

COMPARISON OF TRUVIEW EVO2 LARYNGOSCOPE WITH MACINTOSH LARYNGOSCOPE ON PATIENTS UNDERGOING CAESAREAN SECTION

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ABSTRACT

Objective: A significant part of developing complications from anaesthesia during caesarean section is related to airway management. The goal of this study was to determine the efficiency of the TruView EVO2 laryngoscope compared with the Macintosh laryngoscope on patients undergoing caesarean section.

Material and Method: One hundred patients requiring endotracheal intubation for caesarean delivery were divided into two groups: Group T, using the TruView EVO2 laryngoscope (n=50), and Group M, using the Macintosh laryngoscope (n=50). The view of the glottis evaluating Cormack-Lehane classification, the intubation time, the success rate, the number of intubation attempts, the blood on blade, minor laceration, dental/airway trauma, and the lowest peripheral oxygen saturation during intubation attempts were noted.

Results: The view with the TruView EVO2 laryngoscope was better than the view with the Macintosh laryngoscope,

using the Cormack-Lehane classification ($p<0.05$) for evaluation. The intubation time was 6.0 ± 1.9 sec in group M and 13.8 ± 3.3 sec in group T ($p<0.001$). The success rate was 100% in all groups. The number of intubation attempts was 46/2/2 in group T and 45/3/2 in group M ($p>0.05$). Blood on blade was detected in five patients in group T and in four patients in group M. Minor laceration was detected in four patients in group T and in three patients in group M. No statistically difference was detected in the incidence of complications. The lowest peripheral oxygen saturation during intubation attempts was 99.14 ± 0.67 in group T and 99.00 ± 0.72 in group M ($p>0.05$).

Conclusion: The TruView EVO2 laryngoscope provides better laryngeal views and similar peripheral oxygen saturations and complication rates when compared with the Macintosh laryngoscope; thus, it can be used for intubation in obstetric patients.

Keywords: TruView EVO2 laryngoscope; Macintosh laryngoscope, obstetric airway. Nobel Med 2016; 12(3): 12-16

SEZERYAN OPERASYONU GEÇİRECEK HASTALARDA TRUVIEW EVO2 LARİNGOSKOPU VE MACINTOSH LARİNGOSKOPUNUN KARŞILAŞTIRILMASI

ÖZET

Amaç: Sezeryan operasyonu esnasında gelişen anestezi komplikasyonlarının önemli bir kısmı hava yolu yönetimi ile ilişkilidir. Bu çalışmada amaç sezeryan operasyonu geçirecek hastalarda TruView EVO2 laringoskobunun ve Macintosh laringoskobunun etkinliklerinin araştırılmasıdır.

Materyal ve Metot: Çalışmaya sezeryan operasyonu nedeniyle endotrakeal entübasyon yapılması planlanan 100 hasta dahil edildi. Hastalar iki gruba ayrıldı: Grup T: TruView EVO2 laringoskop kullanılanlar (n=50), grup M: Macintosh laringoskop kullanılanlar (n=50). Cormack ve Lehane Sınıflaması kullanılarak glottik görüntü, entübasyon süresi, başarı oranı, entübasyon deneme sayısı, blade üstünde kan olması, minör lazerasyonlar, dış/hava yolu hasarı ve entübasyon denemeleri esnasındaki en düşük periferik oksijen satürasyonu değerlerinin tümü kayıt edildi.

Bulgular: Cormack ve Lehane sınıflaması kullanılan yapılan glottik değerlendirme TruView EVO2

laringoskobunda Macintosh laringoskobuna göre daha iyi bulundu ($p<0,05$). Grup M'de entübasyon süresi $6,0\pm 1,9$ saniye olarak saptanırken, grup T'de bu süre $13,8\pm 3,3$ saniye olarak bulundu ($p<0,001$). Grupların tümünde başarı % 100 olarak saptandı. Entübasyon deneme sayısı grup T'de 46/2/2 olarak bulunurken, grup M'de 45/3/2 olarak bulundu ($p>0,05$). Grup T'de 5 hastada, grup M'de 4 hastada blade üzerinde kan gözlemlendi. Grup T'de 4 hastada, grup M'de 3 hastada minör lazerasyon saptandı. Grupların komplikasyon insidansları arasında fark saptanmadı. Entübasyon denemeleri esnasındaki en düşük periferik oksijen satürasyonu değeri grup T'de $99,14\pm 0,67$ olarak bulunurken, grup M'de $99,00\pm 0,72$ olarak bulundu ($p>0,05$).

Sonuç: TruView EVO2 laringoskobunun, Macintosh laringoskoba göre daha iyi laringeal görüntüler sağlanması, benzer periferik oksijen satürasyonu ve komplikasyon oranlarına sahip olması nedeniyle obstetrik hastalarda entübasyonda kullanılabilceğini düşünmekteyiz.

Anahtar kelimeler: TruView EVO2 laringoskobu, Macintosh laringoskobu, obstetrik hava yolu. *Nobel Med* 2016; 12(3): 12-16

INTRODUCTION

The management of the airway during pregnancy is fearful for anaesthetists. The increased weight, breast size, edema, fragility, and oxygen consumption can cause airway management problems.¹⁻³ The incidence of complications related to airway management problems is reported as 50%.⁴⁻⁶

Evaluation of the airway before surgical procedure and use of different high viewed laryngoscopes instead of classical laryngoscopes might help avoid this problem.

The TruView EVO2 laryngoscope (Truphatek Ltd, Israel) is a modified laryngoscope system with an oxygen insufflator near the device. Several different studies reported that this laryngoscope ensured better views of the glottis than conventional laryngoscopes, but to the authors' knowledge, this is the first study to evaluate the efficiency of the TruView EVO2 laryngoscope and Macintosh laryngoscope in obstetric patients.⁷⁻¹³

This study aimed to compare the efficiency of the TruView EVO2 laryngoscope with the Macintosh laryngoscope in obstetric patients.

MATERIAL AND METHOD

Ethical approval was taken from the Ethical Committee TUTFEK of Trakya University Hospitals, Edirne, Turkey, TUTFEK 2009/142 (Chairperson Prof. D. Dokmeci) on 11 June 2009. Signed informed consent was taken from all the patients.

One hundred patients 18-35 years of age and scheduled to undergo caesarean section were included in the study. The patients were randomly divided into group M (n=50) using a Macintosh laryngoscope (Figure 1) and group T (n=50) using the TruView EVO2 laryngoscope (Figure 2). The exclusion criteria were coagulopathy, anticoagulant usage, and head and neck pathology.

The Modified Mallampati airway classification (MM) was used for preoperative airway evaluation.¹⁴ The classifications were as follows: Class I (pharynx, soft palate, and uvula seen); Class II (only soft palate and uvula seen); Class III (only soft palate seen); and Class IV (soft palate not seen). Classes III and IV were considered difficult laryngoscopy.

In the operating theatre, electrocardiogram, non-invasive blood pressure, and pulse oximeter were monitored in all patients. After preoxygenation,

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Figure 1. Macintosh laryngoscope



Figure 2. Truview EVO2 laryngoscope

thiopental sodium 4 mg kg^{-1} was used for anaesthetic induction, and after that succinylcholine $1\text{-}1.5 \text{ mg kg}^{-1}$ was used. Ninety seconds after administration of the succinylcholine, the intubation attempts were made. Two anaesthetists made at least 100 intubations using the TruView and Macintosh laryngoscopes. Anaesthesia was maintained with sevoflurane, and 0.25 mg kg^{-1} atracurium was used for further muscle relaxation.

The airway was evaluated according to the following Cormack-Lehane (CL) classifications: Grade I (full view of the glottis); Grade II (partial view of the glottis); Grade III (only epiglottis can be seen); and Grade IV (neither the epiglottis nor the glottis can be seen).¹⁵ Grades I and II were accepted as easy airway, while grades III and IV were accepted as difficult airway.

The following criteria reported by Malik *et al.* were used.⁷ The duration of tracheal intubation was defined as the time the laryngoscope entered the mouth until the time it was removed from the mouth. If the trachea was not intubated or it required more than 20 seconds to perform the intubation, this was defined as a failed intubation. A maximum of three intubations were attempted, and the patient was oxygenated between failed intubation attempts. If tracheal intubation failed with the selected laryngoscope or desaturation occurred (peripheral oxygen saturation $<90\%$), tracheal intubation was made by another laryngoscope.

The success rate the number of intubation attempts, the lowest peripheral oxygen saturation (SpO_2), blood on laryngoscope blade, minor lacerations, and dental or other airway trauma were all recorded.

Statistical Analysis

Post hoc power analysis was done at the end of study taking time for laryngoscopy (seconds) as the main outcome. The power of this study was 100% based on the difference in the mean main outcome between groups, common standard deviation (3.3), type I error (5%), n_1 (50), and n_2 (50).^{7,8}

The numeric data were written as mean \pm SD, and categorical data as a number. One sample Kolmogorov Smirnov test was used for normality distribution of the variables. Student's t test was used for normal distributed data and Mann Whitney U test for non-normal distributed data. The two tests were used to assess the differences between groups. The chi-square test was used to compare the differences of categorical variables. Statistica 7.0 (StatSoft Inc. Tulsa, OK, USA) statistical software was used for statistical analysis. A p value <0.05 was fixed as statistically significant.

RESULTS

In group T the mean age was 27.7 ± 4.5 years, while in group M the mean age was 27.5 ± 4.3 years. The mean weight in group T was $86.5 \pm 4.63 \text{ kg}$ and $86.8 \pm 4.67 \text{ kg}$ in group M. There was no statistically difference between the groups ($p > 0.05$) (Table 1).

In group T, 35 patients had a MM score of I and 15 patients had a MM score of II. In group M, 37 patients had a MM score of I and 13 patients had a MM score of II. The groups were similar ($p > 0.05$) (Table 1).

In group T, 42 patients had a CL Grade I view and eight patients had a Grade II view. In group M, 32 patients had a Grade I view while 18 patients had a Grade II view. No Grade III or IV glottic views were detected. Statistically significant improvement in the view of the glottis was detected with the TruView EVO2 laryngoscope ($p < 0.05$) (Table 2).

The intubation time was $13.8 \pm 3.3 \text{ s}$ in group T and $6.0 \pm 1.9 \text{ s}$ in group M. Statistically significant relevance was detected ($p < 0.001$) (Table 2).

All of the patients were successfully intubated. The intubation attempts were similar in the two groups (Table 2). The SpO_2 was $99.14 \pm 0.67 \text{ s}$ in group T and $99.00 \pm 0.72 \text{ s}$ in group M. No episodes of hypoxia were detected. The incidence of complications was similar between groups. There was no statistically relevance between the groups in the number of attempts, the SpO_2 , and the incidence of complications ($p > 0.05$) (Table 2).

DISCUSSION

This study aimed to compare the efficiency of the Macintosh and the TruView EVO2 laryngoscopes. The results indicated better laryngoscopic view but longer intubation time with the TruView EVO2 laryngoscope compared to the Macintosh laryngoscope in obstetric patients.

The physiological changes relating to pregnancy affect the airway and complicate airway evaluation and intubation.^{1,5,6} The incidence of complications related to airway management problems is reported as 50%.^{4,6} Along with careful anaesthesia management, different methods for improving the airway view are employed.

Different studies reported better views of the laryngeal and pharyngeal anatomy with the TruView EVO2 laryngoscope than other laryngoscopes.^{7,8} Using the CL classification, Malik et al. concluded that the TruView EVO2 laryngoscope ensured better views of glottis than the Macintosh laryngoscope.⁷ They concluded that the indirect angled view of the TruView EVO2 could be the reason for these results. Saxena reported that the TruView EVO2 laryngoscope ensured a better laryngoscopic view than the Macintosh laryngoscope and concluded that this was due to the optical accessory and angled blade of the TruView EVO2 laryngoscope.⁸ In the current study, better laryngoscopic views were also found with the TruView EVO2 laryngoscope. The authors concluded that this might be attributable to the indirect view of the TruView EVO2 laryngoscope.

In addition to the improved views with the TruView EVO2 laryngoscope, several studies also reported longer intubation times with the TruView EVO2 laryngoscope than with other laryngoscopes.⁷⁻⁹ Malik et al. compared different laryngoscopes in cervical spine immobile patients and found longer intubation times with the TruView EVO2 laryngoscope than with the Macintosh, Glidescope® and AWS® laryngoscopes.⁷ They concluded that this might be due to the camera attachment and indirect visualization of the TruView EVO2 laryngoscope. Another study compared the TruView laryngoscope with the Macintosh laryngoscope and reported 22.4±12.68 seconds as the average intubation time for the Macintosh laryngoscope and 34.1±1.19 seconds for the TruView EVO2 laryngoscope.⁸ They concluded that the difference in intubation times might have been due to the higher experience with the Macintosh laryngoscope. Timanaykar et al. found the time for intubation (33.06±5.6 ve 23.11±5.7 seconds) was longer with the TruView than with the Macintosh laryngoscope, and they concluded the indirect visualization of the TruView EVO2 might be the reason

Table 1. Demographic data and preoperative Mallampati scores

	Group T (n=50)	Group M (n=50)	p
Age (years)	27.7±4.50	27.5±4.30	0.856
Weight (kg)	86.5±4.63	86.8±4.67	0.733
Mallampati Score	I	35	0.656
	II	15	

Data are presented as range (mean±SD) median unless otherwise indicated.
Group T: Truview group **Group M:** Macintosh group

Table 2. Data for intubation attempts with each device.

	Group T (n=50)	Group M (n=50)	p
Time for laryngoscopy (seconds)	13.3±3.3	6.0±1.9	0.000*
Cormack and Lehane Grade	I	42	0.023*
	II	8	
	III	0	
	IV	0	
Success Rate (%)	50 (100 %)	50 (100 %)	
Number of intubation attempts	1	46	0.900
	2	2	
	3	2	
Incidence of complications	Blood on laryngoscope blade	5	1.000
	Minor laceration	4	
	Dental or other airway trauma	0	
Lowest peripheral oxygen saturation during intubation attempts	99.14±0.67	99.00±0.72	0.320

Data are presented as range (mean±SD) median unless otherwise indicated.
Group T: Truview group **Group M:** Macintosh group * : different between both groups

for the longer intubation time.⁹ In the current study, longer intubation times were also found with the TruView EVO2 laryngoscope. In the authors' opinion, the main reasons for this situation were the greater experience with the Macintosh laryngoscope and the indirect visualization of the TruView EVO2 laryngoscope.

The increased weight, breast size, edema, and fragility complicate intubation during caesarean section.¹⁻³ Different intubation success rates have been reported with the TruView EVO2 system. Malik et al. reported 93.3% success rate.⁷ In another study, the authors reported only two non-intubated patients and a success rate of 97.5% with the TruView EVO2 laryngoscope.¹⁰ The authors found lower thyromental distance for these non-intubated patients. Tutuncu reported four of 185 patients could not be intubated with the TruView EVO2 laryngoscope because of anatomical or functional deformities.¹¹ Bharti *et al.* reported

100% intubation success rate with the TruView EVO2 laryngoscope.¹² The current study also reported 100% intubation success rate. The difference in the success rates might be related to the experience with the study laryngoscopes. The number of intubation attempts and the effects of laryngoscopes on soft tissue are important in obstetric patients because of increased edema and fragility.¹⁻³

Malik and Timanaykar found no difference in intubation attempts required with the TruView EVO2 and Macintosh laryngoscopes.^{7,9} Dilmen found more intubation attempts were required for the TruView EVO2 group and concluded that this situation was due to the higher experience with the Macintosh laryngoscope and the indirect visualization of the TruView EVO2 laryngoscope.¹⁰ The present study found similar intubation attempts between the TruView EVO2 and Macintosh laryngoscopes. The authors think that the experience with the two laryngoscopes was the main reason.

Malik and Barak found that soft tissue damage was lower with the TruView EVO2 laryngoscope and concluded that this may be because the TruView laryngoscope exerts less force on the tissues.^{7,13} The current study found similar complications with the study laryngoscopes, and the authors attributed this to the great experience with the study laryngoscopes. The authors think that less frequent complications may be

another advantage of the TruView EVO2 laryngoscope because the pregnant patients often had fragile mucosa.

Due to increased oxygen consumption during pregnancy, the SpO₂ values are important during the intubation period. Malik and Bharti found no difference in the SpO₂ values between the TruView EVO2 and Macintosh laryngoscopes.^{7,12} Similar to these studies, the current study also found no difference in the SpO₂ values between different laryngoscopes. The authors believe the reason for this was the oxygen was provided with the TruView EVO2 laryngoscope and in contrast of short intubation time with the Macintosh laryngoscope. Although no difference was found between the SpO₂ values, the authors think that the pregnant patients had increased oxygen consumption, and the demand for oxygen during intubation may be an important advantage of the TruView EVO2 laryngoscope for these patients. Due to the design difference, the blindness of this study was not provided, and this was the main limitation of our study.

In conclusion, the TruView EVO2 laryngoscope appears to provide better laryngeal views, similar SpO₂ values, and similar soft tissue damage with longer intubation times compared to the Macintosh laryngoscope, and thus can be used for intubation in obstetric patients.

*The authors declare that there are no conflicts of interest.

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