Evidence Based Data

Current practice of difficult airway management: A survey

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ABSTRACT

Background and Aims: Difficult airway (DA) management depends on both training and actual usage of the various approaches in the event of difficulty. The aim of the study was to assess how well the anaesthesiologists are equipped to deal with DA situations. The current practice preference of DA management was also assessed. **Methods:** A questionnaire was distributed in a continuing medical education (CME) programme dedicated to DA and responses were noted and analysed, using Statistical Package for Social Sciences (SPSS) version 18. **Results:** The response rate was 73%. Airway assessment was performed by majority. Sixty eight percent consultants and 47% residents were well aware of the American Society of Anesthesiologists' DA algorithm. 67% consultants and 65% residents attended at least one CME on DA in the previous 5 years. There was an overall deficiency of video laryngoscopes, retrograde intubation and cricothyrotomy sets. Most of the respondents were comfortable in using supraglottic airway devices (SGADs). In anticipated DA, the preferred choice of management for junior doctors was attempting conventional method once and awake fibreoptic bronchoscopy (FOB) for the experienced. In unanticipated DA, most of the residents and consultants opted for SGAD. Extubation strategy was similar for both. Thirty four percent of respondents experienced a 'cannot intubate-cannot ventilate' situation at least once. **Conclusion:** Our survey showed that most respondents performed routine pre-operative airway assessment. A good armamentarium of airway gadgets should be made available in hospitals. Further training in techniques like video laryngoscopy, FOB or cricothyrotomy are essential.

Key words: Airway management, difficult airway, survey

INTRODUCTION

Maintaining an adequate airway is the first and foremost responsibility of the anaesthesiologists, the importance of which is being emphasized not only in the curriculum but also in different academic forums.

Difficult airway (DA) is a challenge even to the experienced anaesthesiologists and a 'cannot intubate-cannot ventilate' (CICV) situation though rare, is life threatening. Inability to maintain an adequate airway can cause adverse respiratory events leading to hypoxic brain damage or even death.[1,2] Close adherence to international guidelines like American Society of Anesthesiologists (ASA) DA algorithm Or Difficult Airway Society (DAS) guidelines in a DA scenario will definitely prevent such mishaps.[3,4] Airway assessment, adequate training and experience, and availability of essential equipment are the pillars of successful airway management.

In this study, we aimed to evaluate the routine pre-operative airway assessment practices, equipment

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availability and the current practice preferences of DA management.

METHODS

After obtaining Institutional Research and Ethics Committee approval, a questionnaire was distributed among anaesthesiologists who attended a continuing medical education (CME) - Workshop on DA.

The questionnaire included 15 questions covering demographic profile, working experience, availability and comfort level with equipment and the current practice preference of DA management. The participation was voluntary and anonymity was maintained.

The first half of the questionnaire was mainly to collect demographic data including age, gender, years of practice, type of hospital and the workload of their hospital. Also, the familiarity with ASA DA algorithm and attendance in DA workshop in the previous 5 years was also probed.

The second half of questionnaire was designed to assess the routine pre-operative airway assessment practices, availability of various equipment, and the level of comfort with airway techniques like video-laryngoscopy (VL), fibreoptic bronchoscopy (FOB), cricothyroidotomy (CT) and retrograde intubation (RGI). The level of comfort of the respondents was asked to be mark on a 4-point scale. The comfort level with airway techniques were grouped as comfortable (scores 3 and 4) and uncomfortable (scores 1 and 2) [Appendix 1].

The respondents were asked about their preferred choice of management in anticipated and unanticipated DA scenarios and their extubation strategy in a DA case. The last two questions assessed their experience of CICV situation if any and the clinical scenario of the same.

Survey responses were analysed using Statistical Package for Social Sciences (SPSS) version 18. Categorical variables were compared using Chi-squire test and a $P < 0.05$ was considered significant with a degree of freedom 24. The 4-point scale for comfort level were converted to a binary variable as comfortable (score 3 and 4) and uncomfortable (score 1 and 2).

RESULTS

Out of the 175 questionnaires distributed, 127 were returned completed making a response rate of 73%. Sixty two residents and 65 consultants responded the survey.

The demographic data is summarized in Table 1. Fifty one percent of respondents were between 25 and 34 years. Sixty one percent were males and 39% were females. Most of the respondents were from teaching institutes (76%) mainly Government Medical Colleges (50%). Sixty seven percent of consultants and 65% of residents had attended a DA workshop/CME in the previous 5 years. As far as the awareness of ASA DA algorithm is concerned, our survey found out that 68% of consultants and 47% of residents were familiar with it.

The incidence of DA of 1/100 cases was reported by 25% of respondents. The primary step in DA management is proper evaluation and recognition of a potentially DA. The majority of our respondents (>95%) routinely performed pre-operative airway assessments like adequacy of mouth opening, Mallampatti classification, neck movements and thyromental distance.

Our survey showed that while supraglottic airway devices (SGADs) were widely available, those of advanced airway equipments like VL, Retrograde wire set (RGWS) were below 50% [Figure 1]. The availability of equipment was almost similar between government and private institutions but when compared to teaching institutions, non-teaching hospitals showed

Table 1: Demographic data

Variable	Number (*n*)	Percentage
Age (years)		
25-34	65	51.2
35-44	26	20.5
45-54	24	18.9
55-64	11	8.7
>65	1	0.7
Gender		
Male	78	61.4
Female	49	38.6
Experience (years)		
Resident	62	48.8
0-4	14	11
5-9	15	11.8
10-19	21	16.5
>20	15	11.8
Institution		
Teaching		
Government medical college	64	50.4
Private medical college	33	26
Non-teaching		
Government	10	7.9
Private	20	15.7

a deficiency of advanced airway equipment such as VL, FOB and RGWS.

When the level of comfort with various airway techniques was assessed, the proportion of respondents comfortable with advanced airway devices was related to their experience. Most of the respondents were comfortable with SGADs, but not with FOB, VL or RGI. Although FOB was available for 59% of respondents, only 45% of consultants and 3.2% of residents were comfortable in using it, which shows the need for further training. It was alarming that availability and confidence with CT - a life-saving technique in CICV was very low. Only 18% of consultants and 2% of residents were comfortable with CT technique [Table 2].

Airway management choices of our respondents in anticipated DA cases is summarized in Figure 2. Nearly 73% residents and 36% of junior consultants (<5 years) opted for attempting conventional method once, whereas the experienced consultants opted for awake FOB (47–67%). The difference was statistically significant ($P = 0.001$). However, the second choice of junior consultants and residents in DA was awake FOB. The more experienced anaesthesiologists (more than 20 years experience) when compared with their juniors, were more confident with conventional techniques in DA. Among them, nearly 47% opted for awake FOB as the first choice.

But in an unanticipated difficult intubation scenario [Figure 3], when conventional methods failed, most of the consultants (73%) and residents (66%) opted for SGADs as a rescue measure. Only 2.95% of consultants and 1.6% of residents preferred tracheostomy over the less invasive SGADs as a rescue measure. When questioned about the extubation strategy, (74%) residents and (81.5%) consultants preferred to extubate a DA case when fully awake in Intensive Care Unit. The alternate strategies of extubation in DA like the short-term use of a guide (bougie) or conduit (laryngeal mask airway [LMA]) was less preferred by our respondents.

Only 34% of our respondents had encountered a CICV situation at least once and mostly in head and neck surgical patients followed by trauma patients [Table 3].

DISCUSSION

The survey included airway assessment, equipment availability and current DA management practices

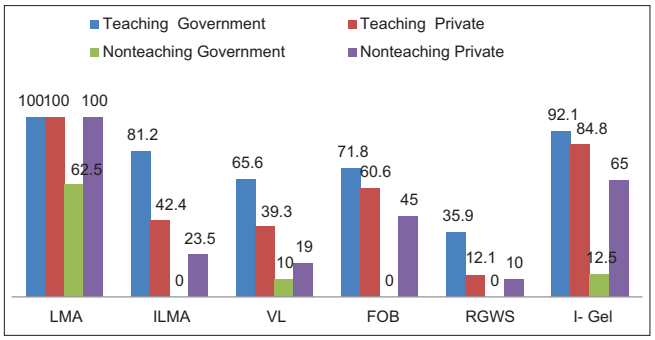

Figure 1: Availability of airway equipment in institutes (%)

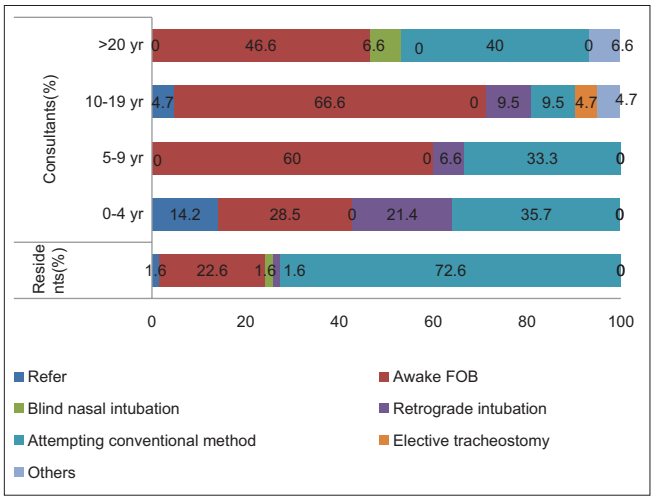

Figure 2: Airway management of choice in anticipated difficult airway

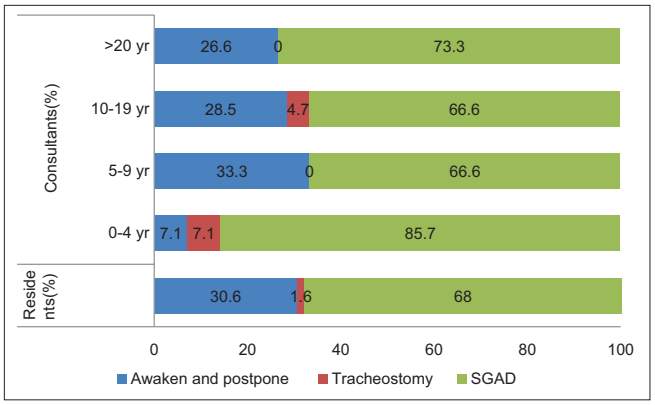

Figure 3: Airway management choices in unanticipated difficult airway

Table 2: Number of respondents comfortable with alternate airway devices/technique

Device/technique	Number of respondents (%)		
	Overall	Consultant	Resident
Blind nasal intubation	33	46	19
SGADs	80.3	97	72
FOB	24.4	45	3.2
VL	28.3	38	18
Retrograde intubation	12.6	24	3.2
CT	10.2	18	2

VL – Video-laryngoscopy; SGADs – Supraglottic airway devices; FOB – Fibreoptic bronchoscopy; CT – Cricothyroidotomy

Table 3: Incidence of CICV with clinical situations			
Clinical situation	**Frequency**	**Percentage**	**Valid percentage**
Head and neck surgery	22	17.3	51.1
Obstetrics	3	2.3	6.9
Trauma	6	4.7	14
Burns	2	1.5	4.6
Others	10	7.8	23.2
Total	43	33.9	100

CICV – Cannot intubate - cannot ventilate

of anaesthesiologists who attended a CME/workshop on DA. There is a paucity of such surveys reported in Indian scenario, and few of the reported surveys had a low response rate also.[5,6] The high response rate (73%) of our survey was similar to many Western reports.[7-9]

Pre-operative airway assessment was routinely performed by more than 95% of respondents which were similar to many previous reports.[7,10,11] The high awareness of ASA DA algorithm and recent attendance in DA workshop/CME among our anaesthesiologists reflected their desire to update and improve their airway skills. The positive mindsets of anaesthesiologists to improve their procedural skills by showing a desire to attend workshop/CMEs were reported earlier also.[12]

Availability of equipment varied between teaching and non-teaching hospitals. Availability of airway equipment was comparatively less in non-teaching hospitals, similar to the finding of a previous report.[13] When Jenkins *et al*. reported a 99% availability of FOB among Canadian anaesthesiologists,[13] our survey revealed only 59% overall availability of FOB and 47% of VL. Various other Western surveys also reported a high availability of FOB.[7,13-15] Cost constraints may be the limiting factor in a developing country like ours.

Our survey revealed that most of the anaesthesiologists are comfortable using SGADs, but not with techniques like VL, FOB, RGI or CT. Their level of comfort was related to their experience, as observed in a previous survey.[16]

Interestingly, the airway management technique of choice in anticipated DA varied with experience. While the experienced consultants (more than 5 years) opted for awake FOB, the less experienced junior consultants and residents still tried conventional method at least once. This showed their lack of experience and confidence with FOB. In a previous report by Bokhari *et al*.[8] trainees were less likely to choose awake FOB in difficult intubation due to lack of experience/training. In our survey more experienced anaesthesiologists (more than 20 years) were confident with conventional technique as only 47% selected awake FOB in DA. This may be due to their lack of adequate exposure to this newer advanced airway technique or confidence with familiar practices. Similar observations were made by Jenkin *et al*. also,[13] who in 2002 reported FOB as the preferred choice of management in DA. Even though 59% of our respondents had the availability of FOB in their workplace, only 52% consultants and 22.6% of residents preferred it in a DA case as the first choice. This definitely showed the lack of confidence and need for further training in FOB.

As with FOB, the availability and level of comfort with the novel airway gadget - videolaryngoscope was very low with the respondents (47% and 28.3%). Similar observations were noted in a recent Indian survey also.[12] Although VL has been included in the DA algorithm only very recently,[17] it is gaining rapid popularity and has got a promising role in DA management due to its short learning curve and ease of use. In a recent report by Wong *et al*., 96% respondents choose VL as the first choice rescue technique in unanticipated difficult laryngoscopy.[18] The majority of their respondents were comfortable with FOB and VL.

When faced with an unanticipated DA, where conventional methods failed, the majority of our respondents chose SGADs as a rescue measure which shows their awareness of ASA DA algorithm.[3] Similar observations were made by Dimitriou *et al*. in 2008[10] and Ezri *et al*. in 2003.[15] The high availability and ease of use may be the reason for this choice. The extubation strategy in a DA case was also same for most of our respondents. 78% of our respondents opted for awake extubation rather than going for alternate extubation strategies like the short-term use of intubating bougie or LMA.

Only 34% of our respondents ever experienced a CICV situation, at one or other time of their professional career, of which majority (51%) were in head and neck surgical patients. Benumof estimates an incidence of CICV as 0.01–2 in 10,000 elective anaesthetic practice.[19] The importance of CT comes in a life threatening CICV situation. Many of our anaesthesiologists lack the confidence to perform a CT comfortably. Only 18% of consultants and 2% of residents were comfortable in performing a CT. Wong *et al*. in 2003 concluded that training in manikins leads to improvement in the

success rate of this life saving technique.[20] Bainten also reported that practice on cricothyrotomy simulators significantly reduced the actual performance time.[21]

Various published reports have confirmed that training on mannequins and simulators are the most effective teaching tools for learning and improving the procedural skills in anaesthesia.[22,23] In the era of information technology, we should make use of these simulators and computer assisted teaching more effectively to improve our airway skills. Training in life saving technique like CT should be emphasized during airway workshops.

The survey had some limitations. The high response rate of our survey could be because the target population was interested in learning about DA as it was an exclusive DA CME where the questionnaire was distributed. Questionnaire lacked details about the availability of CT set. Participation from non-teaching institutions was limited. Small sample size and 48% of participants being residents could add bias to the results.

CONCLUSION

Our survey clearly showed that majority of consultants are well aware of ASA DA algorithm and follows the same. Also, they are equipped to deal with DA situations, as is evident from their ability to use airway gadgets in DA situations. With respect to residents in anaesthesia, awareness and application of technique shows definite lacunae. A cause of concern is about the relative non-availability of DA gadgets in non-teaching hospitals and the overall lack of comfort in handling life saving techniques like cricothyrotomy.

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Conflicts of interest
There are no conflicts of interest.

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APPENDIX 1: SURVEY QUESTIONS

Survey questions

1. Age ___ years ___ gender (male/female)
2. Working in ___
   a. Teaching hospitals: Government Medical College/other Medical College
   b. Non-teaching hospitals: Government/private
3. Anaesthesia experience
   a. Resident: 1st year/2nd year/3rd year
   b. Consultant: 0-4 years/5-9 years/10-19 years/>20 years
4. Participated in difficult airway workshop/CME in last 5 years: ___ (Yes/No)
5. Approximate no of GA cases you handle in a month: ___
6. Incidence of unanticipated difficult intubation (unable to visualize any part of vocal cords) ___ encountered in 100 case
7. Are you familiar with the exact steps of ASA difficult airway algorithm: ___ (Yes/No)
8. Your institution/yourself is equipped with: (Please tick)
   a. LMA
   b. ILMA
   c. Video laryngoscopes
   d. FOB
   e. Retrograde wire set
   f. I-Gel
   g. Others (specify)
9. Airway examination you routinely carry out before a GA case: (Please tick)
   a. Mallampatti
   b. Mouth opening
   c. Neck movements
   d. Thyromental distance
   e. Upper lip bite test
10. Your level of comfort in using following devices/techniques: (Please tick)

1. Not used; 2. Will require senior help; 3. Fairly comfortable; 4. Confident

a. Upper airway blocks	1	2	3	4
b. Blind nasal intubation	1	2	3	4
c. SGADs	1	2	3	4
d. Fiberoptic bronchoscopy	1	2	3	4
e. Video laryngoscopes	1	2	3	4
f. Retrograde intubation	1	2	3	4
g. Cricothyrotomy	1	2	3	4

Survey questions

11. Your first choice in anticipated difficult airway scenario
    a. Refer the case to higher center
    b. FOB
    c. Blind nasal
    d. Retrograde intubation
    e. Attempting conventional method once
    f. Elective tracheostomy
    g. Others (specify)
12. Your preferred choice in unanticipated difficult intubation if conventional method fails
    a. Awaken and post-pone the case
    b. Tracheostomy
    c. SGADs
13. Your extubation strategy in a difficult airway
    a. Extubate on table over tube exchanger
    b. Extubate in ICU when fully awake
    c. Use LMA as extubation bridge
14. Have you ever come across a CICV situation: ___ (Yes/No)
15. If yes, what was the clinical situation?
    a. Head and neck surgery
    b. Obstetrics
    c. Trauma
    d. Burns
    e. Others (specify)

FOB – Fibreoptic bronchoscopy; CICV – Cannot intubate - cannot ventilate; ICU – Intensive Care Unit; LMA – Laryngeal mask airway; GA – General anaesthetic; ILMA – Intubating laryngeal mask airway; CME – Continuing medical education; ASA – American Society of Anaesthesiologists; SGADs – Supraglottic airway devices