

# *Improvement of the visualization of larynx and successful intubation with Airtraq<sup>®</sup> optical laryngoscope in nine neonates, infants and children with difficult airway*

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## ABSTRACT

### **Improvement of the visualization of larynx and successful intubation with Airtraq<sup>®</sup> optical laryngoscope in nine neonates, infants and children with difficult airway**

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The goal of this observational study was to evaluate the improvement of the visual view of the larynx in neonates, infants and children with difficult airway using the Airtraq<sup>®</sup> Optical Laryngoscope, compared with visual views of the first conventional laryngoscopy with Macintosh blade. We studied clinical and/or laryngoscopic manifestations of difficult airway and advanced airway management of nine consecutive pediatric patients (2 neonates, 5 infants and 2 children) admitted from 1/1/2011 to 31/08/2012 for elective/emergency surgery or diagnostic procedure under general anesthesia. All nine pediatric patients had successful airway management and intubation, using the Airtraq<sup>®</sup> Optical Laryngoscope after intubation failure following conventional laryngoscopy. The percentage of glottis opening (POGO), the laryngoscopy difficulty level according to Cormack-Lehane Grade and the Visual Analogue Scale (VAS) of easiness in recognizing the laryngeal structures improved using of Airtraq<sup>®</sup> Optical Laryngoscope at 2<sup>nd</sup> attempt. Airtraq<sup>®</sup> Optical Laryngoscope could be a first-line device for intubation of neonates, infants and children with difficult airway.

## INTRODUCTION

Among many anesthetic skills, tracheal intuba-

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tion is the more important, and failed or prolonged intubation attempts are conducted with high morbidity rates<sup>1</sup>. The effect of "difficult laryngoscopy and/or intubation" in children is

less than in adults, but not insignificant<sup>2</sup>. Although many methods exist for evaluating and predicting the difficult airway in adults<sup>3,4</sup>, no published studies have assessed the use of any of these techniques in children<sup>5,6</sup>. Assessment of the pediatric airway can be based mainly on history, such as the presence of congenital syndrome or anomaly, and physical examination, with specific reference to the airway. Routine evaluation of the airway in all children followed by correlation with any airway problems occurring during anesthetic management helps the practitioner to develop experience.

The Airtraq<sup>®</sup> Optical Laryngoscope (Prodol Meditec S.A., Guecho, Vizcaya, Spain) is an alternative, disposable, rigid laryngoscope. The blade comprises two channels; one channel locks the tracheal tube and acts as passage, whilst the other contains a light source and series of lenses, prisms and mirrors. The image is reflected from the tip of the blade to the viewfinder of the scope. So it can enable good visualization of the larynx and trachea opening, easily<sup>7</sup> and without maneuvers or movement of the cervical spine<sup>8</sup>, in cases where conventional laryngoscopy with Macintosh blade may be rigorous and unsuccessful.

The availability of pediatric Airtraq<sup>®</sup> in two sizes, infant (for tracheal tubes 2.5-3.5mm ID) and child (tracheal tubes 4.0-5.5mm ID) makes it an alternative device for laryngoscopy

and intubation in pediatric patients with specific airway pathology<sup>9</sup>.

To date, evidence for the safety and efficacy of the pediatric Airtraq<sup>®</sup> is limited to few evaluations of pediatric populations with normal airway<sup>10,11</sup>, and some case reports regarding pediatric patients with difficult airway, due to congenital syndromes, such as Treacher-Collins, Goldenhar or Hallermann–Streiff syndrome<sup>9,12-19</sup>. All references conclude that pediatric Airtraq<sup>®</sup> is a safe and beneficial device for tracheal intubation, and valuable in securing a known difficult airway. If these results can be confirmed by prospective studies, Airtraq<sup>®</sup> could be a first-line device for intubation of neonates, infants and children with difficult airway<sup>18</sup>, mainly at places lacking advanced airway management devices, such as fiberoptic bronchoscope<sup>19</sup>.

The aim of this study was to evaluate the improvement of the visualization of the larynx, by the use of Airtraq<sup>®</sup> in neonates, infants and children with difficult airway, compared with the visual views of the larynx after conventional laryngoscopy with Macintosh blade, in the same patients, and to record our observations and acquired experience, by the use of this device in neonates, infants and children with “anticipated” or “unanticipated” difficult airway.

## MATERIAL AND METHODS

Between 1/1/2011 and 31/08/2012, we treated and recorded nine specific patients, two neonates (3 and 28 days old), five infants (1,5-15 months old), and two children (6 and 7 years old), who needed general anesthesia for elective/emergency surgery or diagnostic procedure.

On preoperative evaluation, all nine pediatric patients were haemodynamically stable, with oxygen saturation of 96-99% on room air, and were classified as ASA Grade I-III, according to their physical status. Preoperative airway evaluation is in general not possible, because of lack of cooperation, but evidence of a possible difficult airway, in these nine patients, was considered by the presence of facial deformities, immaturity or respiratory pathology. After formal description of the anesthetic procedure, a written informed consent was obtained from parents, as well as an approval for the study from the research Ethics Committee of our Institution.

All nine patients were assigned to receive a routine pediatric induction in anesthesia, followed by conventional laryngoscopy. In the presence of difficult intubation (Cormack-Lehane Grade > 2b), our planning was to perform a second laryngoscopy with Airtraq<sup>®</sup>. All laryngoscopy/intubation attempts were performed by the same consultant, with a lot of experience

in the use of Airtraq<sup>®</sup>, to exclude objective bias.

### *Description of the anesthetic and airway management technique:*

Premedication is generally avoided in neonates and infants, but we also avoided it in the two studied children with known syndrome, because of the risk of central respiratory depression and sudden airway loss<sup>11,20</sup>. In the operating room, standard monitoring was instituted and noninvasive blood pressure (NIBP), heart rate (HR) and oxygen saturation were recorded every 3min<sup>21</sup>.

After preoxygenation for 3min, we proceeded with inhalational induction in anesthesia, with sevoflurane 8% in O<sub>2</sub> 100%, until adequate depth of anesthesia was achieved (no eyelash reflex/no response to jaw thrust). While patients were still breathing spontaneously, an intravenous access was placed, and propofol (2mg/kg), and fentanyl (1mcg/kg) were administered. The use of muscle relaxants was avoided. After manual ventilation with 100% O<sub>2</sub> for 2 min, we proceeded with 1<sup>st</sup> attempt of conventional laryngoscopy. The selected tube size for neonates and infants was No 2,5-3,5 cuffed, while for children followed the type "age/4+3,5" (cuffed tubes). The selected Airtraq<sup>®</sup> size was in accordance with the manufacturer's instructions<sup>22</sup>.

We recorded: percentage of glottis opening (POGO)<sup>23</sup>, difficulty level in laryngoscopy ac-

according to Cormack-Lehane Grade (1-4), ease in recognizing laryngeal structures and the field of view with VAS score (1:poor-10:excellent), haemodynamic parameters and oxygen saturation of all nine patients during procedure, and time taken for the 1<sup>st</sup> laryngoscopy/intubation attempt. Time was defined as the time from first picking up the laryngoscope until leaving down tube and laryngoscope, after failed attempt.

In all studied cases we failed intubation at 1<sup>st</sup> attempt, so we proceeded to our alternative technique with Airtraq<sup>®</sup> after reoxygenating patients. We recorded again POGO, Cormack-Lehane Grade, VAS score, haemodynamics and oxygen saturation during procedure, and time required for the 2<sup>nd</sup> laryngoscopy/intubation attempt. Time was now defined as the time from picking up Airtraq<sup>®</sup> until the first capnography upstroke following intubation. We also recorded: successful rates of intubation at 2<sup>nd</sup> attempt, the need for corrective maneuvers using Airtraq<sup>®</sup>, and finally evidence of injury. Traumatic intubation was defined as: i. presence of blood on tracheal tube on extubation, and ii. hoarse cry/voice. After successful intubation we measured specific anatomical features, such as mouth opening, thyromental distance and head extension degree, to extract some conclusions about their effect on difficult intubation in neonates, infants and children.

Statistical analysis was performed with the Statistical Package for the Social Sciences (SPSS 20, Inc., Chicago IL). Data are expressed as mean  $\pm$  SD. Parametric data were compared using paired samples t-test. Statistical significance was assumed, if  $p < 0,01$ .

## RESULTS

Demographic data and clinical findings of the nine studied pediatric patients are shown in Table 1.

**Table 1.** Demographics and Clinical findings of the nine pediatric patients

M/F	Age	BW kg	Height cm	Procedure	Known Syndrom	Immaturity /NICU	Congenital disorders	Facial deformities
M	15m	11	96	Orchidopexy		NO/NO		Small chin Prominent maxilla
F	7y	11	105	Endoscopy for celiac disease	Williams S. - Psychomotor Retardation	YES/NO		Small jaw Large tongue Prominent incisors
M	3m	7	60	Inguinal Hernia repair		NO/NO		Big head Large inelastic cheeks
M	2m	3,2	58	Inguinal Hernia repair		YES/NICU	Abnormal development	
M	28d	4,9	55	Rectum Displacement		NO/NICU	Colonic atresia	Small mouth Strange form
F	45d	3,9	48	Diagnostic Endoscopy for right vocal cord paresis	Unknown	NO/NICU	Left shift of larynx	
M	2m	2,5	56	Colectomy / Necrotizing enterocolitis		YES: 3plets /NICU		
F	3d	2,3	43	Colonic atresia surgery	Unknown	YES/NICU	Congenital heart disease	Microtia Small jaw, chin
F	6y	22	118	MRI of brain / Psychomotor retardation	Hurler S.	NO/NO		Large tongue Prominent maxilla Strange form

*M: male, F: Female, BW: Body Weight, NICU: Neo-natal Intensive Care Unit*

All nine pediatric patients were successfully intubated with Airtraq<sup>®</sup> at 2<sup>nd</sup> attempt (the successful rate of intubation with Airtraq<sup>®</sup> was 100%).

Percentage of glottis opening (POGO), laryngoscopy difficulty level with Cormack-Lehane Grading (1-4), VAS of ease in recognizing laryngeal structures, time required for both attempts, and presence of traumatic intubation, defined as i. presence of blood on tracheal tube on extubation, ii. hoarse cry or voice, are shown in Table 2.

**Table 2.** Intubation characteristics and performance of conventional laryngoscope and Airtraq® Optical laryngoscope.

	Conventional laryngoscopy	Airtraq® laryngoscopy	p value
<b>POGO score (%) :</b>			
AVG (SD)	41.66 (12.5)	93.33 (5)	0.001
RANGE	[25 – 60]	[85 – 100]	
<b>Cormack – Lehane Grade (1a – 4)</b>	2b – 3a	1a – 1b	
<b>VAS ease in recognizing laryngeal structures and field of view (1-10)</b>	3.77 (1.2) [2 – 6]	8.66 (1) [7 – 10]	0.001
<b>Time of laryngoscopy / intubation (sec)</b>	52.22 (3.59) [48 – 57]	51.33 (9.27) [43 – 51]	0,17
<b>Traumatic intubation</b>			
<b>i. blood on tracheal tube</b>	-	0	
<b>ii. hoarse cry / voice</b>	-	0	

*POGO(%): percentage of glottis opening, VAS: visual analogue score (1=poor, 10=excellent), AVG: Average, SD: Standard Deviation. Values are mean (SD), median [range] or numbers.*

The improvement rate of the percentage of glottis opening (POGO) at 2<sup>nd</sup> laryngoscopy,

compared to 1<sup>st</sup> laryngoscopy attempt, was 120%.

Values of oxygen saturation SpO<sub>2</sub>, systolic blood pressure (SBP) and heart rate (HR) after induction in anesthesia, at 1<sup>st</sup> conventional laryngoscopy and at 2<sup>nd</sup> laryngoscopy/intubation with Airtraq® are shown in Table 3.

**Table 3.** Oxygen saturation and haemodynamic parameters after anesthesia induction and during the two laryngoscopy/intubation attempts in the nine pediatric patients.

	After anesthesia induction	Conventional laryngoscopy	Airtraq® laryngoscopy	p value
<b>SpO<sub>2</sub> (%)</b>				
AVG (SD)	97.44 (1.01)	93.22 (1.98)		< 0.01
RANGE	[96 – 99]	[90 – 96]		
AVG (SD)	97.44 (1.01)		93.88 (1.53)	< 0.01
RANGE	[96 – 99]		[92 – 97]	
AVG (SD)		93.22 (1.98)	93.88 (1.53)	0.16 (NS)
RANGE		[90 – 96]	[92 – 97]	
<b>SBP (mmHg)</b>				
AVG (SD)	67.88 (15.84)	78.33 (16.37)		< 0.01
RANGE	[52 – 97]	[67 – 108]		
AVG (SD)	67.88 (15.84)		73.66 (17.42)	< 0.01
RANGE	[52 – 97]		[60 – 106]	
AVG (SD)		78.33 (16.37)	73.66 (17.42)	< 0.01
RANGE		[67 – 108]	[60 – 106]	
<b>HR (b/min)</b>				
AVG (SD)	117.55 (14.3)	125.88 (13.69)		< 0.01
RANGE	[92 – 130]	[104 – 141]		
AVG (SD)	117.55 (14.3)		123.11 (13.95)	< 0.01
RANGE	[92 – 130]		[99 – 139]	
AVG (SD)		125.88 (13.69)	123.11 (13.95)	< 0.01
RANGE		[104 – 141]	[99 – 139]	

*SpO<sub>2</sub>: oxygen saturation, SBP: Systolic Blood Pressure, HR: Heart rate. AVG: Average, SD: : Standard Deviation. Values are mean(SD), median [range] or numbers.*

Measurements of specific anatomical features, such as body weight and height, mouth opening, thyromental distance, head extension degree of the 9 pediatric patients, Internal Diameter size (ID) of the nine cuffed tracheal tubes, and Cormach-Lehane grade taken from conventional laryngoscopy are shown in Table 4.

**Table 4.** Measurements of specific anatomical features of the nine pediatric patients and size of the ID of the used tracheal tubes.

Age	BW (kg)	Height (cm)	Mouth opening (cm)	Thyromental Distance (cm)	Head extension degree	ID tube (mm) cuffed	C-L Grade at 1 <sup>st</sup> laryngoscopy
15m	11	96	3,5	4,5	=90	4,5	IIIa
7y	11	105	4	5	>90	4	IIIa
3m	7	60	3	4	>90	3,5	IIb
2m	3,2	58	2,8	4	>90	3	IIb
28d	4,9	55	2,5	4	=90	3	IIIa
45d	3,9	48	2,5	3,5	=90	3	IIIa
2m	2,5	56	2,5	3	>90	3	IIb
3d	2,3	43	1,5	2,5	=90	2,5	IIIa
6y	22	118	4	6	=90	4,5	IIIa

*BW: Body Weight, ID: size of the internal diameter of the tracheal tube (mm), C-L: Cormack-Lehane grade (1-4).*

We recorded that in the 3 days old neonate, with mouth opening 1.5cm, we had to withdraw and reposition Airtraq<sup>®</sup> to improve its place in the mouth and to by-pass the large tongue. In the 45 days old infant, with a profound left shift of larynx, we had to turn Airtraq<sup>®</sup> to the left towards its vertical axis. At 2<sup>nd</sup> laryngoscopy with Airtraq<sup>®</sup> we were able

to recognize some structural peculiarities of larynx, such as obstruction of the visual view from a large, swelled right arytenoid cartilage, a profound left shift of the larynx, or an epiglottis with quadrate shape.

## DISCUSSION

In our study, all nine pediatric patients had a difficult airway, a failed intubation at first conventional laryngoscopy, and finally a successful intubation at second laryngoscopy with Airtraq<sup>®</sup> Optical Laryngoscope. Although the sample of the nine pediatric patients is relative small, it is of some value that we collected nine pediatric patients (2 neonates, 5 infants and 2 children) with a difficult airway, who became witnesses of themselves, allowed us to evaluate the efficacy of the two laryngoscopes (conventional vs Airtraq<sup>®</sup>). Several case reports confirm the successful intubation with Airtraq<sup>®</sup>, in pediatric patients with difficult airway due to a known congenital syndroms or specific pathology<sup>12-16</sup>, but no published data exist, evaluating the efficacy of Airtraq<sup>®</sup>, compared to conventional laryngoscopy, in a difficult pediatric airway situation, in a large number of children.

In our study, duration of laryngoscopy and intubation attempts, with both conventional blade and Airtraq<sup>®</sup>, were equal, on average 51sec. A study, comparing Airtraq<sup>®</sup> with conventional laryngoscopy in infants and children

with normal airway<sup>11</sup>, concludes that intubation with Airtraq<sup>®</sup> took, on average, 20sec longer than conventional intubation, but times ranged from 23sec to 49sec, mainly because of lack of experience in the Airtraq<sup>®</sup> use, and differences in the airway anatomy of children at different ages. There is an agreement for the need of experience in the use of Airtraq<sup>®</sup>, despite its low learning curve<sup>24-25</sup>. However, if the Airtraq<sup>®</sup> use is to be of maximum benefits in a difficult airway scenario, users must first be as familiar as possible. This comes in agreement with our case, where all laryngoscopy and intubation attempts were performed by the same person, a consultant with experience in the management of pediatric airway, meaning familiarization with conventional laryngoscopy, and more than hundred intubations with Airtraq<sup>®</sup>. The longer duration of our laryngoscopy/intubation attempts could be easily explained by the presence of difficult airways in all nine studied cases.

Some case reports describe the use of Airtraq<sup>®</sup> in difficult pediatric airways and report the difficult positioning or misposition of tracheal tubes posterior to the glottis, although there was an excellent laryngeal view, resulting in longer intubation times<sup>26-28</sup>. There is an agreement, that these problems can be resolved by manipulation of Airtraq<sup>®</sup>, using the “backwards and upwards maneuvers”<sup>29</sup>.

In our study, despite the relatively long duration of intubation, we achieved to intubate all nine pediatric patients with difficult airway, with use of Airtraq<sup>®</sup>. We recorded, that Airtraq’s<sup>®</sup> thin shape allowed us its easy positioning in the mouth, even in patients with small mouth opening (<1.5cm) and provided excellent laryngeal views, without any head movement. So, the improvement rate of the percentage of glottis opening (POGO) reached 120%, while Cormack-Lehane grade improved from 2b-3b to 1a-1b. Consequently, VAS scores of ease in recognizing laryngeal structures increased to over 100%. Additionally, we were able to recognize structural peculiarities of the larynx, such as a large, swelled right arytenoid cartilage, a profound left shift of larynx, or an epiglottis with quadrate shape. About the easiness in directing the tracheal tube through the glottis, we observed that this was only possible, when the device was slightly lifted upwards (vertical lift maneuver), so that glottis view was located central and on the upper hemisphere, in the view finder<sup>30</sup>. Finally, in two cases, additional maneuvers were needed, to improve Airtraq’s<sup>®</sup> place in the mouth. These were either withdrawing and repositioning Airtraq<sup>®</sup> under epiglottis, converting it to a Miller’s blade laryngoscope, to bypass the large tongue, or turning Airtraq<sup>®</sup> to the left towards its vertical axis, in a case of left shift of larynx.

Studies about the efficacy of Airtraq<sup>®</sup> in adult populations with difficult airway conclude that intubation with Airtraq<sup>®</sup> is safe, easy in its use<sup>7,31</sup>, provides an improved laryngeal view<sup>32,33</sup>, with less movement of the spine<sup>34</sup>, while reducing the time of intubation attempts, compared with conventional laryngoscopy<sup>35</sup>. It is assumed that tracheal tube can be easily guided into trachea, because of the minimum distance between the exit of channel and the glottis opening, and the small variation of adult tube sizes, compared to pediatrics. Also, there is a greater familiarization with adult Airtraq<sup>®</sup>, because it is available for longer time. In contrast, pediatric Airtraq<sup>®</sup> is not formally evaluated in children with difficult airway. Studies are limited in few case reports, concerning airway management of pediatric patients with congenital syndromes, and some clinical trials, mostly in healthy populations with routine airways<sup>9-19</sup>.

No published studies exist, comparing haemodynamic parameters in pediatric patients, during intubation with Macintosh laryngoscope and Airtraq<sup>®</sup>. Reports in adult populations show only small alterations in heart rate, compared to baseline values, by the use of Airtraq<sup>®36</sup>, while one study concludes that tracheal intubation with Airtraq<sup>®</sup> resulted in minimal but significant increase of heart rate, decrease of mean arterial blood pressure, and stable oxygen saturation during the procedu-

re<sup>37</sup>. In our study we compared haemodynamic parameters and oxygen saturation after anesthesia induction, during 1<sup>st</sup> conventional laryngoscopy and during 2<sup>nd</sup> intubation attempt with Airtraq<sup>®</sup>. It shows that systolic arterial blood pressure and heart rate are significantly raised at both laryngoscopy/intubation attempts ( $p < 0,01$ ), compared to baseline values, and that systolic blood pressure and heart rate at first conventional laryngoscopy are significantly higher than values at 2<sup>nd</sup> laryngoscopy/intubation with Airtraq<sup>®</sup> ( $p < 0,01$ ). Oxygen saturation is significantly decreased at both laryngoscopy attempts, compared to baseline saturation ( $p < 0,01$ ), but there is no significant difference in oxygen saturation between the 2 laryngoscopy attempts ( $p = 0,16$ ). The safety of new devices is, in general, difficult to be evaluated, because adverse effects are rare and most safety data come mainly from clinical use<sup>11</sup>. In this study, the evaluation of airway injury, showed that no traumatic intubation was appeared, in all extubated patients. It is of a question whether this study can really prove, if a traumatic intubation is caused either by conventional laryngoscopy or by the Airtraq<sup>®</sup>; two laryngoscopy attempts and one intubation were performed in each pediatric patient. In any case, in this study there was no evidence, that Airtraq<sup>®</sup> causes more trauma than conventional laryngoscopy.

Over the last decades the use of fiberoptic bronchoscopes has changed the scenario of difficult intubation radically, and seems to be gold standard in difficult intubations<sup>28,38,39</sup>. However, its use is precluded by high cost and the required experience. Airtraq<sup>®</sup> is a relatively new device, which presents a reliable alternative for special conditions. Several case series demonstrate the efficacy of Airtraq<sup>®</sup> in accomplishing “awake” intubation, in patients with suspected or known “difficult airway”. The built in antifog technology of lens makes this device suitable for patients breathing spontaneously, so it may be a useful alternative, where other methods have failed or are not available<sup>40,41</sup>. More studies are required to evaluate the efficacy of Airtraq<sup>®</sup>, for “awake” intubation in neonates, infants and children. However, many authors agree that the Airtraq<sup>®</sup> use offers many modification possibilities, such as combination with gumelastic bougie, making it a suitable device in accordance with the underlying airway pathology<sup>18</sup>. The management of the “anticipated” difficult pediatric airway, namely an airway preoperatively assessed and revealed, according to specific criteria, to be difficult to manage<sup>42,43</sup>, is still a matter of question. In pediatric patients, these risk criteria reveal mainly from clinical and physical examination. A history of congenital disorders and syndromes, or presence of immaturity, are strongly related with

difficult airway problems, because of the coexistence of facial deformities. Deformities such as hypoplasia of mandible or midface, macroglossia or microtia (syndromes such as Apert, Crouzon, Goldenhar, Hallermann-Streiff, Pierre-Robin, Down, Stevens-Johnson, Treacher-Collins, Hurler, Hunter, SanFilippo, Morquio) are strongly associated with difficult laryngoscopy and intubation<sup>44-46</sup>. Although airway examination, including mouth size and opening, tongue size related to pharyngeal structures (Mallampati score)<sup>3</sup> or palate and mandible size, is very important, many authors agree that Mallampati score has no practical use in infants and small children, due to poor cooperation<sup>47</sup>, so it cannot predict a poor view of glottis during direct laryngoscopy in paediatric patients. Also, standard thyromental and mandibular values does not exist in pediatrics, due to the variability of age and size<sup>46</sup>. In our studied patients, we indentified several facial deformities, that could link to a possible difficult airway. Not all pediatric patients with facial deformities have difficult airway, so we had to perform many intubations, to select paediatric patients with a difficult laryngoscopy and intubation. We also indentified, that it’s very rigorous to carry out airway examination in neonates and infants, so we made our measurements after intubation.

On the other hand, it is obvious, that we deviated from ASA and DAS recommendations for the management of an “anticipated difficult airway”, which is the “awake” intubation technique<sup>44</sup>, mainly because of lack of fiberoptic bronchoscope in our institution. Piraccini et al reported their experience using Airtraq<sup>®</sup> in children during humanitarian missions and noted that fiberoptic laryngoscope was not always available in developing countries. They concluded that clinicians should be aware of other devices, and that pediatric Airtraq<sup>®</sup> could solve many of their difficult airway problems. Thus, pediatric Airtraq<sup>®</sup> could be a useful solution, when it is impossible to meet all the anaesthetic society guidelines<sup>48</sup>. More studies are now required, to evaluate the potential use and efficacy of pediatric Airtraq<sup>®</sup>, for an “awake intubation” technique.

Conclusively, the Airtraq<sup>®</sup> Optical Laryngoscope allowed us to avoid complications associated with repeated failed attempts with Macintosh blade. This device was found suitable and easy for tracheal intubation, because it did not require forceful elevation of the epiglottis or any head movement. Perhaps Airtraq<sup>®</sup> is an excellent choice, as an alternative intubation device, for the management of an “anticipated” difficult airway, in neonates, infants and children. It’s use leads to successful intubation, in cases where the Macintosh blade fails, and where a fiberoptic bronchoscope is

not available. The easiness and the relative low learning curve in its use, together with the high improvement rates of the visual views of larynx, are encouraging and bring this laryngoscope in the first line of choice, for the management of difficult airway, in neonates, infants and children.

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