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Original Research Article

Role of Video laryngoscopy in the Management of Difficult Airway in Modern Anaesthesiology: A Survey

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Abstract: *In patients with anticipated difficult airway, video laryngoscopy (VL) has shown improved laryngeal view, higher success rates, and higher first-attempt success, leading to fewer intubation maneuvers in VL.* ***Objective:*** *To determine the availability, usage factors, restrictions, and preferences of video laryngoscopes in difficult airway management among anesthesiologists in Sindh.* ***Methods:*** *A total of 94 participants were included. A questionnaire was used, which was divided into two parts. The first part contained questions regarding demographic data and difficult airway management. The second part addressed the availability, use, and perception of anesthesiologists toward its use. The data were compiled and analyzed using SPSS version 25. The Shapiro-Wilk test was used to check normality. If the data were non-normal, the median (IQR) was reported. Stratification was performed and post-stratification chi-square or Fisher's exact tests were applied, with a P-value <0.05 considered significant.* ***Results:*** *The mean age of the anesthesiologists was 32.46±5.88 years. The majority (83%, n=78) of participants reported having access to video laryngoscopy. A total of 3 (3.2%) anesthesiologists faced restrictions. The high expense was the reason for not using VLs. First-generation LMA (48.9%), video laryngoscopy (64.9%), and fibreoptic bronchoscopy (42.6%) were the most preferred first, second, and third options for managing the anticipated difficult airways.* ***Conclusion:*** *Most respondents had access to VLs. A very low percentage of participants faced restrictions in using VLs. The high cost of the device is the primary barrier to its use.*

Keywords: Video laryngoscope, difficult airway management, Anesthesia practice patterns, Medical device accessibility, Anesthesiologist preferences

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Introduction

Direct laryngoscopy (DL) remains the gold standard for endotracheal intubation. However, in the past decade, video laryngoscopy (VL) has gained widespread use in airway management due to its advantages, particularly in patients with an anticipated difficult airway (1). VL has demonstrated improved laryngeal visualization, higher overall success rates, and better first-attempt success compared to DL (2, 3, 4). There are several designs of VLs available channelled and non-cannelled, and their use has been encouraged in both difficult and routine intubations in settings such as emergency rooms and critical care units (5). According to the latest Difficult Airway Society (DAS) difficult intubation guidelines, wherever intubation is performed, it is recommended that VL should be immediately available.

While VL offers numerous benefits, understanding its penetration into routine practice, the availability of different devices, and the barriers to its broader adoption remain crucial (5, 6). A survey conducted by Shruti and colleagues reported that only 42% of respondents had access to VL, with 20% indicating that its use was restricted to consultants.

To address these gaps, we conducted an electronic survey to evaluate the availability of VL, factors influencing its use, and the perceptions of anesthesiologists working in tertiary care hospitals in Sindh regarding the role of VL in managing difficult airways.

Video laryngoscopy (VL)**:** Video laryngoscopy is a laryngoscope with a video camera technology which helps to visualize airway structures and facilitate endotracheal intubation (ETI)(7).

Difficult Airway (DA): A difficult airway is a clinical situation in which anticipated or unanticipated difficulty or failure is experienced by a trained anesthesiologist with experience of at least 2 years (4).

Methodology

This cross-sectional study was conducted at the Department of Anesthesiology, Critical Care, and Pain, Liaquat National Hospital & Medical College, Karachi, following approval from the institutional research and ethics committee. A questionnaire was designed to validate the survey. It was divided into two sections: The first section collected demographic data and information on difficult airway management (Annexure 1). The second section focused on the availability, use, and perceptions of anesthesiologists toward video laryngoscopy (Annexure 2). Participants included anesthesiologists of both genders from various training hospitals in Sindh who had more than two years of experience and completed the survey form. A difficult airway was defined as a situation in which an anticipated or unanticipated difficulty or failure was experienced by a trained anesthesiologist. The survey also included questions about the management of anticipated and unanticipated difficult airways, preferred techniques, and desirable features of video laryngoscopes. Respondents were asked to rank these preferences in order of importance. The survey was created using the www.**s**urveymonkey.com platform and distributed via a link shared through WhatsApp numbers and WhatsApp groups of anesthesiologists in Sindh. The groups were identified with the assistance of the Pakistan Society of Anesthesiologists (PSA). The survey remained open until responses from all 94 participants were recorded. Reminders were sent every fortnight to encourage participation during this period. The sample size was calculated using the sample size calculator by Wan or Arifin (available at: https://wnarifin.github.io/ssc_web.html). A prevalence of access to video laryngoscopy (42%) (6) Was used, with a margin of error of 10% and a confidence level of 95%. The total calculated sample size was 94 participants. Data were compiled and analyzed using SPSS version 25. Frequencies and percentages were computed for qualitative variables. The Shapiro-Wilk test was used to assess the normality of quantitative data. Normally distributed quantitative variables were

presented as mean ± standard deviation, while non-normal data were reported as median (interquartile range, IQR). Effect modifiers were controlled through stratification, and post-stratification analysis was conducted using the chi-square test or Fisher's exact test, as appropriate. A p-value ≤0.05 was considered statistically significant.

Results

The current study comprised 94 anesthesiologists from various hospitals in Pakistan. The average age of the anesthesiologists was 32.46±5.88 years, with 58.5% of them were male and 41.5% were female. Of the 94 anesthesiologists, 1.1% worked in private clinics or restricted specialty hospitals, 14.9% worked in private medical colleges, 26.6% worked in government hospitals, 44.7% worked in private tertiary care hospitals, and 11.7% worked in government medical colleges. There were 5.4% of consultants, 21.3% were senior registrars, and 73.4% of residents had more than two years. Of the 94 anesthesiologists, the majority treated 31–60 cases of general anesthesia each month, while 38.3% dealt with 1.1–2% of airway difficulties. Of the 94 anesthesiologists, 78 (83%) said their institute had a video laryngoscope, while 16 (17%) did not. According to 16 anesthesiologists, the high expense is the reason why video laryngoscopes are not used. C-MAC (53.8%), Airtraq (19.2%), and Glide scope (12.8%) were the most widely used video laryngoscopes. Three anesthesiologists (3.2%) acknowledged restrictions on the use of video laryngoscopes, and all three anesthesiologists cited expensive equipment as the cause of these restrictions. Of the anesthesiologists surveyed, 37.2% said their institutes had a channeled video laryngoscope, while 62.8% said theirs did not. Detailed Descriptive statistics are presented in Table 1.

First generation LMA (48.9%), video laryngoscopy (64.9%), and fibreoptic bronchopscopy (42.6%) were the most popular first, second, and third preferences for managing an anticipated difficult airway, while first generation LMA (57.4%), video laryngoscope (58.5%), and awaken and postpone the case (52.1%) were the most popular first, second, and third preferences for managing an unanticipated difficult airway.

Table 2 displays the detailed frequency distribution of preferences for managing anticipated and anticipated difficult airways.

We found a significant association between video laryngoscope availability in the primary workplace (p=0.002) and several General Anesthesia cases handled in a month (p=0.009) whereas Video laryngoscope use restriction was found significantly associated with Primary Workplace (p=0.007) as presented in Table-3.

Primary workplace (p=0.001), the number of general anesthesia cases handled in a given month (p=0.041), and the percentage of GA cases with airway difficulty in a given month (p=0.004) were significantly associated with the first preference for managing an anticipated difficult airway. Additionally, we discovered an association between the number of General Anesthesia (GA) patients handled in a given month (p=0.001) with the second preference for managing an anticipated difficult airway and primary workplace (p=0.003) and several General Anesthesia (GA) cases handled in a month (p=0.001) with the third preferences for managing an anticipated difficult airway. The first preference for managing an unanticipated difficult airway was significantly associated with primary workplace (p<0.001), the number of GA cases handled throughout the month (p=0.041), and the percentage of GA cases with airway difficulty during the month (p=0.001). Additionally, we discovered an association between the primary workplace (p<0.001) and the second preference for managing an anticipated difficult airway whereas the percent GA cases with airway difficulty in a month (p=0.004) were associated with the third preference for managing an unanticipated difficult airway. Tables 4 through Table 9 give the detailed results of preferences for managing anticipated and unanticipated difficult airways.

Table 1: Descriptive statistics of the study population (n=94)

	Frequency (percent)
Gender	
Male	55(58.5)
Female	39(41.5)
Age	
Mean ± SD	32.46±5.88
≤35 years	68(72.3)
>35 years	26(27.7)
Primary Workplace	
Govt. Medical College	11(11.7)
Private Medical College	14(14.9)
Govt. Hospital	25(26.6)
Private Tertiary Care Hospital	42(44.7)
Private Clinic / Limited Specialty Hospital	2(2.1)
Professional experience in Anesthesia	
Resident with more than 2 years of experience	69(73.4)
Senior Registrar	20(21.3)
Consultant for 0-10 years	5(5.4)
General Anesthesia (GA) cases are handled in a month.	
0-30	13(13.8)
31-60	34(36.2)
61-90	25(26.6)
91-120	12(12.8)
121-150	10(10.6)
Percent GA cases with airway difficulty in a month	
<1%	15(16)
1.1 to 2%	36(38.3)
2.1 to 3%	28(29.8)
3.1 to 4%	6(6.4)
>4%	9(9.5)

Video laryngoscope availability at the workplace	
Yes	78(83)
No	16(17)
Types of Video laryngoscope Institute own (n=78)	
Airtraq	15(19.2)
C-MAC	42(53.8)
C Trach	2(2.6)
Glide scope	10(12.8)
McGrath	9(11.5)
Video laryngoscope restrictions (n=78)	
Yes	3(3.2)
No	75(96.2)
VL type used at the workplace	
Channeled	29(37.2)
Non-Channeled	49(62.8)

Table 2: Management preferences for anticipated and unanticipated difficult airway

	Frequency (percent)		
	1st preference	2nd preference	3rd preference
Managing the ANTICIPATED difficult airway			
First generation LMA	46(48.9)	0(0)	0(0)
Second generation LMA	22(23.4)	6(6.4)	0(0)
Video laryngoscopy	22(23.4)	61(64.9)	4(4.3)
Fibreoptic laryngoscopy	2(2.1)	16(17)	40(42.6)
Conventional Laryngoscopy	2(2.1)	10(10.6)	19(20.2)
Tracheostomy	0(0)	1(1.1)	31(33)
Managing UN ANTICIPATED difficult airway			
First generation LMA	54(57.4)	0(0)	0(0)
Second generation LMA	19(20.2)	16(17)	0(0)
Video laryngoscope	15(16)	55(58.5)	9(9.6)
Tracheostomy	0(0)	2(2.1)	36(38.3)
Awaken and postpone the case	6(6.4)	21(22.3)	49(52.1)

Table 3: Association of a video laryngoscope availability and restrictions

	Video laryngoscope availability at the workplace (n=94)			Video laryngoscope restrictions (n=78)		
	Yes	No	P-value	Yes	No	P-value
Primary Workplace						
Govt. Medical College	6(54.5)	5(45.5)	0.002*	2(33.3)	4(66.7)	0.007*
Private Medical College	14(100)	0(0)		0(0)	14(100)	
Govt. Hospital	22(88)	3(12)		1(4.5)	21(95.5)	
Private Tertiary Care Hospital	36(85.7)	6(14.3)		0(0)	36(100)	
Private Clinic / Limited Specialty Hospital	0(0)	2(100)				
Professional experience in Anesthesia						
Resident with more than 2 years of experience	58(84.1)	11(15.9)	0.891	3(5.2)	55(94.8)	1.000
Senior Registrar	16(80)	4(20)		0(0)	16(100)	
Consultant for 0-10 years	4(80)	1(20)		0(0)	4(100)	
General Anesthesia (GA) cases are handled in a month.						
0-30	7(53.8)	6(46.2)	0.009*	0(0)	7(100)	0.881
31-60	28(82.4)	6(17.6)		1(3.6)	27(96.4)	
61-90	24(96)	1(4)		2(8.3)	22(91.7)	
91-120	9(75)	3(25)		0(0)	9(100)	
121-150	10(100)	0(0)		0(0)	10(100)	
Percent GA cases with airway difficulty in a month						
<1%	10(66.7)	5(33.3)	0.337	0(0)	10(100)	0.470
1.1 to 2%	29(80.6)	7(19.4)		3(10.3)	26(89.7)	
2.1 to 3%	25(89.3)	3(10.7)		0(0)	100(100)	

3.1 to 4%	6(100)	0(0)		0(0)	100(100)	
>4%	8(88.9)	1(11.1)		0(0)	100(100)	

*The Chi-square/fisher exact test was applied. A P-value less than 0.05 is considered as significant. *Significant at 0.05 level.*

Table 4: Association for 1st Preference in Managing an Anticipated Difficult Airway

	1st preference in managing an ANTICIPATED difficult airway Frequency (percent)					p-value
	First generation LMA	Second generation LMA	Video laryngoscopy	Fibreoptic laryngoscopy	Conventional Laryngoscopy	
Primary Workplace						
Govt. Medical College	9(81.8)	0(0)	2(18.2)	0(0)	0(0)	0.001*
Private Medical College	8(57.1)	0(0)	4(28.6)	2(14.3)	0(0)	
Govt. Hospital	6(24)	12(48)	5(20)	0(0)	2(8)	
Private Tertiary Care Hospital	21(50)	10(23.8)	11(26.2)	0(0)	0(0)	
Private Clinic / Limited Specialty Hospital	2(100)	0(0)	0(0)	0(0)	0(0)	
Professional experience in Anesthesia						
Resident with more than 2 years of experience	32(46.4)	13(18.8)	20(29)	2(2.9)	2(2.9)	0.294
Senior Registrar	12(60)	6(30)	2(10)	0(0)	0(0)	
Consultant for 0-10 years	2(40)	3(60)	0(0)	0(0)	0(0)	
General Anesthesia (GA) cases are handled in a month.						
0-30	4(30.8)	5(38.5)	2(15.4)	0(0)	2(15.4)	0.041*
31-60	18(52.9)	5(14.7)	11(32.4)	0(0)	0(0)	
61-90	10(40)	9(36)	6(24)	0(0)	0(0)	
91-120	8(66.7)	1(8.3)	1(8.3)	2(16.7)	0(0)	
121-150	6(60)	2(20)	2(20)	0(0)	0(0)	
Percent GA cases with airway difficulty in month						
<1%	9(60)	0(0)	4(26.7)	0(0)	2(13.3)	0.004*
1.1 to 2%	22(61.1)	5(13.9)	7(19.4)	2(5.6)	0(0)	
2.1 to 3%	9(32.1)	14(50)	5(17.9)	0(0)	0(0)	
3.1 to 4%	2(33.3)	2(33.3)	2(33.3)	0(0)	0(0)	
>4%	4(44.4)	1(11.1)	4(44.4)	0(0)	0(0)	

*The Chi-square/fisher exact test was applied. A P-value less than 0.05 is considered as significant. *Significant at 0.05 level.*

Table 5: Association for second preference in managing an ANTICIPATED difficult airway

2nd preference in managing an ANTICIPATED difficult airway Frequency (percent)						
	Second Generation LMA	**Video Laryngoscopy**	**Fibreoptic Laryngoscopy**	**Conventional Laryngoscopy**	**Tracheostomy**	**p-value**
Primary Workplace						<0.001*
Govt. Medical College	0 (0%)	4 (36.4%)	0 (0%)	6 (54.5%)	1 (9.1%)	
Private Medical College	4 (28.6%)	8 (57.1%)	2 (14.3%)	0 (0%)	0 (0%)	
Govt. Hospital	0 (0%)	22 (88%)	3 (12%)	0 (0%)	0 (0%)	
Private Tertiary Care Hospital	0 (0%)	27 (64.3%)	11 (26.2%)	4 (9.5%)	0 (0%)	
Private Clinic / Limited Specialty Hospital	2 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
Professional Experience in Anesthesia						0.365
Resident (>2 years)	4 (5.8%)	44 (63.8%)	12 (17.4%)	8 (11.6%)	1 (1.4%)	
Senior Registrar	0 (0%)	14 (70%)	4 (20%)	2 (10%)	0 (0%)	
Consultant (0-10 years)	2 (40%)	3 (60%)	0 (0%)	0 (0%)	0 (0%)	
GA Cases Handled Per Month						0.106
0-30	0 (0%)	9 (69.2%)	4 (30.8%)	0 (0%)	0 (0%)	
31-60	2 (5.9%)	17 (50%)	7 (20.6%)	7 (20.6%)	1 (2.9%)	
61-90	0 (0%)	20 (80%)	2 (8%)	3 (12%)	0 (0%)	
91-120	2 (16.7%)	9 (75%)	1 (8.3%)	0 (0%)	0 (0%)	

121-150	2 (20%)	6 (60%)	2 (20%)	0 (0%)	0 (0%)	
Percent GA Cases with Airway Difficulty Per Month						0.180
<1%	2 (13.3%)	7 (46.7%)	2 (13.3%)	3 (20%)	1 (6.7%)	
1.1 - 2%	2 (5.6%)	22 (61.1%)	5 (13.9%)	7 (19.4%)	0 (0%)	
2.1 - 3%	2 (7.1%)	19 (67.9%)	7 (25%)	0 (0%)	0 (0%)	
3.1 - 4%	0 (0%)	6 (100%)	0 (0%)	0 (0%)	0 (0%)	
>4%	0 (0%)	7 (77.8%)	2 (22.2%)	0 (0%)	0 (0%)	

*The Chi-square/fisher exact test was applied. A P-value less than 0.05 is considered as significant. *Significant at 0.05 level.*

Table 6: Association for Third Preference in Managing an ANTICIPATED Difficult Airway

	3rd preference in managing an ANTICIPATED difficult airway Frequency (percent)				p-value
	Video laryngoscopy	Fibreoptic laryngoscopy	Conventional Laryngoscopy	Tracheostomy	
Primary Workplace					
Govt. Medical College	0(0)	2(18.2)	2(18.2)	7(63.6)	0.003*
Private Medical College	4(28.6)	4(28.6)	1(7.1)	5(35.7)	
Govt. Hospital	0(0)	10(40)	7(28)	8(32)	
Private Tertiary Care Hospital	0(0)	24(57.1)	9(21.4)	9(21.4)	
Private Clinic / Limited Specialty Hospital	0(0)	0(0)	0(0)	2(100)	
Professional experience in Anesthesia					
Resident with more than 2 years of experience	2(2.9)	31(44.9)	12(17.4)	24(34.8)	0.058
Senior Registrar	0(0)	7(35)	6(30)	7(35)	
Consultant for 0-10 years	2(40)	2(40)	1(20)	0(0)	
General Anesthesia (GA) cases are handled in a month.					
0-30	0(0)	1(7.7)	5(38.5)	7(53.8)	0.001*
31-60	2(5.9)	10(29.4)	12(35.3)	10(29.4)	
61-90	0(0)	18(72)	1(4)	6(24)	
91-120	0(0)	7(58.3)	0(0)	5(41.7)	
121-150	2(20)	4(40)	1(10)	3(30)	
Percent GA cases with airway difficulty in month					
<1%	2(13.3)	5(33.3)	2(13.3)	6(40)	0.345
1.1 to 2%	0(0)	12(33.3)	9(25)	15(41.7)	
2.1 to 3%	2(7.1)	15(53.6)	6(21.4)	5(17.9)	
3.1 to 4%	0(0)	4(66.7)	0(0)	2(33.3)	
>4%	0(0)	4(44.4)	2(22.2)	3(33.3)	

*The Chi-square/fisher exact test was applied. A P-value less than 0.05 is considered as significant. *Significant at 0.05 level.*

Table 7: Association for first preference in managing an UNANTICIPATED difficult airway

	1st preference in managing an UNANTICIPATED difficult airway Frequency (percent)				p-value
	First generation LMA	Second generation LMA	Video laryngoscopy	Awaken and postpone the case	
Primary Workplace					
Govt. Medical College	9(81.8)	0(0)	0(0)	2(18.2)	<0.001*
Private Medical College	12(85.7)	0(0)	0(0)	2(14.3)	
Govt. Hospital	6(24)	12(48)	5(20)	2(8)	
Private Tertiary Care Hospital	25(59.5)	7(16.7)	10(23.8)	0(0)	
Private Clinic / Limited Specialty Hospital	2(100)	0(0)	0(0)	0(0)	
Professional experience in Anesthesia					
Resident with more than 2 years of experience	44(63.8)	12(17.4)	9(13)	4(5.8)	0.119
Senior Registrar	8(40)	4(20)	6(30)	2(10)	
Consultant for 0-10 years	2(40)	3(60)	0(0)	0(0)	
General Anesthesia (GA) cases are handled in a month.					
0-30	4(30.8)	3(23.1)	4(30.8)	2(15.4)	0.041*
31-60	22(64.7)	7(20.6)	5(14.7)	0(0)	
61-90	11(44)	6(24)	6(24)	2(8)	

91-120	11(91.7)	1(8.3)	0(0)	0(0)	
121-150	6(60)	2(20)	0(0)	2(20)	
Percent GA cases with airway difficulty in month					
<1%	11(73.3)	0(0)	2(13.3)	2(13.3)	0.001*
1.1 to 2%	24(66.7)	9(25)	1(2.8)	2(5.6)	
2.1 to 3%	9(32.1)	9(32.1)	10(35.7)	0(0)	
3.1 to 4%	6(100)	0(0)	0(0)	0(0)	
>4%	4(44.4)	1(11.1)	2(22.2)	2(22.2)	

*The Chi-square/fisher exact test was applied. A P-value less than 0.05 is considered as significant. *Significant at 0.05 level.*

Table 8: Association for second preference in managing an UNANTICIPATED difficult airway

	2nd preference in managing an UNANTICIPATED difficult airway Frequency (percent)				p-value
	Second generation LMA	Video laryngoscopy	Tracheostomy	Awaken and postpone the case	
Primary Workplace					
Govt. Medical College	0(0)	4(36.4)	0(0)	7(63.6)	<0.001*
Private Medical College	3(21.4)	9(64.3)	2(14.3)	0(0)	
Govt. Hospital	2(8)	16(64)	0(0)	7(28)	
Private Tertiary Care Hospital	9(21.4)	28(61.9)	0(0)	7(16.7)	
Private Clinic / Limited Specialty Hospital	2(100)	0(0)	0(0)	0(0)	
Professional experience in Anesthesia					
Resident with more than 2 years of experience	12(17.4)	42(60.9)	2(2.9)	13(18.8)	0.285
Senior Registrar	2(10)	10(50)	0(0)	8(40)	
Consultant for 0-10 years	2(40)	3(60)	0(0)	0(0)	
General Anesthesia (GA) cases are handled in a month.					
0-30	0(0)	7(53.8)	0(0)	6(46.2)	0.205
31-60	7(20.6)	19(55.9)	0(0)	8(23.5)	
61-90	5(20)	13(52)	2(8)	5(20)	
91-120	2(16.7)	10(83.3)	0(0)	0(0)	
121-150	2(20)	6(60)	0(0)	2(20)	
Percent GA cases with airway difficulty in month					
<1%	4(26.7)	5(33.3)	0(0)	6(40)	0.079
1.1 to 2%	4(11.1)	24(66.7)	0(0)	8(22.2)	
2.1 to 3%	5(17.9)	18(64.3)	0(0)	5(17.9)	
3.1 to 4%	2(33.3)	4(66.7)	0(0)	0(0)	
>4%	1(11.1)	4(44.4)	2(22.2)	2(22.2)	

*The Chi-square/fisher exact test was applied. A P-value less than 0.05 is considered as significant. *Significant at 0.05 level.*

Table 9: Association for third preference in managing an UNANTICIPATED difficult airway

	3rd preference in managing an UNANTICIPATED difficult airway Frequency (percent)			p-value
	Video laryngoscopy	Tracheostomy	Awaken and postpone the case	
Primary Workplace				
Govt. Medical College	0(0)	7(63.6)	4(36.4)	0.283
Private Medical College	3(21.4)	4(28.6)	7(50)	
Govt. Hospital	2(8)	7(28)	16(64)	
Private Tertiary Care Hospital	4(9.5)	16(38.1)	22(52.4)	
Private Clinic / Limited Specialty Hospital	0(0)	2(100)	0(0)	
Professional experience in Anesthesia				
Resident with more than 2 years of experience	7(10.1)	26(37.7)	36(52.2)	0.061
Senior Registrar	0(0)	10(50)	10(50)	
Consultant for 0-10 years	0(0)	0(0)	3(60)	
General Anesthesia (GA) cases are handled in a month.				
0-30	0(0)	6(46.2)	7(53.8)	0.412
31-60	4(11.8)	15(44.1)	15(44.1)	
61-90	3(12)	10(40)	12(48)	

91-120	0(0)	4(33.3)	8(66.7)	
121-150	2(20)	1(10)	7(70)	
Percent GA cases with airway difficulty in month				
<1%	4(26.7)	5(33.3)	6(40)	0.004*
1.1 to 2%	2(5.6)	14(38.9)	20(55.6)	
2.1 to 3%	0(0)	8(28.6)	20(71.4)	
3.1 to 4%	2(33.3)	4(66.7)	0(0)	
>4%	1(11.1)	5(55.6)	3(33.3)	

*The Chi-square/fisher exact test was applied. A P-value less than 0.05 is considered as significant. *Significant at 0.05 level.*

Discussion

This study explored the availability, utilization, and perceptions of video laryngoscopy (VL) among anesthesiologists in Sindh, emphasizing its critical role in managing both anticipated and unanticipated difficult airways. The findings are consistent with global trends that recognize VL as an indispensable tool in airway management, with increasing adoption across clinical settings.

Our findings showed that 83% of participating anesthesiologists reported access to VLs in their institutes. This percentage is significantly higher compared to Shruti et al.'s findings, where only 42% of participants had VL access (38). Despite this encouraging figure, 17% of respondents in our study cited the unavailability of VLs, with the high cost of equipment being the primary barrier. This aligns with prior studies highlighting cost as a significant obstacle, especially in resource-limited settings (7, 8).

Among the VL devices used, the C-MAC was the most preferred (53.8%), followed by Airtraq (19.2%) and GlideScope (12.8%). The preference for C-MAC correlates with its versatility, ease of use, and established efficacy in both routine and difficult airway management, as previously reported (9). Interestingly, only 37.2% of respondents had access to channeled VLs, which are often advantageous in scenarios such as intubation for patients with restricted mouth opening (10).

Our study revealed video laryngoscopy (64.9%) as the most preferred modality for managing the anticipated difficult airways, followed by first-generation LMA (48.9%) and fibreoptic laryngoscopy (42.6%). The popularity of VL for anticipated difficult airway management is supported by its superior visualization and higher first-pass success rates, as evidenced in prior research (25, 26). For unanticipated difficult airways, first-generation LMA (57.4%) was the most common initial management choice, followed closely by VL (58.5%). These findings are in agreement with the Difficult Airway Society (DAS) guidelines, which emphasize VL as a vital adjunct for both anticipated and unanticipated airway difficulties (40).

There was considerable variability in the availability of airway equipment across institutes. While widely used devices like the classic LMA (93.6%), McCoy laryngoscope (77.7%), and fibreoptic bronchoscope (77.7%) were accessible to most participants, advanced tools such as the intubating video stylet (17%) and retrograde intubation kit (16%) were underrepresented. This disparity mirrors resource limitations frequently noted in similar studies (8). Additionally, the availability of VLs was significantly associated with the anesthesiologist's primary workplace and the volume of general anesthesia cases managed monthly, suggesting that institutional resources and workload strongly influence equipment access.

Although VL has proven advantages, 3.2% of respondents reported restrictions on its use, primarily citing the high cost of acquisition and maintenance. This finding is consistent with earlier research, which identified cost as a major limiting factor (18). Addressing this barrier through cost-reduction strategies, such as pooled procurement or government subsidies, could significantly enhance VL accessibility in resource-constrained settings.

The findings reinforce the critical role of VL in airway management, highlighting gaps in equipment availability that could compromise patient safety. Institutional policies should prioritize the procurement of VLs and related airway management tools to ensure preparedness for difficult airway scenarios. Furthermore, structured training programs are essential to familiarize anesthesiology residents and registrars with VL technology, enhancing their competence and confidence in managing challenging airways (29, 35).

This study has several limitations. Firstly, as a cross-sectional survey relying on self-reported data, there is a potential for recall bias or overestimation of VL availability and usage. Secondly, the study was limited to a single province (Sindh), which may affect the generalizability of findings to other regions of Pakistan. Finally, while the sample size was calculated appropriately, it may not fully represent the diversity of practice patterns across different healthcare settings.

Conclusion

Video laryngoscopy is widely available and utilized in tertiary care settings in Sindh. However, significant institutional and workload-related factors influence its accessibility and usage. Addressing cost-related barriers and improving access to advanced airway devices can further enhance patient safety and outcomes in difficult airway management.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate
Approved by the department concerned. (IRBEC-NIKHR-55-24)

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The authors declared the absence of a conflict of interest.

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