European Journal of Molecular & Clinical Medicine

ISSN 2515-8260 Volume 09, Issue 07, 2022

Original Research Article

Channelled video laryngoscopic intubation with or without bougie: A comparative study

[1]Dr. Sangeetha D, [2]Dr. Hareesh SB, [3]Dr. Pradeep MS

[1]Associate Professor, Department of Anaesthesiology, Institute of Nephro-Urology, Victoria Hospital Campus, Bangalore, Karnataka, India
[2]Assistant Professor, Department of Anaesthesiology, Institute of Nephro-Urology, Victoria Hospital Campus, Bangalore, Karnataka, India
[3]Professor, Department of Anaesthesiology, Institute of Nephro-Urology, Victoria Hospital Campus, Bangalore, Karnataka, India

Corresponding Author:
Dr. Sangeetha D (sangidatt23@gmail.com)

Abstract

Objectives:

- To assess the ease of intubation with and without bougie.
- To assess Time taken for successful intubation.

Material and Methods: A randomised, prospective, comparative, interventional study, on 60 patients posted for Urological procedures under general anaesthesia with endotracheal intubation and controlled ventilation was conducted in a single centre. The patients included in the study were intubated with or without bougie using a channelled video laryngoscope after induction of anaesthesia.

Results: The demographic data such as age, sex and BMI, ASA physical status, airway assessment were matched in both the groups. The heart rates, systolic and diastolic blood pressure, SP02, $ETCO_2$ variations post-procedure and complications were statistically comparable in both the groups. Ease of insertion was better when intubation was done with channelled video laryngoscope alone than with bougie aided channelled video laryngoscopy intubation, but was not statistically significant. Time taken for intubation was significantly higher in the bougie aided group than unaided channelled video laryngoscopic intubation. Various manoeuvres to negotiate ETT across the glottis were more frequently used in bougie aided group, but were not statistically significant.

Conclusion: Intubation with unaided channelled video laryngoscope, offered less intubation time compared to bougie assisted channelled video laryngoscopic intubation. With channelled video laryngoscope ease of intubation was better and fewer manoeuvres were required, though statistically not significant.

Keywords: Channelled video laryngoscope, endotracheal intubation, bougie

Introduction

Video laryngoscopes have gained a strong foothold in the field of airway management of patients. It can be used in both normal and difficult airways. They are broadly classified into two groups based on the blade types: channelled and non-channelled blades. To facilitate the approach of the ETT tip towards the glottis, "channelled" blades have been developed. These are equipped on their right edge with a longitudinal trough (channel), into which the ETT is inserted so that its tip becomes permanently visible on the screen. Thus, the ETT strictly follows the VLS blade. As soon as the glottis opening is in the centre of the video image, the ETT is advanced forward and should enter the airway without the necessity of being separately steered. After placing the ETT into its final position, the user removes the VL by detaching it from the ETT. This configuration should enable successful intubation in the

ISSN 2515-8260 Volume 09, Issue 07, 2022

hands of less experienced users. The disadvantage of the channelled blade is a bulkier design and the necessity for a larger mouth opening, Channelled blades not only require a "good view "but an "optimal view", to ensure ETT is directed correctly through the guide channel toward the larynx. Device-specific adjuncts are required to ensure that an improved view of the larynx translates reliably into successful tracheal intubation. Gum elastic bougie is an extremely useful aid for intubation. Its angulated distal end facilitates insertion through the vocal cords.

The hypothesis of the study was that a bougie being narrower and firmer is more likely to pass unhindered through the glottis. A preloaded endotracheal tube should then pass easily over it into the trachea without hinging against the vocal cords or arytenoids cartilages. However, addition of an airway adjunct could also result in prolonged intubation times.

Material and Methods

After obtaining institutional ethical committee approval [INU-IEC-DHR-05], a single centre, randomised, prospective, comparative, non- blinded, clinical trial was conducted after obtaining written informed consent of the patients participating in the study. Randomization was done with randomizer software. Allocation concealment was not possible since it was an interventional study. Sixty patients coming for elective urologic procedures requiring general anaesthesia with endotracheal intubation and controlled ventilation were randomly allocated into two equal groups, of thirty patients each. Sample size estimation was done with two means, based on the previous literature for an outcome variable on mean level of time taken for endotracheal intubation, 90% statistical power, 5% level of type of I error (α) and 10% type of II error rate (β), the sample size of 60 (30 in each group) was arrived at.

Inclusion criteria

ASA 1and2 patients of both genders in the age group of 18 to 60 years, who present to our hospital for elective urological procedures to be performed under general anaesthesia and endotracheal intubation, were considered for the study. Patients with no anticipated airway difficulty were included in the study.

Exclusion criteria

ASA 3 and 4, BMI of > /= 35kg/m2, restricted mouth Opening (< three fingers), emergency procedures and anticipated difficult airways were excluded from the study.

Sixty patients coming for elective urologic procedures requiring general anaesthesia with endotracheal intubation and controlled ventilation were randomly allocated into two equal groups, containing thirty patients each. Preanesthetic evaluation was done on the day before surgery. The co-investigator performed random allocation using randomizer software, after patient selection using inclusion and exclusion criteria and recorded observations. All patients were kept nil per oral as per fasting guidelines. Patients were reassessed on the day of surgery. Standard monitors such as ECG, NIBP and pulse oximeter and temperature probes were attached and baseline readings were recorded. Premedication was done with intravenous inj. Glycopyrrolate 0.2 mg, Inj. Ondansetron 4mg, inj. Midazolam 1mg and inj. Fentanyl 2mcg/kg. All Patients are preoxygenated for three minutes. The patients were induced with inj. Propofol 2-2.5 mg/kg, I.V. After checking adequacy of mask ventilation, inj. Atracurium 0.5mg/kg was administered. After 3minutes of mask ventilation, Video laryngoscopic intubation was performed with channelled video laryngoscope preloaded with ETT, with or without bougie.

The Principal Investigator took informed consents and performed all the intubations. With head in sniffing position, Video laryngoscope was inserted in the midline over the centre of the tongue with non-dominant hand of the principle investigator, after adequately opening the mouth as the lower jaw was pulled away with the dominant hand of the principle investigator. If difficulty was encountered VLS was inserted from the side of the mouth and recorded. Then blade was advanced along the dorsum of the tongue till tip was positioned in the vallecula, then lifted to obtain a glottic view. The manoeuvres employed to obtain good

ISSN 2515-8260 Volume 09, Issue 07, 2022

glottic view were-lifting the blade anteriorly or rotation to left, OELM (Optimal External Laryngeal Manipulation) and manoeuvres applied are recorded. Once a good glottic view is obtained, in GROUP C, preloaded and lubricated cuffed ETT (7mm ID and 8 mm ID, for female and male respectively) was advanced between the vocal cords.

In GROUP B, Video laryngoscope was preloaded with the lubricated ETT (7mm ID and 8 mm ID, for female and male respectively) with the bougie placed inside it till the tip. The entire assembly is passed en bloc into the mouth. On visualization of the glottis, the bougie was initially advanced across the glottis. The other end of Bougie was held by the assistant, then ETT was railroaded on it. If difficulty was encountered in advancing bougie or ETT, the manoeuvres like-lifting the blade anteriorly or rotation to left, OELM (Optimal External Laryngeal Manipulation) and rotation of ETT manoeuvres were applied and recorded. If the first attempt failed or patient desaturated below 94%, direct laryngoscopy was performed with a Macintosh blade. Patients were mask ventilated between attempts and on any desaturation of less than 94%. Such patients were excluded from the study. Once the ETT cuff passed the glottis, it was inflated. In GROUP C, ETT was displaced laterally from the channel of VLS; IPPV was initiated to obtain a normal capnograph trace. In GROUP B, bougie was removed followed by VLS removal. Time taken from insertion of video laryngoscope in the mouth to a normal capnograph trace was recorded as intubation time. Bilateral air entry was checked and ETT was secured.

Ease of insertion was noted as not easy, if rotation or manipulation of endotracheal tube or laryngoscope manoeuvring was done. It is noted as Easy, if none was required. Use of external laryngeal manipulation if any is noted down.

Parameters observed were: Intubation time in seconds, Ease of intubation, manoeuvres employed, vital parameters post intubation and complications like stridor, blood tinged ETT tip, loss of tooth were noted with an intention to treat.

Vital parameters like BP, SpO2, HR, $ETCO_2$ were recorded 1,3-and 5-minutes post procedure.

Results

A total of sixty patients were studied. They were allocated into two groups-Group B and Group C, with 30 patients in each group.

Demographic data

Table 1: Age in years-Frequency distribution in two groups of patients cohort studied

Age in Years	Group B	Group C	Total
<30	7(23.3%)	4(13.3%)	11(18.3%)
30-40	8(26.7%)	10(33.3%)	18(30%)
41-50	12(40%)	9(30%)	21(35%)
>50	3(10%)	7(23.3%)	10(16.7%)
Total	30(100%)	30(100%)	60(100%)
Mean ± SD	38.23±10.98	41.26±11.15	39.75±11.08

Samples are age matched with P=0.293, student t test

Table 2: Gender-Frequency distribution in two groups of patients cohort studied

Gender	Group B	Group C	Total
Female	9(30%)	11(36.7%)	20(33.3%)
Male	21(70%)	19(63.3%)	40(66.7%)
Total	30(100%)	30(100%)	60(100%)

P=0.777, Not Significant, Chi-Square Test.

ISSN 2515-8260 Volume 09, Issue 07, 2022

Table 3: BMI (kg/m2)-Frequency distribution in two groups of patients cohort studied

BMI (kg/m2)	Group B	Group C	Total
<18.5	0(0%)	0(0%)	0(0%)
18.5-24.9	0(0%)	0(0%)	0(0%)
25.0-29.9	14(46.7%)	17(56.7%)	31(51.7%)
30.0-35.0	16(53.3%)	13(43.3%)	29(48.3%)
>35.0	0(0%)	0(0%)	0(0%)
Total	30(100%)	30(100%)	60(100%)
Mean ± SD	29.60±2.45	28.93±1.99	29.26±2.24

P=0.254, Not Significant, Student t Test.
Both groups are matched with respect to demographic data.

Data collected prior to intubation

Table 4: ASA-Frequency distribution in two groups of patients cohort studied

ASA	Group B	Group C	Total
1	18 (60%)	13 (43.3%)	31 (51.7%)
2	12 (40%)	17 (56.7)	29 (48.3%)
Total	30 (100%)	30 (100%)	60 (100%)

P=0.300, Not Significant, Chi-Square Test.
Both groups do not show any significant difference with respect to ASA grading.

Vital parameters

Table 5: Comparison of HR per min in two groups of patient's cohort studied

Variables	Group B	Group C	Total	P Value
Baseline	82.9±12.59	81.53±10.23	82.22±11.39	0.646
Post-Procedure-1 Minute	92.5±14.89	90.93±10.63	91.72±12.85	0.641
Post-Procedure-3 Minutes	88.73±12.44	86.87±9.83	87.8±11.15	0.521
Post-Procedure-5 Minutes	87.1±12.14	83.63±8.83	85.37±10.67	0.211

Table 6: SBP (mm hg)-Comparison in two groups of patients studied

Variables	Group B	Group C	Total	P Value
Baseline	123.73±11.82	123.07±10.33	123.4±11.01	0.817
Post-Procedure-1 Minute	133.43±12.44	133±14.9	133.22±13.61	0.903
Post-Procedure-3 Minutes	129.03±9.15	124.9±12.39	126.97±11	0.147
Post-Procedure 5 Minutes	117.5±12	119.7±12.17	118.6±12.03	0.484

Table 7: DBP (mm Hg)-Comparison in two groups of patients studied

Variables	Group B	Group C	Total	P Value
Baseline	76.23±7.28	74.83±7.44	75.53±7.33	0.464
Post-Procedure-1 Minute	81.83±8.71	80.6±10.68	81.22±9.68	0.626
Post-Procedure-3 Minutes	75.67±9.27	76.53±7.3	76.1±8.29	0.689
Post-Procedure 5 Minutes	72.63±8.7	72.37±7.38	72.5±8	0.899

Table 8: SPO_2%-Comparison in two groups of patients studied

Variables	Group B	Group C	Total	P Value
Baseline	99.23±0.77	99.23±0.73	99.23±0.74	1.000
Post-Procedure-1 Minute	99.1±0.92	99.27±0.69	99.18±0.81	0.432

ISSN 2515-8260 Volume 09, Issue 07, 2022

Post-Procedure-3 Minutes	99.1±0.92	99.27±0.69	99.18±0.81	0.432
Post-Procedure 5 Minutes	99.13±0.86	99.3±0.7	99.22±0.78	0.414

Table 9: $ETCO_2$-Comparison in two groups of patients studied

Variables	Group B	Group C	Total	P Value
Post-Procedure-1 Minute	38.33±3.76	37.27±3.79	37.8±3.78	0.278
Post-Procedure-3 Minutes	36.43±3.73	35.7±3.83	36.07±3.76	0.455
Post-Procedure 5 Minutes	35.2±3.95	34.53±3.97	34.87±3.94	0.517

Variations in vital parameters are similar in both the groups.

Parameters observed during intubation

Table 10: Ease of Insertion-Frequency distribution in two groups of patient's cohorts studied

Ease of Insertion	Group B	Group C	Total
Easy	20(66.6%)	25(83.3%)	45(75%)
Not Easy	10(33.3%)	5(16.7%)	15(25%)
Total	30(100%)	30(100%)	60(100%)

P=0.233, Not Significant, Chi-Square Test

Though clinically ease of insertion was better in GROUP C, there was no statistical difference between the two groups with respect to ease of insertion.

Table 11: Intubation Time (Seconds)-Frequency distribution in two groups of patient's cohort studied

Intubation Time (Seconds)	Group B	Group C	Total
20-30	4(13.3%)	7(23.3%)	11(18.3%)
31-40	3(10%)	8(26.7%)	11(18.3%)
41-50	2(6.7%)	9(30%)	11(18.3%)
>50	21(70%)	6(20%)	27(45%)
Total	30(100%)	30(100%)	60(100%)
Mean ± SD	63.50±24.76	43.93±17.62	53.71±23.48

$p \leq 0.001$**, Significant, Student t Test.

Intubation time was significantly prolonged in Group B compared to Group C. Mean Intubation time in GROUP B was 63.50±24.76, where as it was 43.93±17.62 in Group C

Table 12: OELM-Frequency distribution in two groups of patients cohort studied

OELM	Group B	Group C	Total
Nil	23(76.7%)	27(90%)	50(83.3%)
Yes	7(23.3%)	3(10%)	10(16.7%)
Total	30(100%)	30(100%)	60(100%)

P=0.298, Not Significant, Fisher Exact Test

Requirement of OELM was more in GROUP B (7) than GROUP C (3), but was not statistically significant.

Table 13: Complications-Frequency distribution in two groups of patient's cohort studied

Complications	Group B	Group C	Total
None	30(100%)	30(100%)	60(100%)
Yes	0(0%)	0(0%)	0(0%)
Total	30(100%)	30(100%)	60(100%)

P=1.000, Not Significant, Fisher Exact Test.

ISSN 2515-8260 Volume 09, Issue 07, 2022

No complications were observed during the procedure in both the groups.

Table 14: Comments-Frequency distribution in two groups of patient's cohort studied

Maneuvers Performed	Group B	Group C	Total
Nil	20(66.7%)	26(86.7%)	46(76.7%)
Yes	10(33.3%)	4(13.3%)	14(23.3%)
▪ Bougie hitting anterior commissure VL scope rotated to left	2(6.7%)	0(0%)	2(3.3%)
▪ Bougie hitting anterior commissure, VL scope rotated and lifted anteriorly	2(6.7%)	0(0%)	2(3.3%)
▪ Difficulty in introducing VLS in the mouth	1(3.3%)	2(6.6%)	3(5.0%)
▪ VLS Maneuvered	0(0%)	2(6.7%)	2(3.3%)
▪ ETT Tip hitting aryepiglottic fold	0(0%)	2(6.7%)	2(3.3%)
▪ ETT Rotated	0(0%)	2(6.7%)	2(3.3%)
▪ Bougie hitting anterior commissure	1(3.3%)	0(0%)	1(1.7%)
▪ Bougie hitting anterior commissure VL scope lifted anteriorly	1(3.3%)	0(0%)	1(1.7%)
▪ Bougie hitting posterior commissure VL scope lift reduced	1(3.3%)	0(0%)	1(1.7%)
▪ Bougie tip not visualised properly	1(3.3%)	0(0%)	1(1.7%)
▪ Difficulty in maneuvering the tube across glottis	1(3.3%)	0(0%)	1(1.7%)
Total	30(100%)	30(100%)	60(100%)

P=0.125, Not Significant, Fisher Exact Test.

10 patients in GROUP B and 4 patients in GROUP C required airway maneuvers in some form like, lifting the video laryngoscope anteriorly or rotation to left, rotation of ETT, but was not statistically significant.

Statistical Methods: Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5% level of significance. The following assumptions on data is made,

Assumptions

1. Dependent variables should be normally distributed.
2. Samples drawn from the population should be random cases of the samples should be independent.

Student t test (two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups (Inter group analysis) on metric parameters. Leven`s test for homogeneity of variance has been performed to assess the homogeneity of variance. A t-test is a statistical test that is used to compare the means of two groups. It is often used in hypothesis testing to determine whether a process or treatment actually has an effect on the population of interest, or whether two groups are different from one another with the null hypothesis (H_0) is that the true difference between these group means is zero and the alternate hypothesis (H_a) is that the true difference is different from zero.

Chi-square/Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups, Non-parametric setting for Qualitative data analysis. Fisher exact test used when cell samples are very small.

Significant figures

- + Suggestive significance (P value: $0.05 < p < 0.10$).
- Moderately significant (P value: $0.01 < p \leq 0.05$).
- ** Strongly significant (P value: $p \leq 0.01$).

ISSN 2515-8260 Volume 09, Issue 07, 2022

Statistical software: The Statistical software namely SPSS 22.0 and R environment ver. 3.2.2 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

Discussion

Tracheal intubation by video laryngoscope is the most Innovative advancement and a completely different experience as compared with conventional Macintosh Laryngoscope and skills needed for the former method of indirect laryngoscopy is very different from those needed for direct laryngoscopy by Macintosh or Miller blade Laryngoscopes [1]. Basic videolaryngoscopy blade types may be either non-channelled or channelled. Channelled video laryngoscopes are equipped on their right edge with a longitudinal trough (channel), into which the E TT is inserted So that its tip becomes permanently visible on the screen. Thus, the ETT strictly follows the VL blade. As soon as the glottis opening is in the centre of the video image, the ETT is advanced forward and should enter the airway without the necessity of being separately steered. After placing the E TT into its final position, the user removes the VL by detaching it from the channel. Biro P *et al*. suggests that the time to video laryngoscopic glottis recognition is longer when using a channelled blade, but time to intubation and the total time to secure the airway is shorter than non channelled video laryngoscope. The reason for delayed glottic recognition time is due to its bulkiness but steering the ETT across the glottis is easier as it omits the "blind phase" [2]. Lafferty and colleagues reported that "gaining a view of the vocal cords is the easy part"' when using a video laryngoscope. Training, regular practice and use of device-specific adjuncts are required to ensure that an improved view of the larynx translates reliably into successful tracheal intubation. Use of bougie has been advocated for assisted video laryngoscopy [3]. Mathew *et al*. noted that in spite of better glottic view, intubation using Airtraq® may not always be successful and GEB when used along with Airtraq® aids in intubation and prevents repeated attempts [4]. Mendonca *et al*. compared sniffing position (The 'sniffing' position was achieved by placing a standard 7-cm high positioning non-compressible pad under the head and adjusting the bed headrest to elevate the occiput to achieve flexion of the neck and extension at the atlantooccipital joint.) and neutral position for video laryngoscopy and concluded that they could not demonstrate any difference in the ease of intubation between the 'sniffing' and the neutral position in patients undergoing tracheal intubation when using a video laryngoscope [5].

The ASA practice guidelines for management of difficult airway also state that Adjuncts (e.g., introducers, bougies, stylets, alternative tracheal tubes, intubating stylets, or tube changers) showed intubation success ranging from 87 to 100% of patients and case reports observed intubation success with bougie and stylets. Meta-analyses of randomised controlled trials comparing video-assisted laryngoscopy with direct laryngoscopy in patients with predicted difficult airways reported improved laryngeal views, a higher frequency of successful intubations, a higher frequency of first attempt intubations and fewer intubation manoeuvres with video-assisted laryngoscopy however findings for time to intubation were equivocal [6].

Madishetti ER, *et al*. observed that The Gum Elastic Bougie aids intubation with the Airtraq avoiding the need for repeated attempts. The time required for visualization of the glottis and intubation when a GEB is used along with the Airtraq is comparable to the time taken when the Airtraq is used alone [7].

Ömür D compared intubations with and without stylets using a Storz C-MAC D-Blade® on a manikin that simulated a difficult airway. The intubations were performed by anesthesiology experts and residents, and the results showed that intubations with no stylet and with GEB required longer to complete, more attempts and resulted in increased complication rates [8].

Video laryngoscopy (VL) is increasingly used, but not yet routine practice, for tracheal intubation. Cook T M used a formal trial of universal VL, over a prolonged period, to determine the suitability and feasibility of converting to video laryngoscopy as the first

ISSN 2515-8260 Volume 09, Issue 07, 2022

choice for intubation [9].

In our study major challenges in GROUP C were difficulty in introducing video laryngoscopes into the mouth, which was overcome by manoeuvring the VLS. Another challenge was ETT tip hitting the aryepiglottic fold, which was overcome by rotation of the ETT and lifting the VLS anteriorly or rotation to the left. Most intubations in GROUP C were easy, requiring comparatively less intubation time. Major challenges in GROUP B were. Bougie hitting anterior commissure, which was overcome by manoeuvring the VLS anteriorly or left and bougie hitting posterior commissure, for which lift was reduced. Ease of insertion was comparatively less in GROUP B requiring significantly long intubation times which was statistically significant

Conclusion

We observed that Intubation with channelled video laryngoscope alone, offered less intubation time compared to bougie assisted channelled video laryngoscopic intubation. With unaided channelled video laryngoscope ease of intubation was better and fewer manoeuvres were required, though statistically not significant. The strength of our study was the single user approach, which reduces inter individual variations of skill set and randomisation, to name a few. The gaps in our study were: it was a non-blinded study probably leading to observer bias and failed video laryngoscopy intubation in first attempt was not included in the study. Hence further studies are needed to come to valid conclusions.

References

1. Channa AB. Video laryngoscopes. Saudi J Anaesth. 2011;5(4):357-359.
2. Biro P, Schlaepfer M. Tracheal intubation with channeled vs. non-channeled videolaryngoscope blades. Rom J Anaesth Intensive Care. 2018 Oct;25(2):97-101. Doi: http://dx.doi.org/10.21454/rjaic.7518.252.sch
3. Kelly FE, Cook TM. Seeing is believing: getting the best out of Videolaryngoscopy. British Journal of Anaesthesia. 2016;117(S1):i9-i13. Advance Access publication 19 April 2016. doi:10.1093/bja/aew052
4. Mathew, *et al*. Comparison of two methods of gum elastic bougie aided endotracheal intubation using Airtraq® video laryngoscope. Sri Lankan Journal of Anaesthesiology. 2018;26(1):28-33.
5. Mendonca C, Ungureanu N, Nowicka A, Kumar P. A randomised clinical trial comparing the 'sniffing' and neutral position using channelled (King Vision®) and non-channelled (C-MAC®) videolaryngoscopes. Anaesthesia. 2018 Jul;73(7):847-855. Doi: 10.1111/anae.14289. Epub 2018 Apr 16. Erratum in: Anaesthesia. 2019 Aug;74(8):1061. PMID: 29660807.
6. Jeffrey L Apfelbaum, Carin A Hagberg, Richard T Connis, Basem B Abdelmalak, Madhulika Agarkar, Richard P Dutton, *et al*. American Society of Anesthesiologists Practice Guidelines for Management of the Difficult Airway. Anesthesiology. 2022;136:31-81. Doi: https://doi.org/10.1097/ALN.0000000000004002
7. Madishetti ER, Kaur J, Jain R, *et al*. A comparative study on role of gum elastic bougie with Airtraq optical laryngoscope for endotracheal intubation: aid or impediment. J Evid. Based Med. Healthc. 2016;3(72):3933-3939. Doi: 10.18410/jebmh/2016/840.
8. Ömür D, Bayram B, Özbilgin Ş, Hancı V, Kuvaki B. Comparação de diferentes estiletes usados para intubação com o videolaringoscópio C- MAC D- Blade®: um estudo randômico e controlado [Comparison of different stylets used for intubation with the C-MAC D-Blade® Videolaryngoscope: a randomized controlled study]. Rev Bras Anestesiol. 2017 Sep-Oct;67(5):450-456. Portuguese. Doi: 10.1016/j.bjan.2017.04.008. Epub 2017 May 17. PMID: 28526471.
9. Cook TM, Boniface NJ, Seller C, Hughes J, Damen C, MacDonald L, *et al*. Universal videolaryngoscopy: a structured approach to conversion to videolaryngoscopy for all intubations in an anaesthetic and intensive care department. Br J Anaesth. 2018

ISSN 2515-8260 Volume 09, Issue 07, 2022

Jan;120(1):173-180. Doi: 10.1016/j.bja.2017.11.014. Epub 2017 Nov 21. PMID: 29397126.