. The view of the glottis at laryngoscopy based on Cormack and Lehane scores were compared. **Results:** There was a difference in the view of glottis in 15 patients. Among these patients the view was better for the English blade in 13 patients and the standard blade was better in 2 patients. Laryngoscopy was difficult (grade 3) for at least one blade in 3 patients. In these 3 patients, the view was better for the English blade in 2 patients and for standard blade in 1 patient. The view of glottis as described by Cormack and Lehane for English blade was Grade I in 60 patients (85.7 %), Grade II in 9 patients (12.9 %), and this view for standard blade was: Grade I in 50 patients (71.4 %), Grade II in 18 patients (25.7 %). These differences were statistically significant ($P = 0.006$) **Conclusion:** Laryngoscopy with English blade provided a better view on glottis and lower score of Cormack & Lehane in comparison of standard blade of Macintosh laryngoscope.

Key words: Cormack and Lehane score, intubation tracheal, laryngoscopes, laryngoscopy

INTRODUCTION

Since Macintosh described a new laryngoscope in 1943, it has been used most widely for tracheal intubation in both adults and children of more than one year old^{1,2,3,4,5}. Several different types of Macintosh laryngoscope have been developed and there are currently two major types available. The standard and the English type (E type) laryngoscope blades. The English blade differs from the standard blade in a few aspects. (Fig 1). Compared with the standard blade, the English blade is longer, its curve is more continuous across the entire length of the blade, and the height of the blade flange is shorter. In addition, the flange of the English blade continues close to the blade tip, whereas the flange of the standard blade ends more abruptly and further away from the tip. Many studies were carried out about airway management and different kinds of laryngoscopes¹⁻¹¹ but only two of them was about two kinds of blades of Macintosh laryngoscope^{10,11}. The authors of these two studies concluded that the English blade provided a better glottis view significantly more frequently than the standard blade^{10,11}. Then we conducted this study to compare standard blade versus English blades of Macintosh laryngoscope in airway classification, based on Cormack and Lehane scores¹², on elective surgical patients.

MATERIALS AND METHODS

This single blind comparative trial was done after obtaining approval from the university research ethics committee and written informed consent from the patients, on 70 patients (ASA class I or II, male and female, aged 18-50 yr) undergoing elective surgery and in whom tracheal intubations was indicated. Patients who had history of ischemic heart disease, obstructive or restrictive lung disease, or had any pathology in neck, upper respiratory or alimentary tracts, or were at risk of pulmonary aspiration of gastric contents were excluded.

Four senior resident of anesthesia were recruited to undertake this study in four centers to reduce possible observer bias. The view of the oropharynx was classified before anesthesia according to Mallampati classification¹³. If the faucial pillars and uvula could not be seen (score 3 or 4), the patient was excluded from the

study.

The distance between the thyroid notch and the mentum (thyromental distance) was recorded. In the operating room, a firm pad (7 cm in height) was placed under the patient's occiput, but not under the neck. After preoxygenation of patients, fentanyl 3 mcg / kg were injected for premedication and then anesthesia was induced with propofol 1.5- 2 mg / kg or thiopental 4 - 5 mg/ kg. Atracurium 5 mg was injected for defasciculation, after 3 - 5 minutes neuromuscular block was obtained with succinylcholine 1.5 mg / kg. Neuromuscular block was confirmed using a peripheral nerve stimulator in single twitch mode by 40 - 50 mA without any response. In this situation laryngoscopy and endotracheal intubation was done. Anesthesia was maintained with halothane in N₂O and O₂ (50: 50) during the study period and analgesic agents and neuromuscular agents were given according to the anesthetist's preference.

We used the standard and English Macintosh blades, both of which were manufactured by Welch Allyn (NY, USA). Both blades were made of metal and contained a fiber light. Patients randomly classified in two groups by fixed blocked random allocation (I, II). In-group I laryngoscopy was carried out at first with standard blade and then with English blade, and in-group II laryngoscopy was done at first with English blade and then with standard blade.

A blade of size 3 or 4 was selected according to the anesthetist's preference, but the same size was used for the two blades. The view of the glottis during laryngoscopy procedure was graded according to Cormack and Lehane classification¹² for each blade. No attempt was made to improve the view of the glottis by applying pressure on the neck. The trachea was intubated at the second attempt during laryngoscopy procedure.

The anesthetic resident was asked about quality of blades and for viewing the glottis with each blade based on Cormack and Lehane score. The view of the oropharynx before general anesthesia was defined as

difficult when the score was 3 or 4 based on Mallampati classification^{13,14}. Laryngoscopy was defined as difficult when the view of the glottis was grade 3 or 4 based on C & L classification. Our main interest was to compare the ease of viewing the glottis between the two laryngoscope blades and defining the blade that induced better view of the glottis.

We considered that there would be a clinically important difference if the view of the glottis was grade 1 using one blade but grade 2 or 3 using the other blade. We used the SPSS 10.0.5 statistical package and MC Neman's test to compare the two blades. We also used the test to assess the relationship between the ease of the view of the glottis and quality of preoperative view of the oropharynx, in terms of the oropharynx (classes 1 and 2 vs. class 3). Significance level in all tests was 0.05.

RESULTS

70 patients were recruited into the study: 48 men (68.6%) and 22 women (31.4%). The patients ranged in age from 18 to 49 years with an average of approximately 28.4(SE) year in men and 28.5(SE) year in women.

We classified patients based on the view of the glottis (Cormack & Lehane score) at laryngoscopy for each blade. There was no difference in the view of the glottis between the two laryngoscope blades in 55 of 70 patients, whereas there was a difference in the remaining 15 patients (Table II).

Sex (males: females)	48:22
Age (yr) in males	28.4[18-49]
Age (yr) in females	28.5[18-46]
Thyromental distance (cm)	6.8 [5.5-8.3]

Laryngoscopy was difficult (grade III) with at least one blade in 3 of 70 patients. Among these 3 patients the English blade was better on 2 patients, whereas the standard blade was better only for one of them (table II). The view of glottis for English blade was such: grade I in 60 patients (85.7%), grade II in 9 patients (2.9%) and grade III in 1 patient (1.4%), (table II).

Type of blade		Standard blade			
Type of blade	View of glottis n (percent)	Grade I	Grade II	Grade III	Total
English Blade	Grade I	49 (70%)	11(15.7%)	0(0%)	60(85.7%)
	Grade II	1 (1.4%)	6(7.6%)	2(2.9%)	9(12.9%)
	Grade III	0 (0%)	1(1.4%)	0(0%)	1(1.4%)
	Total	50 (71.4%)	18(25.7%)	2(2.9%)	70 (100%)

The view of glottis for standard blade was such: grade I in 50 patients (71.4%), grade II in 18 patients (25.7%) and grade III in 2 patients (2.9%), (table II).

Mc Neman's test indicated that, the view of glottis was significantly better with English blade than with standard blade (P=0.006), (table II).

Table-III. View of the glottis (Cormack and Lehane score) with the Standard blade and the English blade of Macintosh laryngoscopes in males and females.

Type of blade	Sex	View of glottis n (percent)			
		Grade I	Grade II	Grade III	Total
Standard	Male	33 (68.8%)	14 (29.2%)	1 (2.1%)	48 (100%)
	Female	17 (77.3%)	4 (18.2%)	1 (4.5%)	22 (100%)
English	Male	41(85.4%)	6 (12.5%)	1 (2.1%)	48 (100%)
	Female	19 (86.4%)	3 (13.6%)	0(0%)	22 (100%)

DISCUSSION

The results show that the English blade of Macintosh laryngoscope compares to the Standard blade provided a better view of the glottis in patients who had Mallampati score I or II. Sethuraman et al⁸ in a randomized, cross over study compared the Dorges, McCoy and Macintosh laryngoscope blades in a simulated difficult intubation scenario. They concluded that the Dorges and McCoy blades did not perform any better than the Standard Macintosh blade in either the easy or difficult tracheal intubation setting. Guidelines recommending the use of an alternative blade in an unexpected difficult intubation scenario have limited supporting evidence. This study does not support this recommendation.

Jose J Ariho et al⁹ were conducted a study to compare five different laryngoscopes; Macintosh, McCoy, Miller, Belscope, and Lee-Fiber view with respect to the grade of laryngeal visualization and the difficulty of intubation. They found that regarding the degree of difficulty with intubation; the best results were obtained with Macintosh and McCoy laryngoscopes.

Asai et al¹⁰ in their preliminary study compared the English blade and the Standard blade of Macintosh laryngoscope, and concluded that there was a difference in the view of the glottis in four patients (14%), the view being better with the English blade in all four of these patients. In no patients was the view better with the Standard Macintosh blade.

Asai et al¹¹ in another study to compare the ease of laryngoscopy with each type of Macintosh laryngoscope blades, found a difference in the view of the glottis in 80 of 300 patients (27%). Among these patients, the view was better with English blade on 63 patients (21%) and the Standard blade was better on 17 patients (6%). Laryngoscopy was difficult (grade 3 or 4) for at least one blade in 42 of 300 patients (14%). They found that the view of the glottis was significantly better with the English blade than with the Standard blade ($P < 0.001$) that was matched with our study.

Differences between Asai study with that of ours were in :1-patient selection, we excluded patients with Mallampati score 3 or 4 but they didn't, and 2- age of patients, the range of age in their patients was wide 18-82 yr with mean 49 yr , but in our patients the range of age was narrow 18- 49 yr. We didn't select patients more than 50 yrs old because some of them were edentulous and maybe had difficult ventilation with mask and difficult laryngoscopy; therefore rate of difficult intubation in Asai study was higher than ours (14% vs. 4.2%).

In our crossover study, there was no clinically important difference between the two blades of Macintosh laryngoscope in 55 (78.5%) patients but there was a difference in the remaining 15 (21.4%) patients. The view of the glottis was better in 13 (18.6%) patients with English blade but only in 2 (2.9%) patients the Standard blade provided better view of the glottis. ($P = 0.006$)

Therefore it seems reasonable to conclude that although

both the Standard and the English blade can be used for the majority of patients, it is worth using another type of blade while laryngoscopy procedure is difficult.

Our study has some limitations. First, we did not assess the ease of tracheal intubation because the study was done at four hospitals, where tracheal tubes of the same specification were unavailable. In addition we felt that it would be unethical to compare the ease of tracheal intubation between two blades as a crossover design. Therefore it is not clear if tracheal intubation using the English blade is easier than that with Standard type, as the ease of laryngoscopy may not reflect the ease of tracheal intubation. Secondly, we did not compare the ease of laryngoscopy with each blade in patients where tracheas were judged to be difficult to intubate (Mallampati III and IV were excluded from the study). Thirdly, the ease of use of blades might have been different with blades which was made by different manufacturer. Lastly we didn't assess patients with emergency operation which could have had different results.

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