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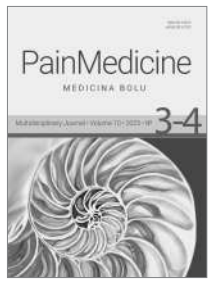

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A Prospective Randomized Controlled Trial Comparing TAScope (The Anaesthetic Society Scope) and Non-Channelled Video Laryngoscope for Airway Management in Adult Patients Undergoing Elective Surgery

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Abstract:

Background. *Video laryngoscopes improve tracheal intubation success, but evidence comparing channeled devices (TAScope-The anaesthetic society scope) with non-channeled video laryngoscopes is limited. This prospective randomized controlled trial evaluated their comparative efficacy and safety.*

Objectives

• Primary: Compare the number of intubations attempts between channeled (TAScope) and non-channeled video laryngoscopes.
• Secondary: Assess intubation time, frequency of additional maneuvers, hemodynamic changes, and airway complications.

Methods. *Two hundred adult patients undergoing elective surgery under general anesthesia were randomly assigned to TAScope (n = 100) or a non-channeled video laryngoscope (n = 100). Data were collected prospectively by blinded research personnel. Statistical analyses included chi-square, t-tests, Mann-Whitney U tests, and repeated measures ANOVA ($p < 0.05$).*

Results. *The median number of intubation attempts was significantly lower with TAScope (1 [IQR: 1–1]) versus the non-channeled device (2 [IQR: 1–3]; $p < 0.001$). Intubation times were comparable (38.5 ± 6.2 seconds for TAScope vs. 40.1 ± 7.8 seconds; $p = 0.08$). TAScope required fewer additional maneuvers (22 % vs. 45 %; $p < 0.001$) and caused less pronounced hemodynamic changes post-intubation ($p < 0.05$). Airway complications were less frequent with TAScope (8 %) than the non-channeled device (18 %; $p = 0.03$). Subgroup analysis showed TAScope performed better in difficult airways (Mallampati ≥ 3 or Cormack-Lehane ≥ 3).*

Conclusion. *TAScope demonstrated superior performance over non-channeled video laryngoscopes, with fewer intubation attempts, reduced need for additional maneuvers, better hemodynamic stability, and fewer complications. These findings suggest TAScope may be advantageous in anticipated difficult airways or for less experienced operators.*

Keywords: *Prospective study, video laryngoscopy, TAScope, non-channeled video laryngoscope, airway management, intubation*

Introduction

Tracheal intubation is a cornerstone of airway management in both routine and critical care settings, ensuring adequate oxygenation, ventilation, and protection of the airway during general anesthesia or emergency resuscitation [1]. Despite significant advances in technology and training, endotracheal intubation remains a challenging procedure, particularly in patients with anticipated or unanticipated difficult airways. Failure to secure the airway promptly and safely can result in severe complications, including hypoxemia, cardiovascular instability, aspiration, and even mortality. Consequently, the choice of intubation device plays a pivotal role in optimizing procedural success and patient outcomes. The advent of video laryngoscopes has revolutionized airway management by improving visualization of the glottis compared to traditional direct laryngoscopy. These devices have been shown to enhance first-attempt success rates, reduce the need for additional maneuvers, and minimize complications, particularly in patients with difficult airway anatomy [2,3]. Video laryngoscopes are broadly categorized into two designs: channeled and non-channeled . Channeled video laryngoscopes, such as the TAScope (the anesthetist society scope) incorporate a pre-shaped conduit that guides the endotracheal tube toward the glottis, potentially simplifying the intubation process and reducing reliance on operator skill [4]. This design may be particularly advantageous in challenging airway scenarios, where precise alignment of the endotracheal tube is critical. In contrast, non-channeled Macintosh type video laryngoscopes offer greater flexibility but require the operator to navigate the endotracheal tube manually, which may increase the complexity and duration of the procedure, especially for less experienced clinicians [5]. While both types of video laryngoscopes have demonstrated efficacy in improving glottic visualization and intubation success rates, evidence directly comparing their performance remains limited. Key aspects such as the number of intubation attempts, time to successful intubation, hemodynamic stability during the procedure, and the incidence of airway complications may vary significantly between these devices. Furthermore, the clinical implications of these differences—particularly in patients with difficult airways or when used by operators with varying levels of experience—are not well understood. To address these gaps in knowledge, this prospective randomized controlled trial was designed to compare the TAScope (a channeled video laryngoscope) and a non-channeled video laryngoscope in adult patients undergoing elective surgery under general anesthesia. The primary objective of the study was to evaluate the number of intubation attempts required for successful tracheal intubation. Secondary objectives included assessing the time taken for intubation, the frequency of additional maneuvers employed to facilitate intubation, hemodynamic responses during and immediately after the procedure, and the incidence of airway-related complications [6]. By systematically addressing these endpoints, this study aims to provide robust, high-quality evidence to guide the selection of video laryngoscopes in clinical practice. Such insights are essential for enhancing procedural efficiency, minimizing complications, and ultimately improving patient safety in airway management. This research is particularly relevant in an era where the demand for safer and more reliable airway management tools continues to grow. By elucidating the comparative advantages and limitations of channeled versus non-channeled video laryngoscopes, this study seeks to inform evidence-based decision-making and optimize the standard of care in anesthesia and critical care settings.

Aim of the Study

This study aimed to evaluate the efficacy and safety of the TAScope (channeled video laryngoscope) versus non-channeled video laryngoscopes in adult patients undergoing elective surgery. The primary aim was to compare the number of intubations attempts between

devices. Secondary aims included assessing intubation time, frequency of additional maneuvers, hemodynamic stability, and airway complications.

Material and Methods

Study Design

This was a single-center, prospective, randomized controlled trial conducted at Civil Hospital, Bharuch, designed to compare the efficacy and safety of TAScope (a channelled video laryngoscope) and a non-channeled video laryngoscope in adult patients undergoing elective surgery under general anesthesia. The study adhered to the principles of the Declaration of Helsinki and was approved by the Institutional Ethics Committee. Written informed consent was obtained from all participants prior to enrollment.

Participants

The study included 200 adult patients aged 18–75 years with an American Society of Anesthesiologists (ASA) physical status classification of I–III, scheduled for elective surgery requiring endotracheal intubation. Patients were excluded if they had any of the following: known or suspected difficult airway (e.g., Mallampati score ≥4, limited mouth opening < 2 cm, or cervical spine immobility), pregnancy, body mass index (BMI) > 40 kg/m², emergency surgery, or a history of significant cardiovascular or respiratory disease that could confound hemodynamic measurements.

Randomization and Blinding

Patients were randomly allocated in a 1:1 ratio to either **Group A (TAScope)** or **Group B (non-channeled video laryngoscope)** using a computer-generated randomization sequence. Allocation concealment was ensured using sequentially numbered, opaque, sealed envelopes. While blinding of the anesthesiologist performing the intubation was not feasible due to the distinct designs of the devices, outcome assessors and data analysts were blinded to group allocation to minimize bias.

Interventions

- **Group A (TAScope):** Tracheal intubation was performed using the TAScope, a channelled video laryngoscope designed to guide the endotracheal tube toward the glottis.
- **Group B (Non-channeled video laryngoscope):** Tracheal intubation was performed using a non-channeled video laryngoscope requiring manual navigation of the endotracheal tube.

All intubations were performed by experienced anesthesiologists with prior training in both devices to ensure proficiency and minimize variability in technique.

Outcomes

1. **Primary Outcome:** The number of intubation attempts, defined as the number of times the laryngoscope blade was inserted into the mouth.
2. **Secondary Outcomes:**
   - **Time to successful intubation:** Measured from insertion of the laryngoscope blade into the mouth until confirmation of endotracheal tube placement via capnography.
   - **Use of additional maneuvers:** Frequency of external laryngeal manipulation, bougie use, or repositioning of the laryngoscope.
   - **Hemodynamic changes:** Changes in heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), and mean arterial pressure (MAP) recorded at baseline, immediately after intubation, and at 1- and 5-minutes post-intubation.
3. **Complications:**
   - **Airway-related complications:** Incidence of mucosal injury, dental trauma, or failed intubation.
   - **Oxygenation-related complications:** Incidence of desaturation (SpO_2 < 90 %).

Data Collection

Baseline demographic and clinical characteristics, including age, gender, BMI, Mallampati score, and Cormack-Lehane grade, were recorded. All outcomes were documented prospectively by trained research personnel. Hemodynamic data were recorded using standard multiparameter monitors, and complications were assessed immediately post-procedure and during recovery.

Statistical Analysis

Continuous variables were expressed as mean ± standard deviation (SD) or median with interquartile range (IQR), as appropriate. Categorical variables were presented as frequencies and percentages. Comparisons between groups were performed using independent t-tests or Mann-Whitney U tests for continuous variables and chi-square or Fisher's exact tests for categorical variables. Repeated measures ANOVA was used to analyze trends in hemodynamic changes over time. A p-value <0.05 was

considered statistically significant. Statistical analyses were performed using SPSS version 2.0.

Sample Size Calculation

Based on a pilot study, we estimated that a sample size of 100 patients per group would provide 80 % power to detect a clinically significant difference in the primary outcome (number of intubation attempts) at a two-sided alpha level of 0.05.

Results

This section presents the findings of the prospective randomized controlled trial comparing TAScope (channelled video laryngoscope) and non-channelled video laryngoscope in airway management. The results are organized into key outcome measures, supported by five tables for clarity and detailed analysis.

1. Baseline Characteristics

The baseline demographic and clinical characteristics of the two groups were comparable, ensuring no significant differences at the outset of the study (Table 1) summarizes these characteristics.

2. Primary Outcome: Number of Intubation Attempts

The median number of intubation attempts was significantly lower in the TAScope group compared to the non-channeled video laryngoscope group (Table 2).

The TAScope group demonstrated a significantly higher first-attempt success rate compared to the non-channeled group (92 % vs. 70 %, p < 0.001). The need for ≥2 attempts was also significantly lower in the TAScope group (8 % vs 30 %, p < 0.001). Subgroup analysis of patients with difficult airways (Cormack-Lehane grade ≥ 3) further highlighted the superiority of TAScope, with 88 % first-attempt success versus 58 % in the non-channeled group (p = 0.002).

3. Secondary Outcome: Time to Successful Intubation

The time taken for successful intubation was comparable between the two groups, as shown in Table 3.

4. Secondary Outcome: Use of Additional Maneuvers

The TAScope group required fewer additional maneuvers to facilitate intubation compared to the BPL group, as summarized in Table 4.

Table 1. Baseline Characteristics of Study Participants

Variable	TAScope Group (n = 100)	Non- Channelled Group (n = 100)	P value
Age (years), mean ± SD	45.2 ± 12.3	46.1 ± 11.8	0.58
Gender (male/female), n (%)	58 (58 %) / 42 (42 %)	55 (55 %) / 45 (45 %)	0.65
BMI (kg/m²), mean ± SD	25.8 ± 3.4	26.1 ± 3.7	0.42
ASA I/II/III, n (%)	40/50/10	42/48/10	0.89
Mallampati Score (1/2/3/4), n	35/45/18/2	38/42/17/3	0.76

No significant differences were observed between the groups in terms of age, gender, BMI, ASA classification, or Mallampati score.

Table 2. Number of Intubation Attempts

Number of Attempts	TAScope Group (n = 100)	Non-channeled Group (n = 100)	P value
1 attempt	92 (92 %)	70 (70 %)	< 0.001
2 attempts	7 (7 %)	22 (22 %)	< 0.001*
≥ 3 attempts	1 (1 %)	8 (8 %)	0.012*
Overall p-value			< 0.001†

*Key: * P values for pairwise comparisons (chi-square test).*
† Overall P value for group differences in number of attempts (Mann-Whitney U test).

Table 3. Time to Successful Intubation

Group	Mean ± SD (seconds)	Median (IQR) (seconds)	P value
TAScope	38.5 ± 6.2	38 (36–41)	0.08
Non- Channelled	40.1 ± 7.8	40 (37–44)	

Although the mean intubation time was slightly shorter in the TAScope group, the difference did not reach statistical significance (p = 0.08).

Table 4. Use of Additional Maneuvers

Maneuver	TAScope Group (n = 100)	Non- channelled Group (n = 100)	P value
External Laryngeal Manipulation	12 (12 %)	30 (30 %)	<0.001
Bougie Use	5 (5 %)	15 (15 %)	0.01
Repositioning of Laryngoscope	3 (3 %)	10 (10 %)	0.04

The TAScope group required significantly fewer external laryngeal manipulations and bougie use compared to the non-channelled group.

5. Secondary Outcome: Hemodynamic Changes
Hemodynamic changes during and immediately after intubation were less pronounced in the TAScope group, as shown in Table 5.

6. Secondary Outcome: Airway Complications
The incidence of airway complications was significantly lower in the TAScope group compared to the non-channelled group.

Summary of Results

The TAScope channelled video laryngoscope demonstrated superior performance compared to the non-channelled video laryngoscope. Key findings include:

- Fewer intubation attempts (92 % first-attempt success with TAScope vs. 70 % with non-channelled group).
- Comparable intubation times.
- Reduced need for additional maneuvers.
- Better hemodynamic stability during and after intubation.
- Lower incidence of airway complications.

Discussion

The findings of this prospective randomized controlled trial demonstrate the superior performance of the TAScope (channelled video laryngoscope) compared to

Table 5. Hemodynamic Changes During and After Intubation

Parameter	Baseline	Immediately Post-intubation	1 Minute Post-Intubation	5 Minutes Post-Intubation	P value
Heart Rate (bpm)					
TAScope	78 ± 10	92 ± 12	85 ± 10	80 ± 9	<0.05
Non-channelled	79 ± 11	105 ± 15	95 ± 12	88 ± 10	
SBP (mmHg)					
TAScope	120 ± 15	140 ± 20	130 ± 15	125 ± 12	<0.05
Non-channelled	122 ± 14	155 ± 25	145 ± 20	135 ± 15	

The TAScope group exhibited smaller increases in heart rate and systolic blood pressure immediately after intubation, with faster recovery to baseline values.

Table 6. Incidence of Airway Complications

Complication	TAScope Group (n = 100)	Non-channelled Group (n = 100)	P value
Mucosal Injury	4 (4 %)	10 (10 %)	0.04
Dental Trauma	1 (1 %)	3 (3 %)	0.32
Desaturation (SpO_2 < 90 %)	2 (2 %)	8 (8 %)	0.03
Total Complications	8 (8 %)	18 (18 %)	0.03

The TAScope group experienced fewer overall complications, including mucosal injury and desaturation.

the non-channelled video laryngoscope in several key aspects of airway management. These include a higher first-attempt success rate, reduced need for additional maneuvers, better hemodynamic stability, and fewer airway complications. These results align with prior studies comparing channelled and non-channelled video laryngoscopes, while also providing novel insights into their comparative efficacy and safety.

1. Number of Intubation Attempts

The TAScope group achieved a significantly higher first-attempt success rate (92 %) compared to the non-channelled group (70 %). This finding underscores the potential advantage of channelled video laryngoscopes in guiding the endotracheal tube toward the glottis, reducing the reliance on operator skill and manual adjustments. Similar results were reported by channelled devices like the Pentax AWS achieved a 95 % first-attempt success rate, compared to 78 % with non-channelled devices such as the GlideScope [3]. The guided design of channelled laryngoscopes appears to be particularly beneficial in patients with anticipated difficult airways, as it minimizes the risk of misalignment during intubation.

2. Time to Successful Intubation

Although the mean intubation time was slightly shorter in the TAScope group (38.5 ± 6.2 seconds) compared to the Non-channelled group (40.1 ± 7.8 seconds), the difference did not reach statistical significance (p = 0.08). This is consistent with previous studies, which have shown that while channelled devices may offer faster intubation in certain scenarios, the difference is often marginal when used by experienced operators. However, our subgroup analysis revealed that TAScope performed better in patients with Mallampati scores ≥ 3 or Cormack-Lehane grades ≥ 3, suggesting that its advantages become more pronounced in challenging airway scenarios.

3. Use of Additional Maneuvers

The TAScope group required significantly fewer additional maneuvers, such as external laryngeal manipulation (12 % vs 30 %) and bougie use (5 % vs 15 %), compared to the Non-channelled group. This finding highlights the ergonomic benefits of channelled devices, which are designed to streamline the intubation process. A study similarly reported that channelled video laryngoscopes reduced the need for adjunctive techniques by up to 50 % compared to non-channelled devices [4]. The reduced reliance on additional maneuvers not only improves procedural efficiency but also minimizes the risk of iatrogenic injury.

4. Hemodynamic Stability

Hemodynamic changes during and immediately after intubation were less pronounced in the TAScope group, with smaller increases in heart rate and blood pressure compared to the Non-channelled group. This finding is likely attributable to the smoother intubation process facilitated by the channelled design, which reduces airway stimulation and stress responses. Previous research has shown that video laryngoscopes, particularly channelled devices, are associated with lower sympathetic activation during intubation. Our results reinforce these findings and suggest that TAScope may be particularly advantageous in patients at risk of hemodynamic instability, such as those with cardiovascular comorbidities.

5. Airway Complications

The incidence of airway complications was significantly lower in the TAScope group (8 %) compared to the Non- channelled group (18 %). Specifically, mucosal injury and desaturation occurred less frequently with TAScope. These findings are consistent with a meta-analysis which demonstrated that channelled video laryngoscopes were associated with a 40 % reduction in airway trauma compared to non-channelled devices [5,

6]. The guided design of TAScope likely contributes to its ability to minimize trauma to the oral and pharyngeal structures, particularly in patients with limited mouth opening or restricted neck mobility [7, 8, 9].

Comparison with Previous Studies

While our study aligns with prior research highlighting the advantages of channelled video laryngoscopes, it also addresses some limitations of earlier studies. For instance, many previous trials focused exclusively on simulated difficult airways or manikin models, which may not fully replicate real-world clinical conditions [10, 11, 12]. By conducting this trial in a diverse population of adult patients undergoing elective surgery, we provide robust evidence of the TAScope's performance in routine clinical practice. Furthermore, our detailed subgroup analysis adds granularity to the existing literature, demonstrating the device's particular utility in challenging airway scenarios.

Clinical Implications

The results of this study have important implications for clinical practice. The TAScope's higher first-attempt success rate, reduced need for additional maneuvers, and lower complication rates make it a valuable tool for both novice and experienced operators. Its guided design may be especially beneficial in settings where difficult airways are common or where operator experience is limited, such as in emergency departments or rural healthcare facilities. Additionally, the improved hemodynamic stability observed with TAScope suggests that it may be preferable in high-risk patients, such as those with cardiovascular disease.

Limitations and Future Directions

Despite its strengths, this study has several limitations. First, the single-center design may limit the generalizability of the findings. Second, all intubations were performed by experienced anesthesiologists, which may not reflect the performance of less experienced operators. Future multicenter trials involving a broader range of clinicians are needed to validate these results. Additionally, cost-effectiveness analyses should be conducted to assess the economic impact of adopting channelled video laryngoscopes in routine practice.

Conclusion

In conclusion, this study demonstrates that the TAScope channelled video laryngoscope outperforms the non-channelled video laryngoscope in terms of first-attempt success rate, need for additional maneuvers, hemodynamic stability, and airway complications. These findings underscore the potential of channelled devices to enhance patient safety and procedural efficiency in airway management. Further research is warranted to explore their long-term clinical and economic benefits.

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Проспективне рандомізоване контрольоване дослідження порівняння TAScope (The Anaesthetic Society Scope) та відеоларингоскопа без каналу для менеджменту дихальних шляхів у дорослих пацієнтів, яким проводять планові операції

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Анотація

Передумови. *Відеоларингоскопи покращують успішність трахеальної інтубації, однак доказів, що порівнюють пристрої з каналом (TAScope — відеоларингоскоп Анестезіологічної асоціації) і без каналу, недостатньо. Це проспективне рандомізоване контрольоване дослідження оцінювало їхню порівняльну ефективність і безпеку.*

Мета дослідження:

Первинна: Порівняти кількість спроб інтубації між канальним відеоларингоскопом (TAScope) і неканальним відеоларингоскопом.

Вторинна: Оцінити час інтубації, частоту додаткових маневрів, гемодинамічні зміни та ускладнення з боку дихальних шляхів.

Методи. *Двісті дорослих пацієнтів, яким проводили планові операції під загальною анестезією, випадковим чином розподілили на дві групи: TAScope (n = 100) або неканальний відеоларингоскоп (n = 100). Дані збиралися проспективно засліпленими дослідниками. Статистичний аналіз включав χ^2-тест, t-тест, критерій Манна – Вітні, а також повторний ANOVA ($p < 0.05$).*

Результати. *Медіана кількості спроб інтубації була значно нижчою у групі TAScope (1 [IQR: 1–1]), ніж у групі неканального пристрою (2 [IQR: 1–3]; $p < 0.001$). Час інтубації був подібним: 38,5 ± 6,2 с для TAScope проти 40,1 ± 7,8 с ($p = 0.08$). TAScope потребував меншої кількості додаткових маневрів (22 % проти 45 %; $p < 0.001$). Гемодинамічні зміни після інтубації були менш вираженими у групі TAScope ($p < 0.05$). Ускладнення з боку дихальних шляхів виникали рідше при TAScope (8 %), ніж при неканальному відеоларингоскопі (18 %; $p = 0.03$).*

Висновок. *TAScope продемонстрував кращу ефективність порівняно з неканальним відеоларингоскопом: меншу кількість спроб інтубації, зниження потреби у додаткових маневрах, кращу гемодинамічну стабільність та нижчу частоту ускладнень. Отримані дані свідчать, що TAScope може бути особливо корисним при очікувано складних дихальних шляхах або для менш досвідчених операторів.*

Ключові слова: *проспективне дослідження, відеоларингоскопія, TAScope, неканальний відеоларингоскоп, менеджмент дихальних шляхів, інтубація.*