

Comparison of Standard Polyvinyl Chloride Tracheal Tubes and Straight Reinforced Tracheal Tubes for Tracheal Intubation through Different Sizes of the Airtraq Laryngoscope in Anesthetized and Paralyzed Patients

A Randomized Prospective Study

Vassilios K. Dimitriou, M.D.,* Ioannis D. Zogogiannis, M.D., D.E.A.A.,† Amalia K. Douma, M.D., D.E.A.A.,† Nikolaos D. Pentilas, M.D.,‡ Despoina G. Liotiri, M.D.,‡ Mitchell S. Wachtel, M.D.,§ Dimitrios Karakitsos, M.D., Ph.D.||

Background: The authors compared the intubation success rate of straight reinforced tracheal tubes emerging from the Airtraq laryngoscope (Prodol Meditec S.A., Vizcaya, Spain) with standard preformed polyvinyl chloride tracheal tubes in anesthetized patients.

Methods: The authors randomly allocated 347 adult patients to be intubated with standard polyvinyl chloride tracheal tubes, standard straight wire-reinforced tracheal tubes, or silicone straight wire-reinforced tubes, through either the larger or the smaller adult laryngoscope sizes. The possible influence of laryngoscope size, tube size, and tube type on intubation failure was examined.

Results: Success rates were 100% for polyvinyl chloride tracheal tubes, 78.5% for standard wire-reinforced tracheal tubes, and 75.4% for silicone wire-reinforced tubes ($P < 0.01$). Compared with the former, patients in the straight standard and silicone wire-reinforced tube groups required more optimization maneuvers (4.1% vs. 42.1%; $P < 0.01$) and more attempts at successful intubation (0% vs. 7.3%; $P < 0.01$). The angle created by the tube emerging from the Airtraq guiding channel was inversely correlated to the ratio of the endotracheal tube OD to the width of the channel in the standard and silicone wire-reinforced tube groups ($r = -0.95$ and $r = -0.82$, respectively; $P < 0.01$). Finally, a decrease in 0.1 of the above ratio was associated with a 3.1 (95% confidence interval, 1.9–5.2; $P < 0.01$) times increase in the odds ratio of intubation failure.

Conclusions: Standard polyvinyl chloride tracheal tubes were found to be superior compared with standard and silicone straight wire-reinforced tubes for intubation through the Airtraq laryngoscope. In the latter groups, a decrease of the ratio of their OD to the width of the Airtraq guiding channel resulted in increased intubation failure.

THE Airtraq laryngoscope (AL) (Prodol Meditec S.A., Vizcaya, Spain) is a new disposable intubation device developed to facilitate tracheal intubation in patients with normal or difficult airways. It is designed to provide

a view of the glottis without alignment of the oral, pharyngeal, and tracheal axes. This is due to the exaggerated curvature of the blade and a series of lenses, prisms, and mirrors that transfers the image from the illuminated tip to a proximal viewfinder. A guiding channel on the right side of the blade acts as a conduit holding and directing the endotracheal tube through the glottis opening when the vocal cords are visualized. The AL is commercially available in multiple sizes. The larger size (AL-L), using tube sizes 7.0–8.5 mm ID, and the smaller size (AL-S), using tube sizes 6.0–7.5 mm ID, are recommended for adults, according to the manufacturer's instructions. The widths of the guiding channels in AL-L and AL-S are 14 and 12 mm, respectively. The lengths of the guiding channels in AL-L and AL-S are 20 and 19 cm, respectively. The angle between the guiding channel and the blade in both sizes is 93°.

Recent reports suggested that use of the AL may be superior to the Macintosh laryngoscope (Rusch, Teleflex Medical, Deutschland) in patients in routine airway management¹ and/or increased risk for difficult intubation.^{2,3} The AL was used successfully in a number of cases with difficult airway management,^{4–6} including morbid obesity,^{7–9} posttraumatic asphyxia,¹⁰ and after failed tracheal intubation¹¹ in anesthetized patients, as well as in two cases where awake tracheal intubation was chosen.^{12,13}

All previous clinical trials were conducted using standard preformed polyvinyl chloride tracheal tubes. However, there are cases where straight reinforced tracheal tubes could be used. The latter are particularly useful for head and neck surgical procedures or in the prone-positioned patient, where the endotracheal tube could be sharply bent and/or compressed. In this prospective randomized study, we compared the intubation success rate of straight reinforced tracheal tubes emerging from the AL with standard polyvinyl chloride tracheal tubes in anesthetized and paralyzed patients.

Materials and Methods

After ethical committee approval and written informed consent, 347 patients with American Society of Anesthesiologists physical status I–III, aged 22–75 yr, scheduled to undergo surgical procedures requiring tracheal intu-

* Associate Professor of Anesthesia, † Senior Registrar of Anesthesia, ‡ Registrar of Anesthesia, || Intensivist, "G Gennimatas" General Hospital of Athens, § Associate Professor, Department of Pathology, Texas Tech University Health Sciences Center, Lubbock, Texas.

Received from the Department of Anesthesia, "G Gennimatas" General Hospital of Athens, Athens, Greece. Submitted for publication March 31, 2009. Accepted for publication August 19, 2009. Nutri Medica, Athens, Greece (representing Prodol Meditec S.A., Vizcaya, Spain), provided the Airtraq devices free of charge for use in the study. All other support was solely from departmental sources (Department of Anesthesia, "G Gennimatas" General Hospital of Athens, Greece). Clinical trial identifier: ISRCTN50146191.

Address correspondence to Dr. Dimitriou: 26 Anatolikos Romyias Str, Papagos, 15669, Athens, Greece. vaskdim@otenet.gr. Information on purchasing reprints may be found at www.anesthesiology.org or on the masthead page at the beginning of this issue. ANESTHESIOLOGY's articles are made freely accessible to all readers, for personal use only, 6 months from the cover date of the issue.

Table 1. Technical Specifications of the Tracheal Tubes Used for Intubation

| ID, mm | OD, mm | | |
|--------|--------|------|------|
| | PVCT | RFT | RFST |
| 7.0 | 9.6 | 10.4 | 10.0 |
| 7.5 | 10.3 | 11.1 | 10.4 |
| 8.0 | 10.9 | 11.9 | 11.0 |
| 8.5 | 11.6 | 12.4 | NA |

The widths of the guiding channel in the larger (AL-L) and smaller (AL-S) adult sizes of the Airtraq laryngoscope (Prodol Meditec S.A., Vizcaya, Spain) are 14 and 12 mm, respectively.

ID, internal diameter; NA = not applicable; OD, outer diameter; VCT = polyvinyl chloride tracheal tube; RFST = straight silicone wire-reinforced tracheal tube; RFT = straight wire-reinforced tracheal tube.

bation, were included in the study. The study was conducted at the “G Gennimatas” General Hospital of Athens, Greece, from March 2008 to January 2009. Exclusion criteria were increased risk or history of difficult intubation, gastric aspiration, or history of relevant drug allergy. Preoperative airway examination in all patients included interincisor distance, Mallampati classification, thyromental distance, cervical spine flexion, and previously documented difficult intubation.

Patients who were intubated with standard Portex (Smiths Medical, Hythe, Kent, United Kingdom) polyvinyl chloride tracheal tube (PVCTs) served as controls. PVCTs are reasonably stiff, with a curvature of approximately 130°. Furthermore, Portex wire-reinforced endotracheal tubes (RFT) and silicone wire-reinforced tubes (RFST; Euromedical Industries, Kedah, Malaysia) were used. Both are straight and soft tubes without curvature. We tested both adult sizes of the AL, the larger size

(AL-L), using tube sizes 7.0–8.5 mm ID, and the smaller size (AL-S), using tube sizes 6.0–7.5 mm ID, according to the manufacturer’s instructions. A table of random numbers was used for each patient to determine which tube type and laryngoscope size was used. The technical characteristics of the materials used for intubation for the whole study population are presented in table 1.

Before induction of anesthesia, the angle that was created by different sized PVCT, RFT, or RFST tracheal tubes emerging from the AL (intubation angle) was measured *in vitro* in all patients. All measurements were performed using a goniometer and included the angle between the blade of the AL and the middle axis of the distal 8 cm of the endotracheal tube emerging from the AL (fig. 1). All measurements were performed and recorded by the same physician (V.D.).

Anesthetic management was standardized. Anesthesia was induced with 1 µg/kg fentanyl followed by 1.5–3.0 mg/kg propofol. Neuromuscular blockade was achieved with 0.1 mg/kg cisatracurium. A nerve stimulator was used (TOF Watch S; Organon, Oss, The Netherlands) to confirm full paralysis before intubation. Maintenance was with 1.5–3% sevoflurane in oxygen and nitrous oxide. When full relaxation was confirmed, the patient was placed in the sniffing position and laryngoscopy was performed. Standard monitoring was used. The three anesthesiologists (V.D., A.D., and I.Z.) who performed tracheal intubation were instructors in national airway courses and had significant clinical experience with the AL in mannequins and patients.

Tracheal intubation was attempted with the AL preloaded with the endotracheal tube, using the inventor’s technique, with the blade inserted into the mouth in the

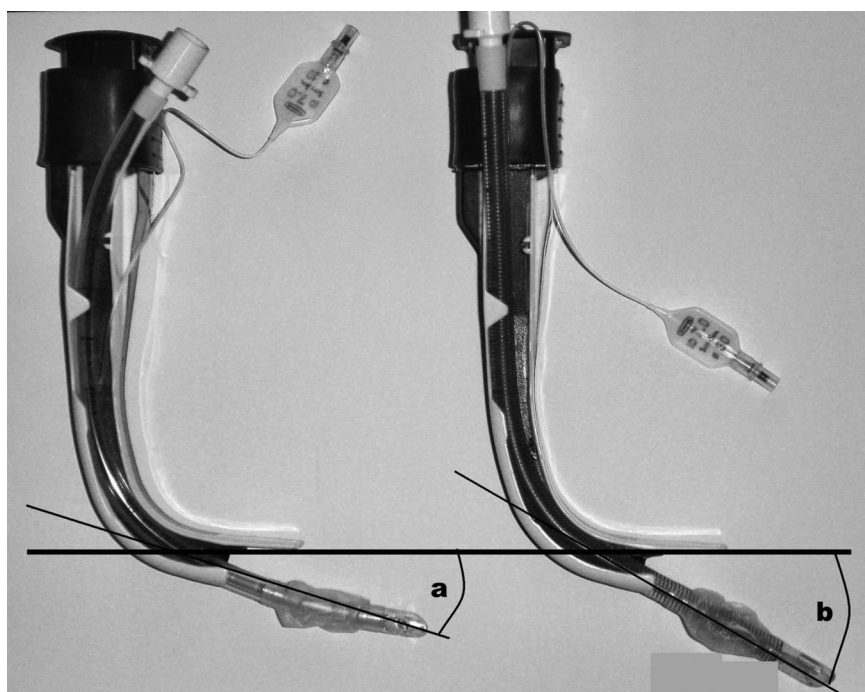


Fig. 1. Different angles created between the curved polyvinyl chloride tube (angle *a*) as well as the straight reinforced tube (angle *b*) and the blade of the Airtraq laryngoscope (Prodol Meditec S.A., Vizcaya, Spain).

midline, over the center of the tongue. Once the view of glottis was optimized, the tube was passed through the vocal cords and the cuff was inflated. Thereafter, it was held in place while the AL was removed. If it was not possible to direct the endotracheal tube to the trachea, optimization maneuvers were attempted. Optimization maneuvers included extension, rotation, or vertical lift of the AL.

The primary endpoint was the rate of successful tracheal intubation. An unsuccessful intubation was defined when the trachea was not intubated after three intubating attempts, or after 120 s had elapsed. The possible influence of AL size, of tube size and type, and of the intubation angle on intubation failure was examined. To analyze the effect of both the laryngoscope and the endotracheal tube on intubation, we used one simple parameter, namely, the ratio of the endotracheal tube OD to the width of the AL guiding channel. Also, the number of optimization maneuvers and the number of attempts to aid tracheal intubation were recorded and analyzed. Finally, the duration of the intubating attempt and the occurrence of trauma including visible trauma to the teeth or lips, or blood on the blade of the AL, were recorded. The duration of the intubating attempt was the time elapsed from inserting the blade between the teeth, until the endotracheal tube crossed the vocal cords, as evidenced by visual confirmation by the anesthesiologist. In cases that the endotracheal tube was not visualized passing through the vocal cords, tracheal intubation was confirmed by capnography. In case of failure to intubate with the AL, the Macintosh laryngoscope was used. Finally, all data were collected and recorded by two independent unblinded observers.

Statistical Analysis

Demographic and other data regarding intubation are presented as median values (interquartile range). Correlations between continuous variables were assessed using the Pearson correlation coefficient. For ordinal data, the Spearman rank correlation was used. Optimization maneuvers (0 and ≥ 1) and attempts at successful intubation (1 and > 1) were entered as dichotomous variables. The Kruskal-Wallis rank sum test compared medians, whereas the Fisher exact test compared proportions (both two-tailed). Contingency table analyses were assessed for the presence or absence of power of 0.80 or greater to detect as significant ($P < 0.01$) differences with a with a medium effect size ($w = 0.30$).¹⁴ Three analyses were performed for each positive omnibus Fisher exact test or Kruskal-Wallis test; hence, *post hoc* Bonferroni corrections were performed. Because omnibus tests were followed, *post hoc*, by pairwise comparisons, α was adjusted such that null hypotheses were rejected when $P < 0.01$. Binary logit regression evaluated the effect of the OD of the tube, of the laryngoscope size (AL-L, AL-S), and of the ratio of the OD

Table 2. Clinical Characteristics of the Study Population

| | PVCT | RFT | RFST | P Value |
|--------------------------------------|------------|------------|------------|---------|
| Sex, n (%) | | | | |
| Female | 55 (56.1) | 74 (54.8) | 73 (64) | |
| Male | 43 (43.9) | 61 (45.2) | 41 (36) | |
| Total | 98 (100) | 135 (100) | 114 (100) | 0.3* |
| ASA, n (%) | | | | |
| I | 45 (45.9) | 59 (43.7) | 50 (43.9) | |
| II | 38 (38.8) | 49 (36.3) | 44 (38.6) | |
| III | 15 (15.3) | 27 (20) | 20 (17.5) | |
| Total | 98 (100) | 135 (100) | 114 (100) | 0.92* |
| Age, median (IQR), yr | 65 (35–71) | 65 (35–71) | 64 (54–72) | 0.61† |
| BMI, median (IQR), kg/m ² | 24 (19–29) | 24 (18–29) | 23 (18–27) | 0.58† |

* Fisher exact test. † Kruskal-Wallis test.

ASA = American Society of Anesthesiologists (physical status); BMI = body mass index; IQR = interquartile range; PVCT = polyvinyl chloride tracheal tube; RFT = straight wire-reinforced tube; RFST = straight silicone wire-reinforced tube.

of the tube to the width of the AL guiding channel on intubation failure in the RFT and RFST groups. All tests were two-sided, and analysis was performed with a commercially available statistical package (SPSS for Windows 11.0; SPSS Inc., Chicago, IL).

Results

Patients were randomly allocated to three groups: a control group (PVCT, $n = 98$) and the two study groups (RFT, $n = 135$ and RFST, $n = 114$). There were no differences between treatment groups with respect to demographic or baseline characteristics (table 2). The success rate of intubation was significantly higher with the PVCT than with RFT or RFST ($P < 0.01$). PVCT patients experienced no intubation failure, required no more than one intubation attempt, had a shorter intubation period, and had, except for one patient, no trauma (table 3). Patients in the RFT and RFST groups required significantly more optimization maneuvers than controls and more attempts at successful intubation, thus resulting in significantly increased duration for tracheal intubation. Although there was no significant difference in attempts (> 1) at successful intubation between the RFT and RFST groups, the recorded differences (10.4% and 3.5%, respectively) could be clinically relevant. This may reflect a type 2 error (table 3).

Hence, the superiority of the PVCT over the RFT and RFST groups was evident. Thereafter, analysis was focused on patients in the RFT and RFST groups. No significant difference was found in success rates between the RFT (78.5%) and RFST (75.4%) groups ($P = 0.65$; table 3). In the RFT and RFST groups, the intubation angle was inversely correlated to the OD of the tube ($r = -0.46$ and $r = -0.35$, respectively; both $P < 0.01$), to the use of AL-S ($r = -0.65$ and $r = -0.58$, respec-

Table 3. Comparisons of Patients with Respect to Laryngoscopic Performance

| | Tube Type | | | P Value | | |
|--|---------------|----------------|----------------|---------|-----------------------|--------------|
| | PVCT (n = 98) | RFT (n = 135) | RFST (n = 114) | Omnibus | PVCT vs. RFT and RFST | RFT vs. RFST |
| Success rate, n (%) | 98/98 (100) | 106/135 (78.5) | 86/114 (75.4) | < 0.01* | < 0.01* | 0.65* |
| Optimization maneuvers, n (%) | | | | | | |
| 0 | 94/98 (95.9) | 60/106 (56.6) | 51/86 (59.3) | | | |
| ≥ 1 | 4/98 (4.1) | 46/106 (44.4) | 35/86 (40.7) | < 0.01* | < 0.01* | 0.76* |
| Attempts at successful intubation, n (%) | | | | | | |
| 1 | 98/98 (100) | 95/106 (89.6) | 83/86 (96.5) | | | |
| > 1 | 0/98 (0) | 11/106 (10.4) | 3/86 (3.5) | < 0.01* | < 0.01* | 0.09* |
| Trauma, n (%) | 1/98 (1.02) | 36/135 (26.6) | 29/114 (25.4) | < 0.01* | < 0.01* | 0.88* |
| Duration, median (IQR), s | 13 (12–14.7) | 20 (16–23.5) | 19 (16–23) | < 0.01† | < 0.01† | 0.78† |

* Fisher exact test, two-tailed. † Kruskal-Wallis test, two-tailed.

IQR = interquartile range; PVCT = polyvinyl chloride tracheal tube; RFT = straight wire-reinforced tube; RFST = straight silicone wire-reinforced tube.

tively; both $P < 0.01$), and to the ratio of the OD of the endotracheal tube to the width of the AL guiding channel ($r = -0.95$ and $r = -0.82$, respectively; both $P < 0.01$). Figure 2 displays the inverse correlation observed between the ratio of the OD of the endotracheal tube to the width of the AL guiding channel *versus* the intubation angle for the PVCT, RFT, and RFST groups.

Also, the performance of AL size among RFT and RFST patients is illustrated in table 4. Success rates were significantly increased with AL-S in both groups. Optimization maneuvers (≥ 1) were significantly reduced with AL-S in both groups, whereas no differences were documented with respect to the time required for intubation and trauma. Finally, binary logit regression performed in the RFT and RFST groups showed that a 1-mm decrease in tube OD increased the odds of intubation failure by a factor of 2.6 (95% confidence interval, 1.5–4.8; $P < 0.01$). The use

of AL-L increased the odds of failure by a factor of 5.3 (95% confidence interval, 2.5–12.1; $P < 0.01$). Similarly, a decrease in 0.1 of the ratio of the OD of the endotracheal tube to the width of the AL guiding channel was associated with a 3.1 (95% confidence interval, 1.9–5.2; $P < 0.01$) times increase in the odds ratio of intubation failure. It is of note that in the RFT and RFST groups, 12 of 249 patients (4.8%) sustained transient arterial desaturation (oxygen saturation measured by pulse oximetry $< 92\%$). The Macintosh laryngoscope was used successfully in 57 of 249 (22.9%) patients who could not be intubated with the AL in the RFT and RFST groups.

Discussion

Currently, when using straight reinforced tracheal tubes, the common practice requires the use of a Macin-

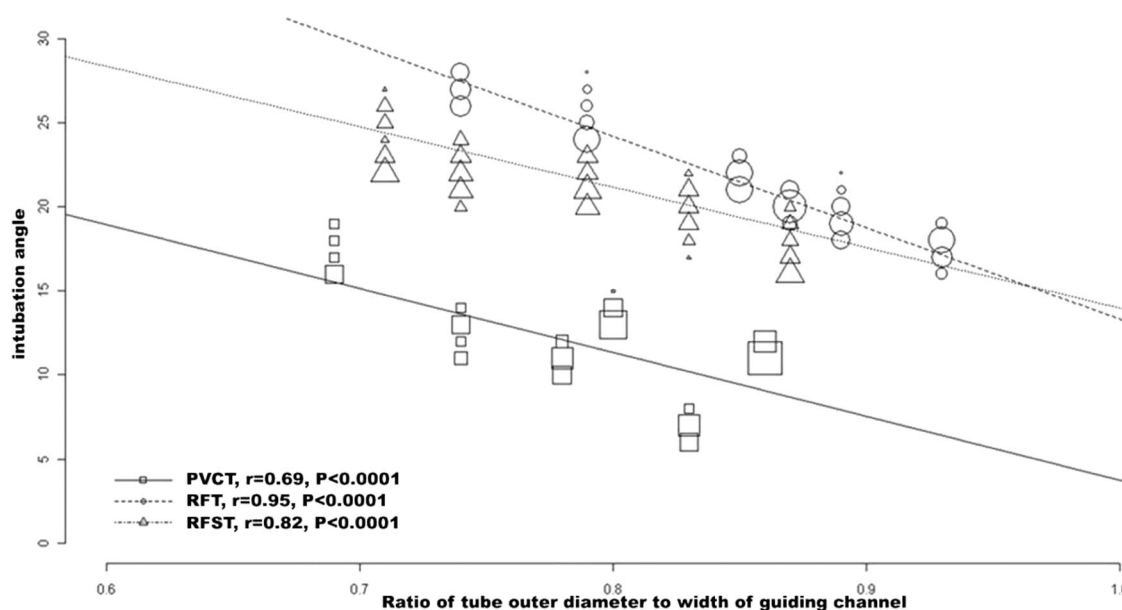


Fig. 2. The ratio of the endotracheal tube OD to the width of the Airtraq laryngoscope (Prodol Meditec S.A., Vizcaya, Spain) guiding channel, plotted *versus* the intubation angle measured in the polyvinyl chloride tracheal tube (PVCT; rectangle), straight wire-reinforced tube (RFT; circle), and straight silicone wire-reinforced tube (RFST; triangle) groups. Symbol sizes represent the number of cases at each point.

Table 4. Data for Tracheal Intubation with Each Size of Airtraq Laryngoscope in the RFT and RFST Groups

| | AL-L (n = 159) | AL-S (n = 90) | P Value |
|--|----------------|---------------|---------|
| Success rate, n (%) | 112/159 (70.4) | 80/90 (88.8) | < 0.01* |
| Optimization maneuvers, n (%) | | | |
| 0 | 57/112 (50.9) | 54/80 (67.5) | 0.02* |
| ≥ 1 | 55/112 (49.1) | 26/80 (32.5) | |
| Attempts at successful intubation, n (%) | | | |
| 1 | 102/112 (91.1) | 76/80 (95) | 0.4* |
| > 1 | 10/112 (8.9) | 4/80 (5) | |
| Trauma, n (%) | 13/159 (8.2) | 2/90 (2.2) | 0.5* |
| Duration, median (IQR), s | 20 (17–24) | 19 (15–22) | 0.05† |

* Fisher exact test, two-tailed. † Kruskal–Wallis test, two-tailed.

AL-L and AL-S = larger and smaller adult sizes of the Airtraq laryngoscope (Prodol Meditec S.A., Vizcaya, Spain), respectively; IQR = interquartile range; RFT = straight wire-reinforced tube; RFST = straight silicone wire-reinforced tube.

tosh laryngoscope and a malleable stylet primed in the tube. We used the AL to place the reinforced tracheal tubes in the trachea without the aid of a stylet. The current results demonstrated that a major factor for successful intubation through the AL is the angle created by the endotracheal tube emerging from the AL guiding channel. Because the endotracheal tube cannot be manipulated by the operator, the AL must be adequately positioned and aligned in front of the glottis entrance for successful intubation. This study underlines that the intubation angle depends on the size and type of the endotracheal tube, as well as the size of the AL used. Finally, the intubation angle measured in RFT and RFST groups was inversely correlated to the ratio of the OD of the endotracheal tube to the width of the AL guiding channel.

Our findings showed the superiority of the PVCT compared with the RFT or RFST for intubation through the AL. The former is reasonably stiff, has a curvature, and emerges from the AL with its distal end pointing anteriorly toward the plane of the glottis. Hence, the preformed shape of the PVCT, with a curvature of approximately 130°, is responsible for its unique characteristics. Also, we found that when flexible straight reinforced tracheal tubes were used, the tip of the endotracheal tube was directed posteriorly toward either the arytenoid cartilage or the esophagus. This was attributed to the fact that flexible straight reinforced tracheal tubes do not have a steep curvature and exit the AL with a higher angle. In most cases, this resulted in additional optimization maneuvers and/or intubating attempts and increased duration of the intubation procedure.

The current results demonstrated the influence of the laryngoscope size among adult patients intubated with straight reinforced tubes. The smaller AL had a higher success rate and required less optimization maneuvers when compared with the larger AL. This may be due to

the technical characteristics of this laryngoscope, because the smaller width of the guiding channel resulted in an increased ratio of the tube's OD to the width of the guiding channel; hence, this significantly affected the intubation angle and the success rate.

This is the first study, to the best of our knowledge, that evaluates the use of straight reinforced tracheal tubes for intubation through the AL, while taking into account the size of the laryngoscope. Only one published study reported the use of polyvinyl chloride tracheal tubes,¹⁵ whereas in others^{1–3,9} this is assumed. Also, there are two studies where double-lumen tracheal tubes were used through the AL,^{15,16} and a preformed nasotracheal tube was used in one case.¹⁵ So far, the published literature has not reported any failures of use of the AL with polyvinyl chloride tracheal tubes. This remains to be confirmed by further studies. However, our study reports 22.9% failure when using straight reinforced tracheal tubes.

This study exhibits two major limitations. First, all intubations were attempted by experienced users, and our results may not necessarily apply to less experienced personnel. Second, the overlapping in size 7.0- to 7.5-mm ID tracheal tubes for both AL sizes as well as the fact that all data were recorded by unblinded observers may be possible sources of bias. Despite the aforementioned limitations, this study clearly demonstrates that the angle created by the straight reinforced tubes emerging from the AL was inversely correlated to the ratio of the OD of the endotracheal tube to the width of the guiding channel. Each 10% decrease in this ratio led to a threefold increase in the odds of intubation failure.

In conclusion, we found that a major factor for successful intubation through the AL is the angle created by the endotracheal tube emerging from the laryngoscope. The PVCT was found to be superior to the RFT and RFST for tracheal intubation through the AL. In cases of using either the RFST or the RFT, the larger endotracheal tube OD and the smaller size AL are preferable because they both decreased the intubation angle and resulted in increased rates of successful intubation.

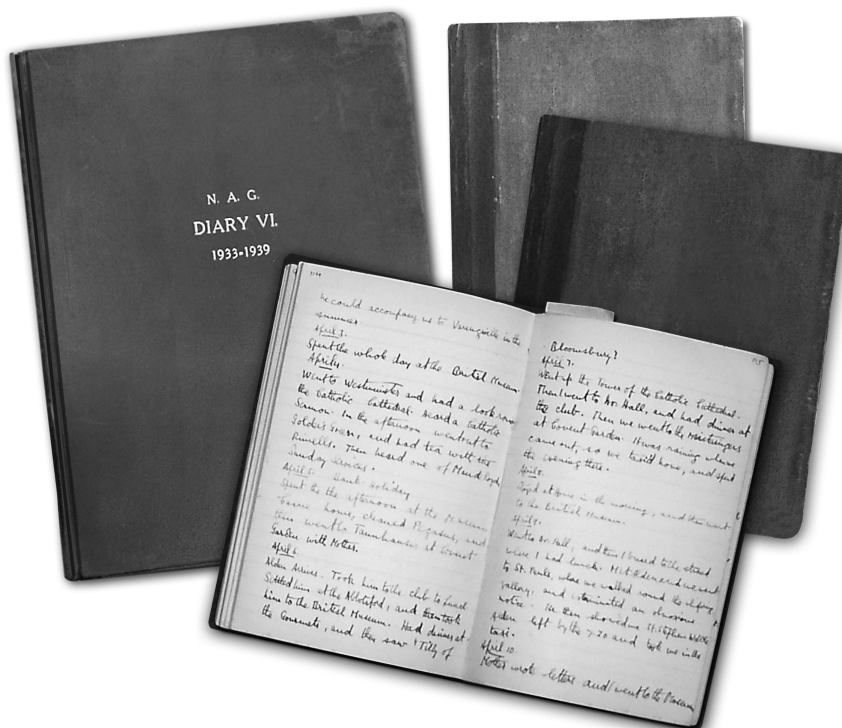
References

1. Maharaj CH, O'Croinin D, Curley G, Harte BH, Laffey JG: A comparison of tracheal intubation using the Airtraq or the Macintosh laryngoscope in routine airway management: A randomised, controlled clinical trial. *Anaesthesia* 2006; 61:1093–9
2. Maharaj CH, Costello JF, Harte BH, Laffey JG: Evaluation of the Airtraq and Macintosh laryngoscopes in patients at increased risk for difficult tracheal intubation. *Anaesthesia* 2008; 63:182–8
3. Maharaj CH, Buckley E, Harte BH, Laffey JG: Endotracheal intubation in patients with cervical spine immobilization: A comparison of Macintosh and Airtraq laryngoscopes. *ANESTHESIOLOGY* 2007; 107:53–9
4. Norman A, Date A: Use of the Airtraq laryngoscope for anticipated difficult laryngoscopy. *Anaesthesia* 2007; 62:533–4
5. Savoldelli GL, Ventura F, Waeber JL, Schiffer E: Use of the Airtraq as the primary technique to manage anticipated difficult airway: A report of three cases. *J Clin Anesth* 2008; 20:474–7

6. Ford PN, Hamer C, Medakkar S: Use of the Airtraq in the difficult airway. *Eur J Anaesthesiol* 2007; 24:730-1
7. Dhonneur G, Ndoko S, Amathieu R, Housseini LE, Poncelet C, Tual L: Tracheal intubation using the Airtraq in morbid obese patients undergoing emergency cesarean delivery. *ANESTHESIOLOGY* 2007; 106:629-30
8. Dhonneur G, Ndoko S, Amathieu R, Attias A, Housseini L, Polliand C, Tual L: A comparison of two techniques for inserting the Airtraq laryngoscope in morbidly obese patients. *Anaesthesia* 2007; 62:774-7
9. Ndoko SK, Amathieu R, Tual L, Polliand C, Kamoun W, El Housseini L, Champault G, Dhonneur G: Tracheal intubation of morbidly obese patients: A randomized trial comparing performance of Macintosh and Airtraq laryngoscopes. *Br J Anaesth* 2008; 100:263-8
10. Black JJ: Emergency use of the Airtraq laryngoscope in traumatic asphyxia: Case report. *Emerg Med J* 2007; 24:509-10
11. Maharaj CH, Costello JF, McDonnell JG, Harte BH, Laffey JG: The Airtraq as a rescue airway device following failed direct laryngoscopy: A case series. *Anaesthesia* 2007; 62:598-601
12. Suzuki A, Toyama Y, Iwasaki H, Henderson J: Airtraq for awake tracheal intubation. *Anaesthesia* 2007; 62:746-7
13. Uakritdathikam T, Asampinawat T, Wanasuwannakul T, Yoosamran B: Awake intubation with Airtraq laryngoscope in a morbidly obese patient. *J Med Assoc Thai* 2008; 91:564-7
14. Cohen J: Differences between proportions, Statistical Power Analysis for the Behavioral Sciences, 2nd edition. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1988, pp 179-214
15. Hirabayashi Y, Otsuka Y, Taira K, Shinohara T, Kikuchi Y, Shimada N, Kono R, Tamai K, Inoue S, Seo N: Airtraq optical laryngoscope. *Masui* 2008; 57:1026-30
16. Hirabayashi Y, Seo N: The Airtraq laryngoscope for placement of double-lumen endobronchial tube. *Can J Anaesth* 2007; 54:955-7

ANESTHESIOLOGY REFLECTIONS

Noel Gillespie's Diaries



Born Christmas Day of 1904 in Sydenham, England, Noel A. Rieder would change his name as a teenager to Noel A. Gillespie (1904–1955). Successfully advised by T. E. Lawrence, the future "Lawrence of Arabia," young Noel matriculated at Oxford. Gillespie interrupted his studies to steam aboard the S.S. *Orestes* as "professor of English" to Albert Schweitzer on the medical missionary's return trip to Africa. Gillespie resumed studies at Oxford, where he earned five academic degrees and then his Diploma in Anaesthetics. In 1939 he forsook England for the University of Wisconsin, where, under the watchful eye of Professor Ralph Waters, Gillespie finished an anesthesia residency, earned a second medical doctorate, and authored his text *Endotracheal Anaesthesia*. Fifty years after his sudden death in 1955, Gillespie's handwritten diaries (from 1917–1933) were curatorially purchased at auction. (Copyright © the American Society of Anesthesiologists, Inc. This image appears in color in the *Anesthesiology Reflections* online collection available at www.anesthesiology.org.)

George S. Bause, M.D., M.P.H., Honorary Curator, ASA's Wood Library-Museum of Anesthesiology, Park Ridge, Illinois, and Clinical Associate Professor, Case Western Reserve University, Cleveland, Ohio. UJYC@aol.com.