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Enhancing Intubation Positioning: Insights from Anesthesia Professionals on positioning challenges.

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ABSTRACT

Background: Tracheal intubation is a critical procedure in anesthesia and critical care practice, requiring precise positioning to ensure patient safety and optimal outcomes. Intubation positioning devices (IPDs) have been developed to facilitate efficient and effective tracheal intubation**.**
Objectives: To evaluate current airway management practices and challenges. Assess the perceived need for intubation positioning devices. Identify key features and functionalities desired in such devices. Explore potential benefits and limitations

Methods: Responses obtained from 130 Anesthesiologists, Intensivists and critical care physicians involved in airway handling through a structured nine questionnaire cross sectional survey analysing the present scenario and future needs for easing intubation positioning.
Results: Respondents had varied experience levels, with 30.5% having over 15 years of experience. Most performed 30-40 intubations monthly, indicating proficiency in airway management.Head extension (43.1%) and neck extension (42.3%) were the most commonly used intubation positions. Head rings (47.3%) were the preferred positioning system, followed by pillows (26%). Cormack-Lehane Grade 2 (73.8%) was the most commonly encountered with rise in grade 3 in recent years. Cricoid pressure was applied selectively, mainly in specific cases or difficult intubations. McCoy Blade (48.8%) and video assist devices (16.8%) were the preferred difficult airway devices. Bougie/stylet use was mainly in difficult intubation cases (85.9%). Majority (52.3%) showed interest in a novel positioning device.

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 10, 2024

Limitations: A smaller sample size can affect the generalizability of the results. Respondent bias and selection bias can influence outcomes. Self-reported data can be subjective and prone to inaccuracies. Differences in individual techniques and practices among respondents can create variability in the data.
Conclusions: The survey results highlight a diverse range of experiences and practices among anesthesia professionals. The data underscores a strong reliance on established techniques for intubation and pain management, with a notable openness to adopting new methods. This balance of tradition and innovation is essential for improving patient outcomes and procedural efficiency in anesthetic practice.

INTRODUCTION

Airway management is a critical aspect of anesthesia care, requiring precise patient positioning to facilitate successful tracheal intubation[1]. Despite advancements in airway devices and techniques, difficult airways continue to pose significant challenges[2]. The importance of optimal patient positioning in airway management has been emphasized by professional organizations such as the American Society of Anesthesiologists (ASA)[3] and the Difficult Airway Society (DAS)[4].

Traditional positioning techniques, such as the sniffing posture[5], have been widely adopted. However, recent studies have highlighted limitations in achieving optimal oropharyngolaryngeal alignment[6]. This has sparked interest in developing innovative solutions, including dedicated intubation positioning devices.

The optimal positioning for direct laryngoscopy, known as the "ear-to-sternal notch" position[7], involves a precise combination of atlanto-occipital extension and neck flexion. This alignment, characterized by a 35° neck flexion and 15° face plane extension, facilitates unobstructed visualization of the glottis.

The concept of optimal positioning for laryngoscopy dates back to 1913, when Chevalier Jackson introduced the "Boyce-Jackson" position[8]. Later, in 1936, Magill coined the term "sniffing position" to describe this alignment[9].Bannister and MacBeth's 1944 proposal of the 3-axis alignment theory further emphasized the importance of aligning the laryngeal, pharyngeal, and oral axes with the line of vision[10]. This theory laid the groundwork for understanding the spatial relationships crucial for successful laryngoscopy.

Keith Greenland's Two Curve Theory provides additional insight into the anatomical considerations[11]. The primary curve, representing the oropharyngeal

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 10, 2024

pathway, and the secondary curve, encompassing the pharyngo-glotto-tracheal route, must be aligned with the line of sight and the trachea for effortless laryngoscopy and intubation. The point of inflection at the base of the epiglottis serves as a critical landmark.

This questionnaire aims to investigate anesthesia professionals' experiences, perceptions, and needs regarding intubation positioning devices. By exploring current challenges, desired features, and potential benefits, we seek to inform the design and development of effective devices that enhance patient safety and outcomes.

Objectives:

1. Evaluate current airway management practices and challenges.
2. Assess the perceived need for intubation positioning devices.
3. Identify key features and functionalities desired in such devices.
4. Explore potential benefits and limitations.

Methodology:

Study received approval from an Institutional Review Board, and we obtained written verbal consent from all the respondents involved in the study.

Source of data: Responses obtained through online google form questionnaires**.**

Study design: A Cross sectional questionnaire based survey study.

Sample size: Responses obtained from 130 Anesthesiologists, Intensivists and critical care physicians involved in airway handling for general anesthesia during surgeries, ICUs working at Government hospitals, nursing homes, medical colleges and private corporate hospitals.

Inclusion criteria:

Attending anesthesiologists, senior resident anesthesiologists, Intensivists and critical care specialists involved in airway handling.

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 10, 2024

Questionnaire used in the survey

1. How many years of experience do you have in anesthesia practice?

2. What is your average number of intubations performed per month?

These first 2 questions help in assessing the reliability of the entire questionnaire survey response as it takes in to account the experience of anaesthesiologists /intensivists in handling airway. More the experience more will be reliability and weightage of the responses.

3. Which intubation position do you commonly use?

A. Neck extension B. Neck flexion C. Head extension D. Head flexion

E. Flexion of neck and extension of Atlantoaxial joint

F. Neck flexion with Atlantooccipital joint extension

4: What equipment do you commonly use for positioning during intubation?

A. Bedsheet B. Pillow C. Head ring D. None E. Other (please specify)

5: What is the most common Cormack-Lehane grade you encounter?

A. Grade 1 B. Grade 2 C. Grade 3 D. Grade 4

6. How often do you require cricoid pressure?

A. Often B. Some cases (very difficult intubations)

C. Only for full stomach D. Never

7. Which difficult airway device do you commonly use?

A. MacGill forceps B. Video laryngoscope C. Fiberoptic

D. Other (specify) E. Bougie F. Always use videolaryngoscope

G. Elastic gum bougie H. Tascope I. Intubating bougie

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 10, 2024

8.How often do you use a bougie or styllet?

A. Often B. Difficult intubation cases C. Always D. Always with bougie

9: Are you interested in using a positioning device to assist with intubation?

A. Yes B. No C. Maybe

Response Analysis:

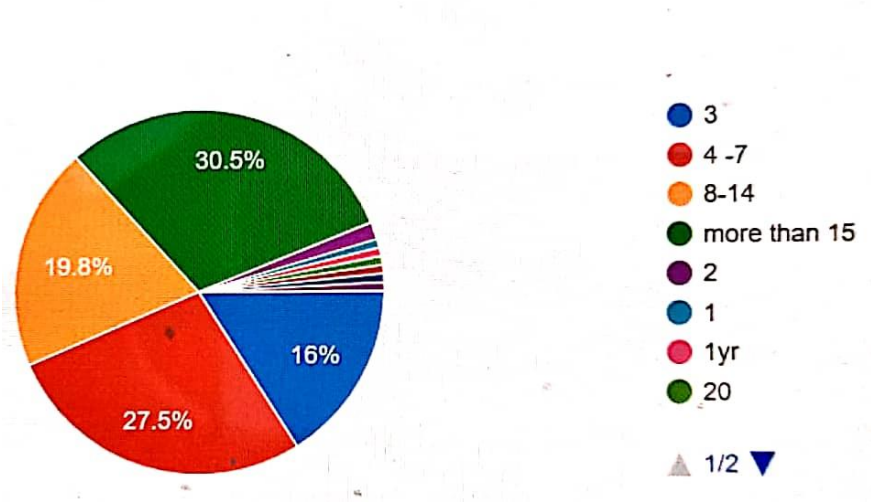


Fig 1: Years of experience in anesthesia practice.

The pie chart illustrates the distribution of years of anesthesia practice respondents, divided into several segments with different ranges of practice years. The largest group, at 30.5%, has over 15 years of experience. Following this, 27.5% have 4-7 years of experience, while 19.8% fall within the 8-14 years range. This distribution suggests a varied level of experience within the group, with a significant proportion having substantial experience (more than 15 years) and a solid representation of mid-career practitioners (4-7 years). This diversity in experience levels can provide a broad range of perspectives and expertise within the group.

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 10, 2024

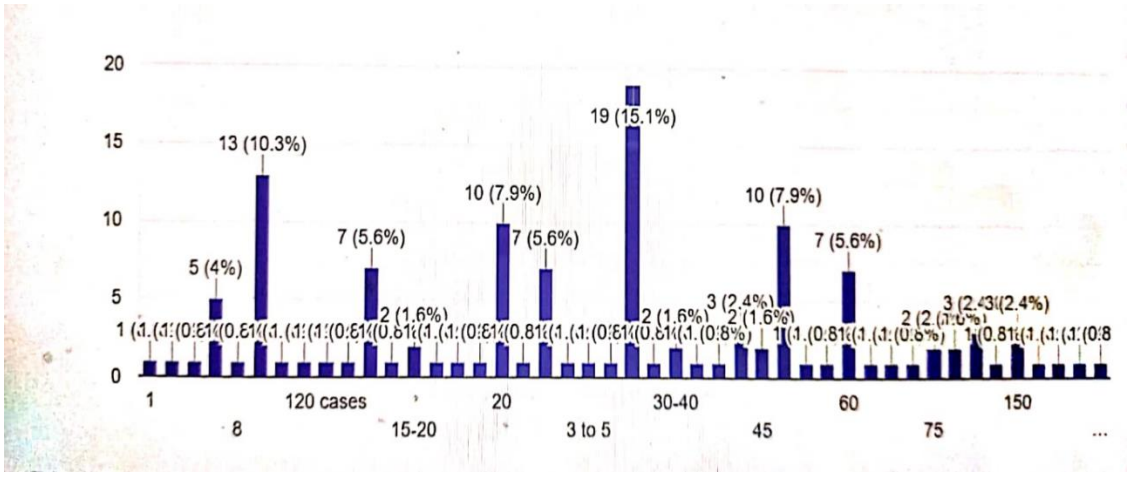


Fig 2- Number of Average Intubations in a Month

There are several ranges-graph highlights the variability in the number of intubations performed by respondents each month from ranging 1 to 170, with a significant number performing 30-40 intubations on average. So everyone involved in the study has a good experience in airway management.

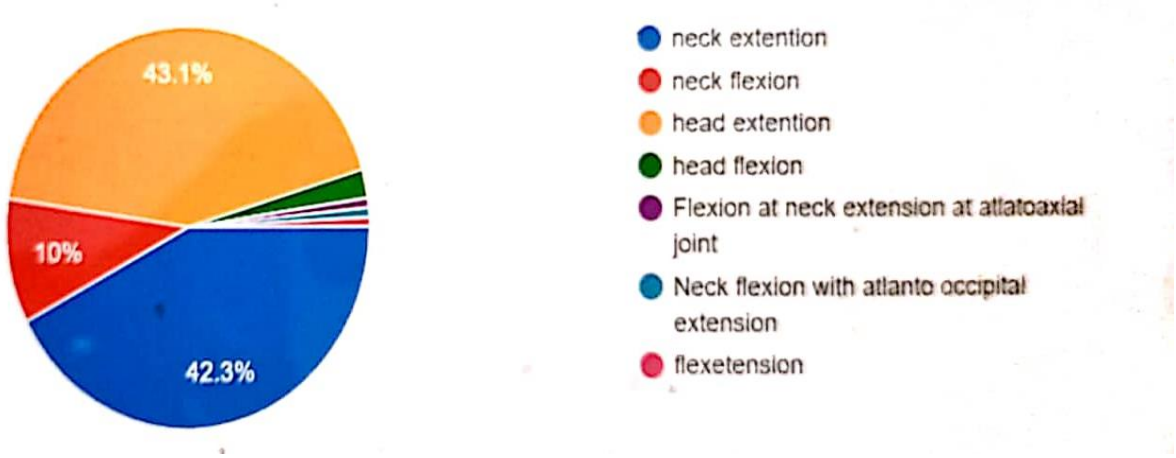


Fig 3: Intubation Position Commonly Incorporated

Neck Extension: 42.3%, **Head Extension:** 43.1%, **Neck Flexion**: 10%

From this, it's clear that Head Extension and Neck Extension are the most comm only used positions, each chosen by over 40% of respondents. Neck Flexion is s ignificantly less preferred.This data indicates that practitioners predominantly pr efer positions that involve extension of the neck or head during intubation proce dures.

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 10, 2024

Fig 4-Commonly used position system -

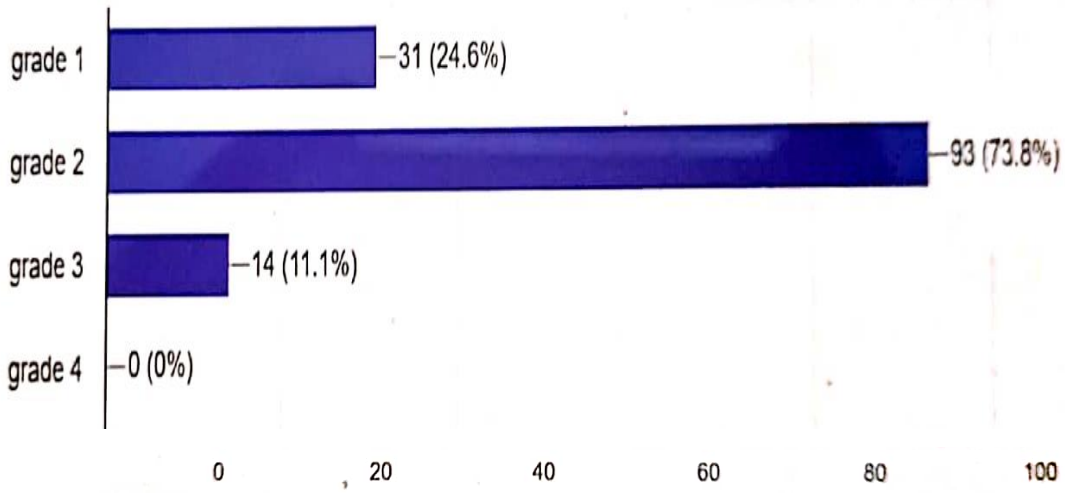
Head Ring (47.3%): Most commonly used & Pillow (26%): Second most common choice. None (16.8%): A significant portion of respondents do not use any specific positioning system. Bed sheets (9.2%): Less frequently used compared to the others. Other: A very small segment, indicating minimal usage of other unspecified systems. From this, we can infer that the head ring is the preferred positioning system among respondents, followed by the pillow. A notable portion opts for no specific positioning system, while bed sheets and other methods are less commonly use. This distribution highlights the varied practices in positioning during procedures. There are various short comings with use of these devices

Inadequate Support, limited adjustability movement during procedure: Some pillows and head rings may not provide sufficient support and accommodate all sizes and anatomies leading to suboptimal positioning.

Pressure Sores: Prolonged use of these devices can cause pressure sores or skin irritation, especially in patients with sensitive skin or those who are immobilized for extended periods.

Cost and Availability and Risk of Aspiration: Improper positioning can increase the risk of aspiration, especially if the head ring or pillow causes the patient's head to tilt too far back or forward

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 10, 2024



. **Fig5 -Commonly Encountered Cormack-Lehane Grading.**

Grade 1: 31 responses (24.6%) Grade 2: 93 responses (73.8%)

Grade 3: 14 responses (11.1%) Grade 4: 0 responses (0%)

The data indicate that Grade 2 is the most commonly encountered, representing the majority of cases at 73.8%. Grade 1 is the second most frequent at 24.6%, followed by Grade 3 at 11.1%. Grade 4 was not encountered. This distribution highlights the prevalence of Grades 1 and 2 in clinical practice, suggesting that most laryngoscopic views are relatively unchallenging.

Since the world is moving towards sedentary lifestyle and obesity becoming a global health concern, the encounter with difficult airway will be on the raise.

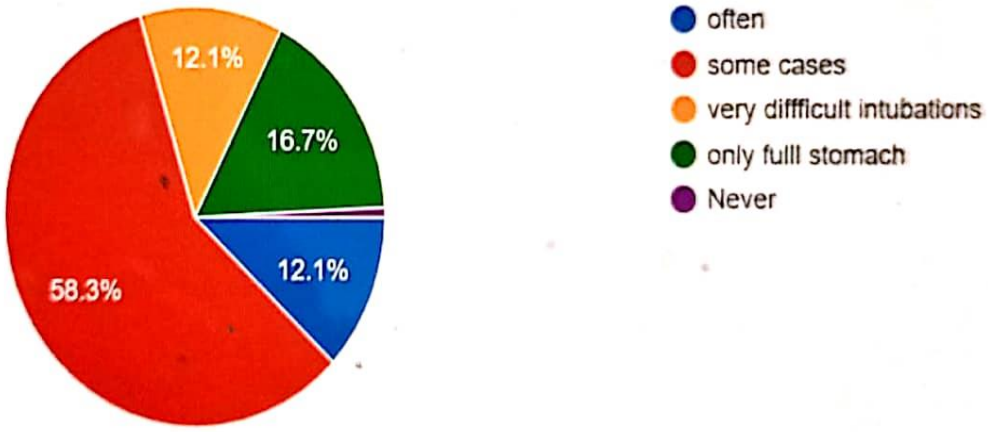


Fig 6-How often you require cricoid pressure".

- Some Cases (58.3%): Majority of respondents indicated they require cric oid pressure in some cases.

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 10, 2024

- Only Full Stomach (16.7%): This group applies cricoid pressure specifica lly for patients with a full stomach.
- Often (12.1%): A smaller segment uses cricoid pressure often.
- Few have used cricoid pressure during very difficult intubations (12.1%) and very few respondents reacted as not using cricoid pressure anytime (less than 1%).

Above chart reveals that cricoid pressure is applied by most practitionars selecti vely, particularly in certain cases or specific situations like a full stomach or diff icult intubations, rather than as a routine practice. Backward upward rightward pressure (BURP) of the thyroid cartilage is very useful in glottic visualisation during intubation. Studies have shown that aligning the external auditory canal with manubrium sternum will reduce this need by improving glottic vision.

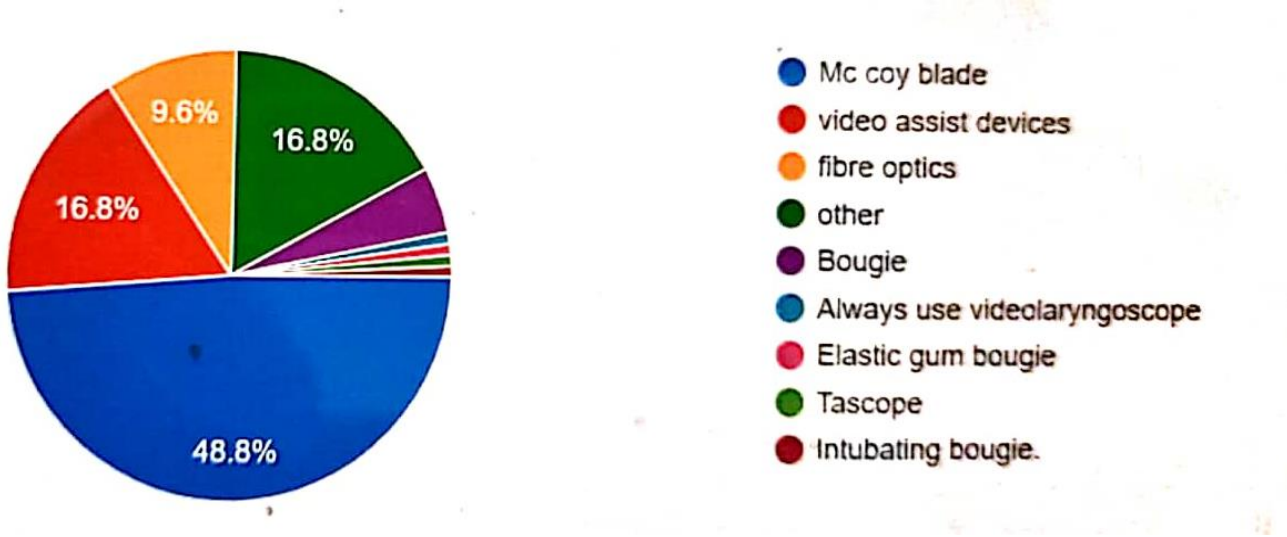


Fig-7 Commonly Used Difficult Airway Device"

Highlights the preferences among respondents for various airway devices:

McCoy Blade (48.8%): The most commonly used device, indicating its widespr ead preference among practitioners.
VideoAssist Devices (16.8%): The second most preferred option, reflecting its u tility in difficult airway management.

Fibre Optics (9.6%): Another significant choice, though less common than the McCoy Blade and video assist devices.Other (16.8%): A considerable portion of respondents use alternative devices not specified in the chart.

There are other devices represented in the pie chart but without specified percen tages. These include Bougie, Always use videolaryngoscope, Elastic gum bougi e, Tascope, and Intubating bougie.

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 10, 2024

The data suggests a strong preference for the McCoy Blade, with a notable use of video assist devices and fibre optics. The use of "other" devices also indicates diverse practices in difficult airway management among respondentsand existence of many difficult airway cases.

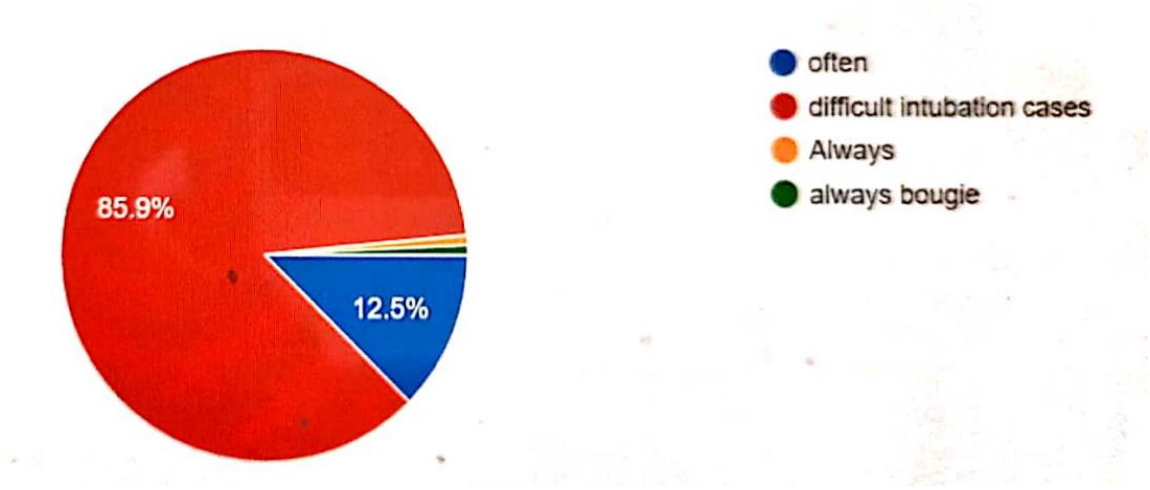


Fig 8-Need for Bougie/Stylet

Showcases the responses of 128 participants about the necessity of using a bougie or stylet. Difficult Intubation Cases: 85.9%, Often: 12.5%, Always: Represented by a small segment, Always Bougie: The smallest segment.

The chart indicates that the majority (85.9%) use bougie/stylet mainly in difficult intubation cases, while a smaller percentage (12.5%) use it often. The use is less frequent in other situations, with only a very few respondents always relying on it. This highlights the critical role of bougie/stylet in managing challenging intubations.

Newer devices addressing the positing issues may be of help in optimal Airway Management and Improved Visualization: Correct positioning can significantly improve the visualization of the vocal cords and the larynx. Patient Safety, efficiency: Proper positioning reduces the risk of complications such as airway trauma, hypoxia, and aspiration.

Efficiency and Success Rates: Guidelines and Recommendations: ASA Difficult Airway Algorithm 2022 highlights the role of positioning in improving ventilation and laryngoscopy views.

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 10, 2024

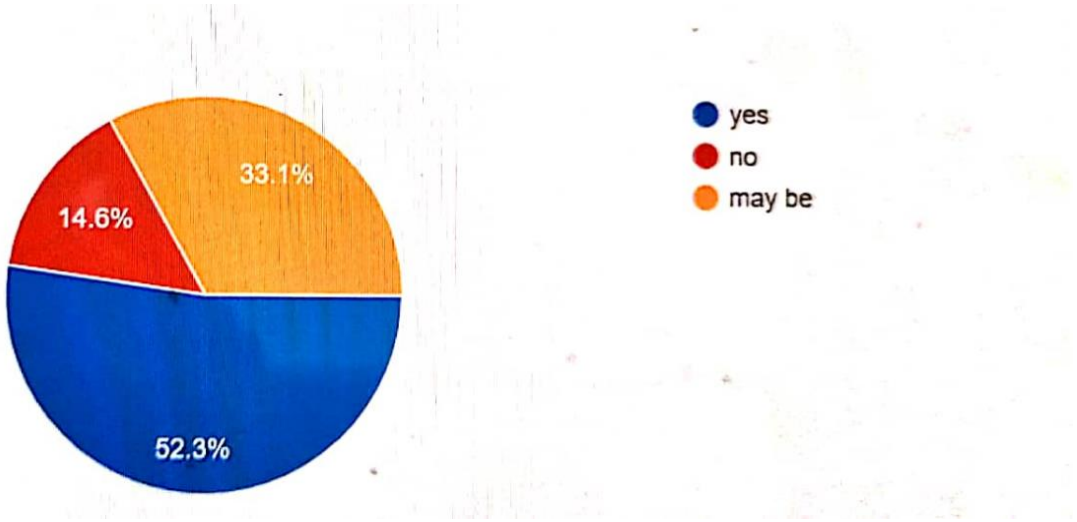


Fig 9- Interest in using a positioning device to assist in intubation

Yes / Maybe (85.4%): Majority of respondents are interested in such device.
No (14.6%): A smaller group is not interested.
Overall, more than half of the respondents are interested in the position, with a notable number considering it but not yet certain, while a minority are uninterested. This shows a positive inclination towards the proposed position among respondents.

Conclusions: The survey results provide valuable insights into the practices and preferences of anesthesia professionals. The diversity in years of practice and the number of intubations performed monthly highlights the breadth of experience and workload variability in the field. Preferred intubation positions and positioning systems indicate a reliance on established techniques to optimize procedural success and patient safety.

The data on Cormack-Lehane grading and the selective use of cricoid pressure reflect effective airway management strategies that minimize complications. The widespread use of difficult airway devices, especially the McCoy blade and video assist devices, underscores the need for tools that enhance visualization and facilitate successful intubation in challenging cases. The critical role of bougie/stylet in difficult intubations is also evident.

Finally, the interest in new positions designed to assist in intubation reveals a willingness among practitioners to embrace innovation and improve current practices. These findings highlight a community of professionals committed to maintaining high standards of care through both established methods and openness to new advancements. This balance ensures that anesthesia practice continues to evolve, enhancing patient outcomes and procedural efficiency.

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 10, 2024

Limitations: A smaller sample size can affect the generalizability of the results. Respondent bias and selection bias can influence outcomes. Differences in individual techniques and practices among respondents can create variability in the data. These limitations highlight the need for careful design, larger sample sizes, and thorough analysis in future research to validate findings

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