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Original Research Article

Failed Intubation in Obstetrics –How I Do It? A Survey

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Abstract: Anesthesia related deaths are the seventh leading cause of maternal mortality. Most of these are related to failed intubation. Decision making in case of failed tracheal intubation for category 1 caeserean section (CS) for fetal distress still remains a dilemma, as to whether to wake up the mother or proceed with surgery. The Obstetric Anaesthetists' Association (OAA) and Difficult Airway Society (DAS) introduced for the first time guidelines for the proper management of difficult and failed tracheal intubation during obstetric general anaesthesia in November 2015. These guidelines take into account specific problems relating to pregnancy, and formulate a protocol for management of difficult and failed intubation in case it occurs. Reduction in experience in general anaesthesia for obstetrics among anaesthetists prompted us to conduct survey to create awareness regarding latest guidelines so that lives of both mother and baby are not endangered. With that idea in mind we conducted a survey to know about awareness and practical use of DAS guidelines in obstetrics among anaesthetists attending Haryana Chapter of Indian Society of Anaesthesiologists Conference 2016. Printed performa with a set of questions was given to the delegates and the result was analysed. Only 13% of the study group had heard about the DAS guidelines and 88% of them would proceed with surgery even though failed intubation occurred. Besides only 16% could perform cricothyrotomy. There is an urgent need to spread awareness about the latest DAS guidelines and one way of achieving it is by demonstration in conferences across the world. Formal training in cricothyrotomy (scalpel) is the need of the hour in the dreaded 'can't intubate, can't oxygenate' (CICO.) situation. It should be incorporated in MD/DNB/Diploma curriculum so that the anaesthetist does not have to perform the procedure for the first time during emergencies.
Keywords: Failed intubation, obstetrics DAS, cricothyrotomy.

INTRODUCTION

Failed intubation in obstetrics continues to be a nightmare for anaesthetists. Maternal mortality from failed intubation remains unchanged over the decades (1 in 90 failed intubations) [1]. The incidence of failed intubation is 1 in 224 about 8-10 times the general population [2]. In a desperate attempt to save two lives (mother and baby) front of neck surgical access to airway is performed as the last resort, the incidence of which is 1 in 60 failed intubations [1]. In November 2015 OAA with DAS formulated the guidelines for management of Difficult/Failed intubation in obstetrics [3]. They stressed on human factors for the first time. Guidelines consist of four algorithms and two tables. A master algorithm provides a synopsis. Algorithm 1 gives a framework for safe obstetric anaesthesia and allows assessment of various criteria before and after induction of anaesthesia that aid in deciding whether to awaken the mother or continue with surgery after failed intubation (Algorithm 2) or a front-of-neck procedure (Algorithm 3) in a CICO situation. They stress on making 'correct' decisions which allow selecting the most appropriate option for each particular case; If properly followed can go a long way in reducing maternal as well as perinatal mortality.

In this survey we have tried to create awareness regarding important factors such as providing best conditions during first intubation attempt such as video laryngoscope, restricting attempts at intubation by not repeating dose of scoline, maintaining oxygenation via bag mask ventilation or supraglottc

aiway preferably second generation device(only two attempts) whether to awaken the mother or continue with surgery in case of fetal distress and performing front of neck procedure as a last resort.

Aims and objectives

To study the level of awareness of DAS guidelines among obstetric anesthetists, knowledge and practice of working with newer airway equipment, how would they manage a situation of failed intubation in category 1 caesarean section (fetal distress) and whether they are acquainted with the technique of cricothyrotomy?

MATERIAL AND METHODS

Inclusion Criteria

- All delegates attending the conference 13th Haryana State Chapter of Indian Society of Anaesthesiologists (ISA) 2016 were included in the study group.

Exclusion Criteria

Delegates those were not willing for participation was excluded. This survey was conducted at 13th Haryana State Chapter of ISA 2016.A questionnaire was distributed among qualified anaesthetists (MD/DNB/DA) practicing obstetric anaesthesia. Those delegates refusing to participate were excluded. The sample printed proforma is given below

PROFORMA FOR FAILED AIRWAY IN OBSTETRICS -HOW I DO IT?

WANT TO PARTICIPATE IN SURVEY: yes/no

1. AGE SEX-male/female
2. WORKING PLACE-medical college/private hospital/nursing home/corporate hospital/freelancer/others-please specify
3. PRESENT DESIGNATION-professor/associate professor/assistant professor/sr/jr/sr consultant/consultant/jr consultant/specialist/others-please specify
4. YEARS OF EXPERIENCE AFTER POSTGRADUATION>35/30-35/25-30/20-25/15-20/10-15/5-10/<5yrs
5. ARE YOU AWARE OF DIFFICULT AIRWAY SOCIETY GUIDELINES 2015 yes/no
6. HAVE YOU GIVEN GA FOR CAESEREAN SECTION yes/no
7. DO YOU KEEP ALTERNATIVE EQUIPMENT READY FOR EMERGENCY CATEGORY 1 LSCS (FETAL DISTRESS AND NO MATERNAL COMPROMISE). Yes/no
8. HAVE YOU WORKED WITH VIDEOLARYNGOSCOPE, IF YES NAME WHICH ONE- yes/no
9. IF INTUBATION FAILS WILL YOU REPEAT DOSE OF SCOLINE AND TRY AGAIN- yes/no
10. WOULD YOU INSERT SUPRAGLOTTIC AIRWAY DEVICE OR CONTINUE OXYGENATION VIA BAG MASK IF INTUBATION FAILS- SGA/BMV
11. WOULD YOU PROCEED WITH SURGERY OR WAKE UP MOTHER---PROCEED/WAKE UP MOTHER-
12. IF PROCEEDING WITH SURGERY WOULD YOU USE CONTROLLED OR SPONTANEOUS VENTILATION CONTROLLED/SPONTANEOUS
13. IF ARE UNABLE TO CONTINUE OXYGENATION AFTER FAILED INTUBATION i.e.CICO(CANT INTUBATE,CANT OXYGENATE)WOULD YOU PERFORM NEEDLE/SURGICAL CRICOTHYROTOMY---- yes/no

Trained/not trained

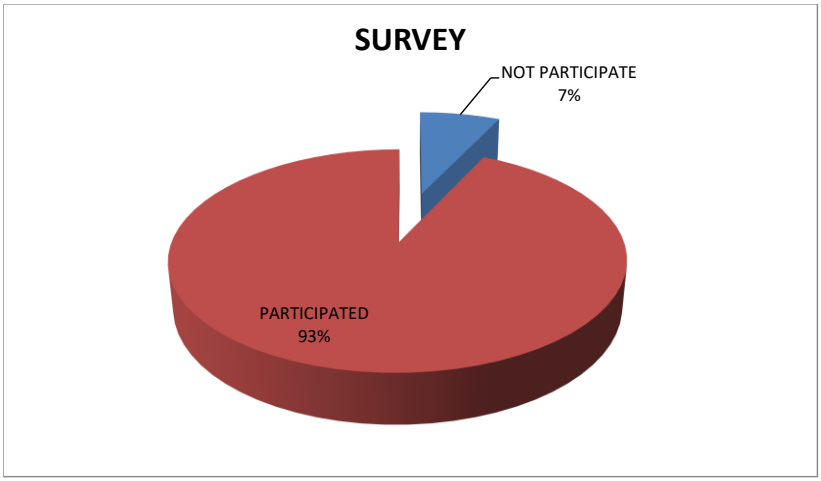
14. HAVE YOU FACED SUCH A SITUATION (CICO) BEFORE AND HOW DID YOU MANAGE IT? Yes/no

Fig-1: PROFORMA FOR FAILED AIRWAY IN OBSTETRICS

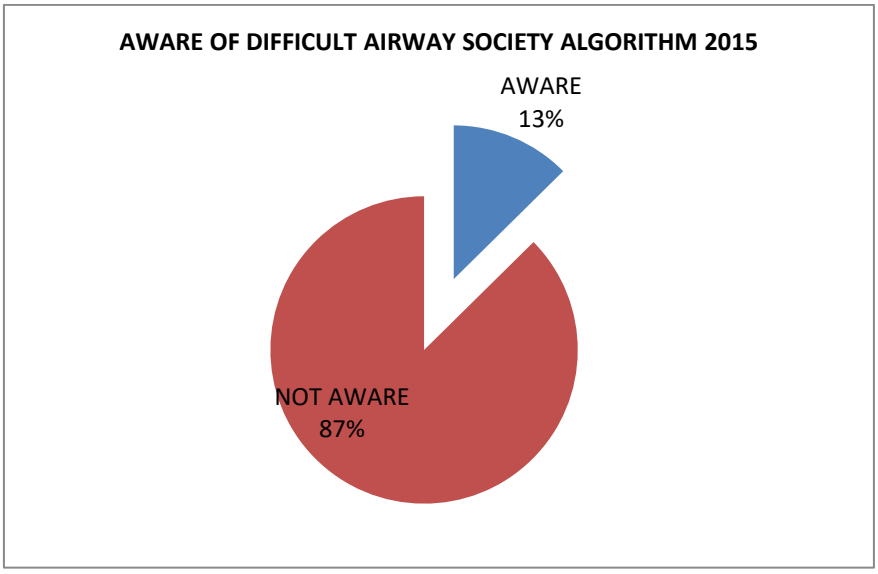
RESULTS

A total of 111 delegates attended the conference out of which 104 (93%) delegates were included and 7 (7%) delegates refused to participate(Figure 2).Only 14(13%) were aware of the DAS guidelines ,while 90 (87%)had not heard of it (Figure 3) All of them had given general anesthesia for caesarean section(100%)unlike in the western countries. Furthermore all agreed that they would keep alternative equipment ready for emergency category 1 caesarian section (fetal distress with no maternal compromise) anticipating difficulty during intubation. Regarding familiarity with Video laryngoscope 28(27%) had worked with different types previously, (Figure 4) whereas 76(73%) were not familiar with the use of videolaryngoscope. 19(18%) would repeat dose of scoline if they were unable to intubate with first dose (Figure 5). On the contrary 85(82%) would refrain from repeating second dose of scoline for patients safety. All delegates would continue ventilation either by

supraglottic device or via bag mask ventilation (BMV) of which 86(88%) would prefer to insert a supraglottic device (SGA) and 18(12%) would ventilate via bag and mask (Figure 6). The most critical step in decision making was next question whether to wake up mother or proceed with surgery in case of fetal distress 12(12%) would wake up the mother (as mothers life comes as first priority)after ventilation and 92(88%)would proceed with surgery as it was for fetal distress(Figure 7). 89(89%) would use controlled ventilation during rest of period of surgery and 11(11%) would proceed with surgery with spontaneous ventilation(Figure 8).Regarding familiarity with technique of cricothyrotomy in CICO situation 17 (!6%) were trained in the procedure whereas 87(84%) could not perform the lifesaving procedure(Figure 9). Only 8(8%) delegates had faced a CICO situation before whereas 96(92%) were fortunate to have not faced the situation before (Figure 10).



Fig−2: Delegates included in the study



Fig−3: Awareness of Difficult Aiirway Society Algorithm 2015

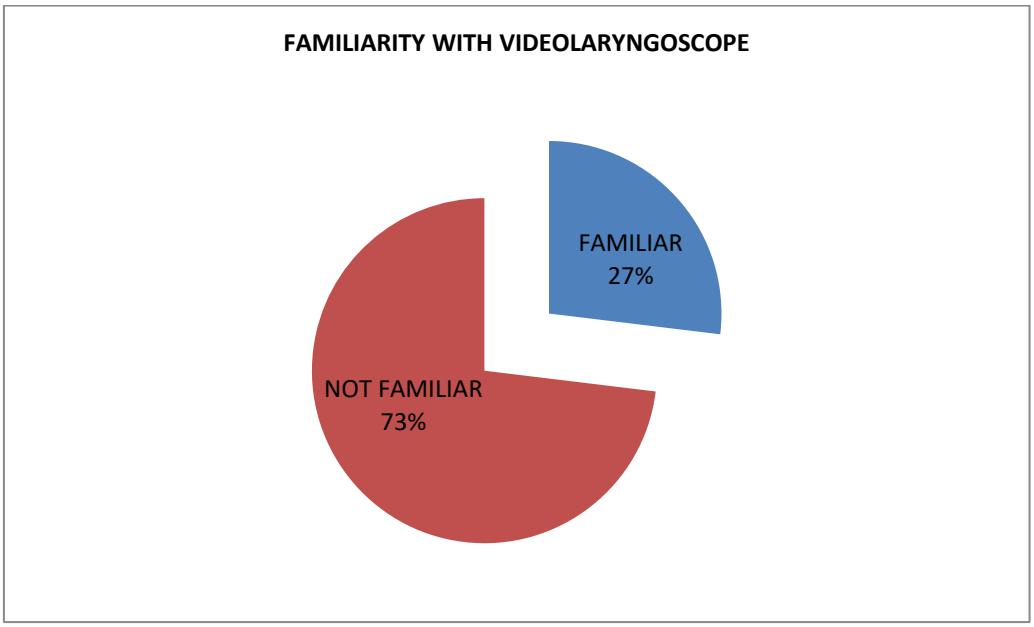


Fig-4: Familiarity with videolaryngoscope

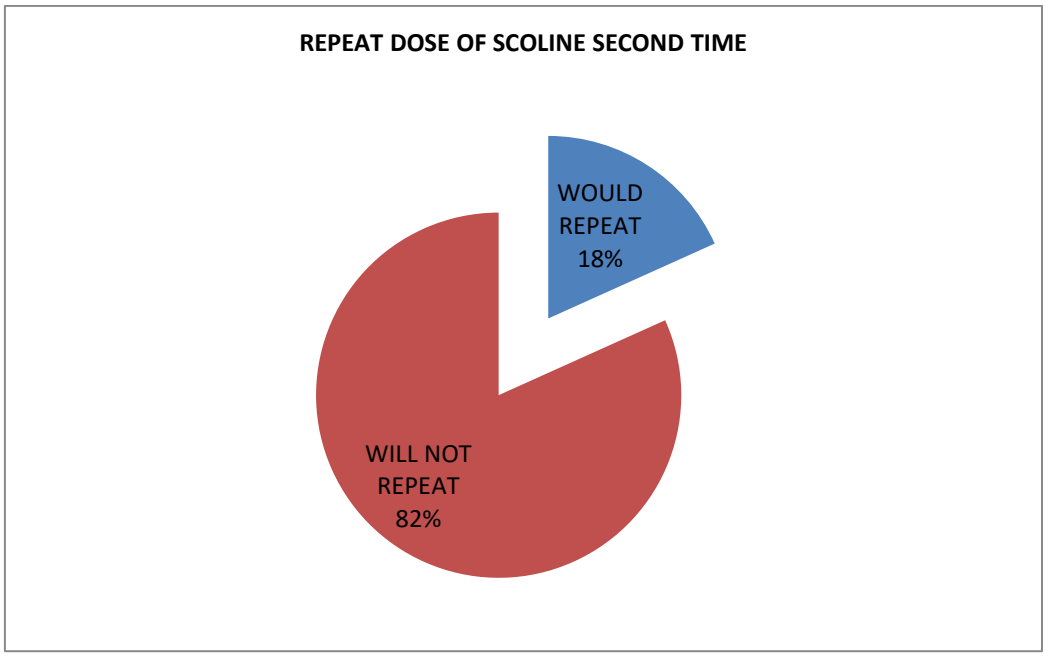


Fig-5: Whether will repeat second dose of scoline or not if intubation fails

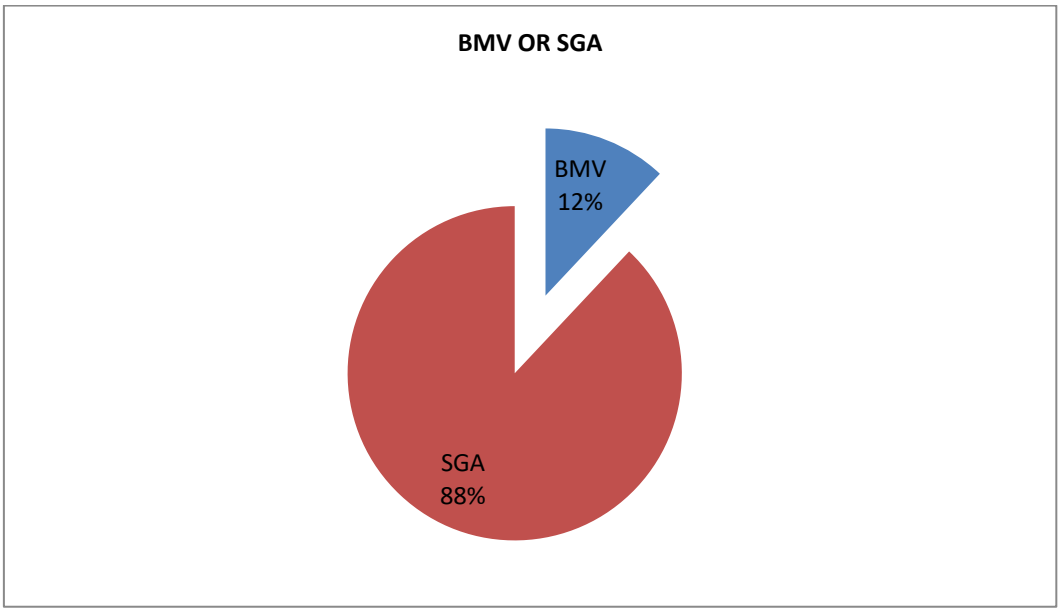


Fig-6: Maintainance of ventilation after failed intubation –BMV or SGA

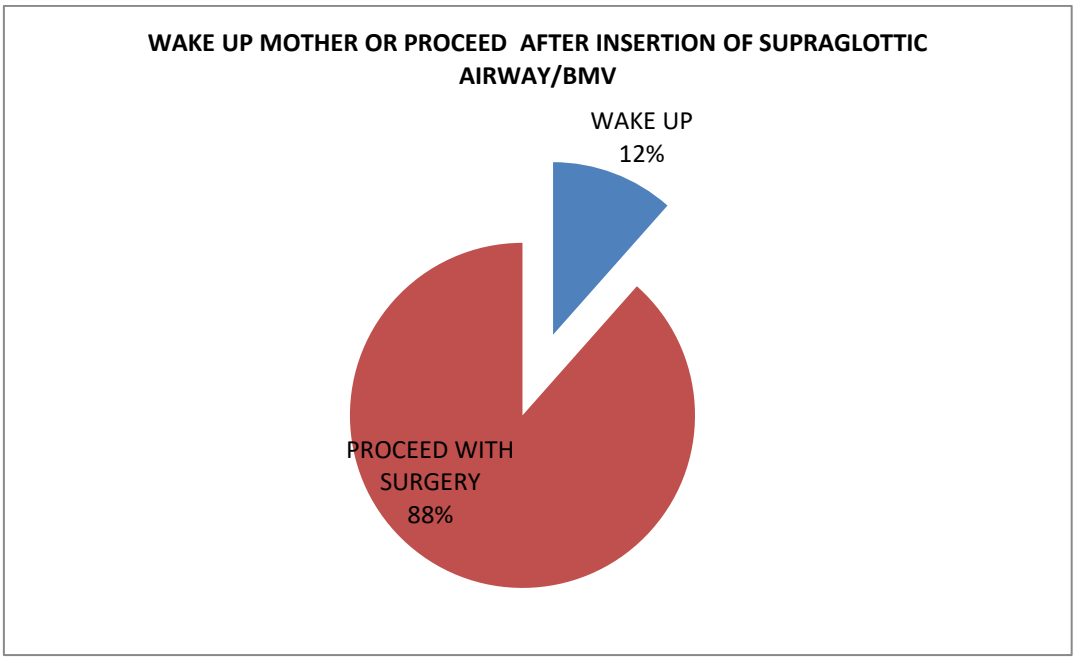


Fig-7: Whether to proceed with surgery or wake up mother

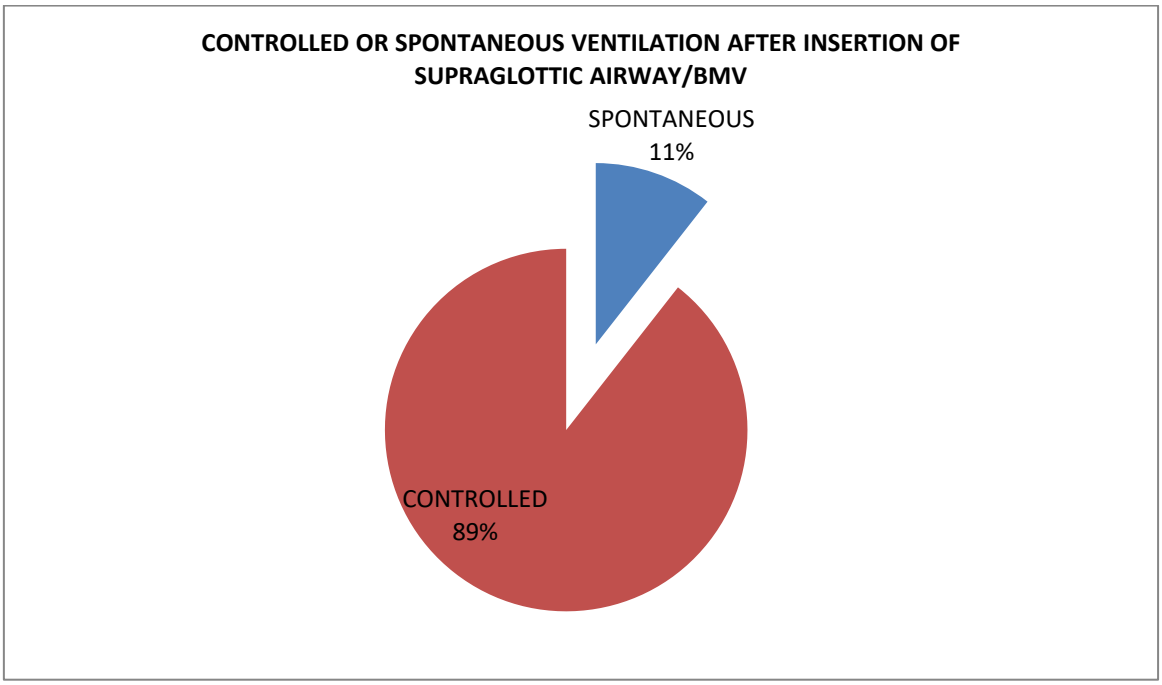


Fig-8: Mode of ventilation after insertion of supraglottic airway/BMV

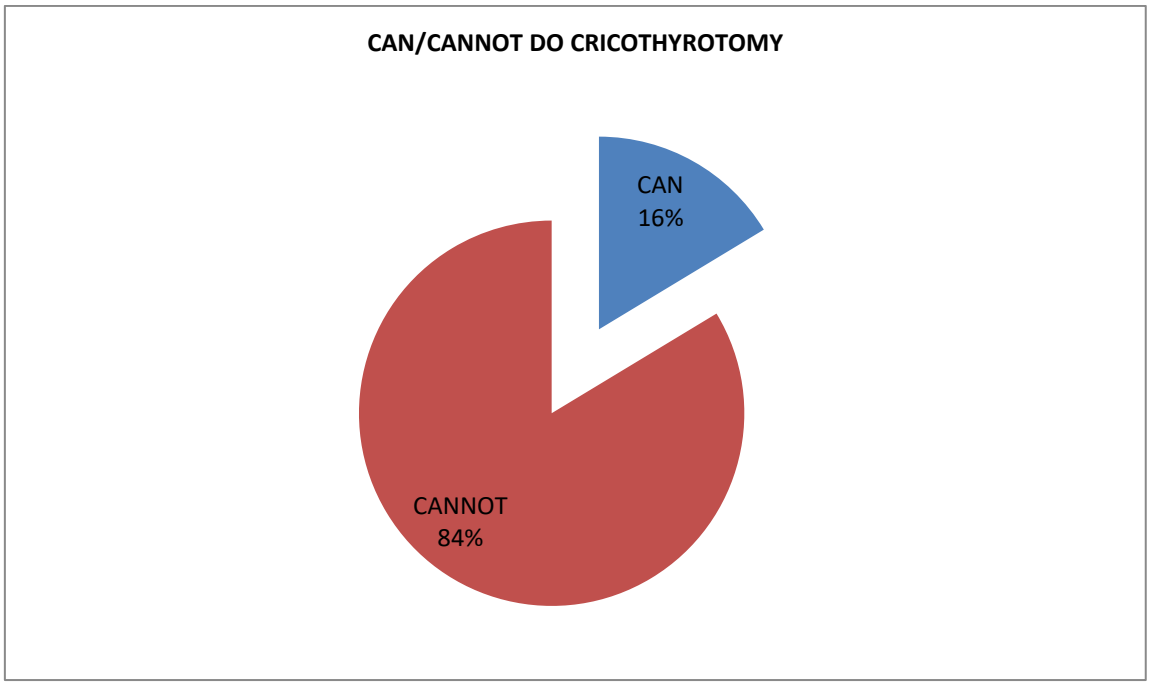
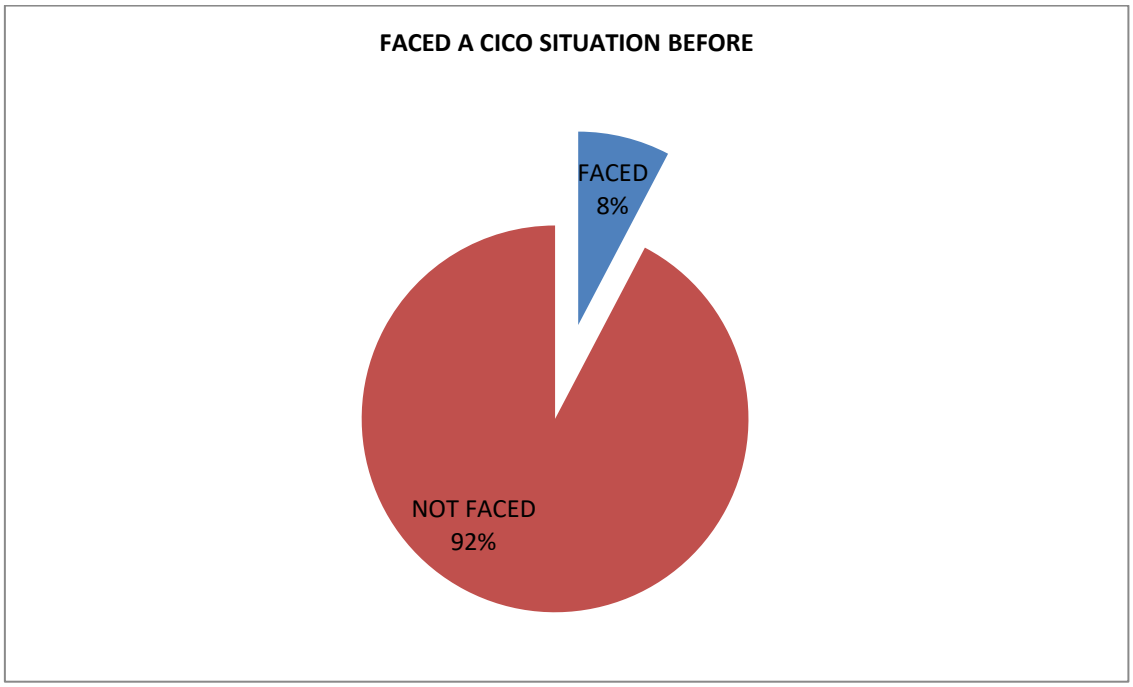


Fig-9: Familiarity with cricothyrotomy



Fig−10: Whether faced a CICO situation before

DISCUSSION

In our survey failed intubation is defined as failure to intubate the trachea with a single dose of scoline[1]. During pregnancy there is increased oxygen consumption along with reduction in functional residual capacity. Thus parturient is more likely to get desaturated during induction of anesthesia. Furthermore swollen upper airway, enlarged breasts along with increased weight is important contributing factors for difficult intubation. General anesthesia is mainly given for category 1 CS [4] such as fetal distress as in our survey. Conditions at these times are often challenging, the decision to incision time pressure of 15-30 minutes, odd hours, less experience[5],limited personnel available thereby reducing the time for airway assessment, planning and preparation. It has been found that Mallampatti score can successfully predict difficult airways in 59% of the obstetric patients [6].

OAA-DAS 2015 [3] guidelines are specifically designed on basis of past experience to ensure that ideal conditions exist for safe obstetric general anaesthesia, however in case one falters and intubation fails, then the best possible management for ventilation and oxygenation is outlined They have for the first time commented on human factors Fixation error [7] has been enlisted as the most common error whereby the anesthetist keeps on trying to intubate the patient without resorting to other techniques and finally lands up in a CICO situation. DAS guidelines use simple protocols. Algorithm 1 outlines the framework for conduct of safe general anesthesia, along with World Health Organization checklists [8] whereby a provisional plan for failed intubation in case it occurs is made. They also advocate nasal oxygenation and gentle mask ventilation immediately after induction thereby increasing oxygen carrying capacity of the lungs, besides restricting intubation attempts to two or three. Table 1 allows assessment of various issues present before and after induction of anaesthesia such as degree of maternal or fetal compromise,; experience of the anaesthetist; obesity,fasting status.,surgical factors,; potential difficulty with provision of regional anesthesia; and post-induction securing of airway and airway problems such as spasm, stridor, bleeding in order to decide whether to awaken the mother or continue with surgery after failed intubation (Algorithm 2) , and stresses on early ventilation with the aid of a second generation SGA. Algorithm 3 covers the management of the dreaded CICO situation and emergency cricothyrotomy in a desperate attempt to save life. Table 2 enlists the protocol for further

management in case the patient is woken up or decided to proceed with surgery

The All India Difficult Airway Association (AIDAA) [9] proposes guidelines for unanticipated difficult intubation in obstetrics in December 2016, shortly after our survey was conducted. They recommend only 2 intubation attempts compared to 3 in the DAS guidelines.

In our study we had tried to analyses the awareness status about the OAA DAS 2015 guidelines in our region. Unfortunately the majority of the anaesthetists (87%) in our study were found not to be aware properly about the guidelines and are currently not using it in their practice. The decreasing use of general anesthesia (GA) in obstetrics mainly due to safety of regional aaesthesia over the past three decades may lead to relative lack of experience with GA and hence increased anxiety among them while performing [5]. On the contrary. All our delegates had given general anaesthesia for caesarean section at some time in their career. Other important measures to deal with this catastrophe include difficult airway cart housing alternative equipment. All the delegates in our study would keep alternative equipment for obstetric general an aesthesia. Mandatory equipment on a difficult airway cart for obstetric anesthesia are given in table 1.

Table−1: Difficult airway cart

1, Bougies,light wand
,2.Atleast one alternative blade(straight,Mccoy, Polio)
3.ClassicLMA,Plma,LMA supreme,Igel,Intubating LMA
4.Videolaryngoscope
5.Flexible fibreoptic laryngoscope
6.Surgical cricothyrotomy set
7.DAS algorithm flowchart
8.Equipment list for restocking

2015 guidelines lay stress on early use of video laryngoscopy (VL), either at first attempt, or when difficulty is encountered. VL has been found to improve glottis view in difficult airways, and increases intubation success rates in experienced hands [3, 10]. All anaesthetists should make efforts to ensure they are skilled with VL. 27%of our delegates had experience of working with VLs such as C-Mac, glide scope, Kings Vision, Trueview, Airtraq, Macgrath series 5.

Among muscle relaxants, scoline, has a rapid onset and shorter duration of action. Even then hypoxia occurs before the action is terminated [11, 2]. As scoline increases oxygen consumption by causing fasciculations. In fact intubating doses of rocuronium (1.0– 1.2 mg.kg_1) with sugammadex for reversal is an appropriate substitute to scoline as reversal of high dose rocuronium-induced (1.2mg/kg) neuromuscular block with sugammadex (16mg/kg) was considerably faster(3 minutes) than spontaneous recovery from scoline (9 minutes) [12]. Our study have repeatedly pressed regarding limiting the attempts at intubation to maximum 3 as per DAS 2015 and 2 in AIDAA 2016 before declaring failed intubation as in our survey we have defined failed intubation as unable to intubate with a single dose of scoline[1] This would mean only 2 or maximum 3 attempts at intubation in our survey. Although 87% were unaware of latest guidelines only 18%would repeat dose of scoline if were unsuccessful with first dose this was mainly a safe anaesthesia trend in our society thereby avoiding precipitating a CICO situation. All delegates would continue ventilation either with bag mask (BMV) or insert a supraglottic airway (SGA) device if intubation was not possible. The supraglottic airways familiar to the participants were classic LMA, PLMA, I-gel&, LMA supreme.

Next was the trickiest question of the study whether to wake up mother or proceed with surgery after SGA or BMV. 88%of our participants would proceed with surgery as it was for fetal distress. A Quinn [13] quoted that of 52 failed intubations at caesarean section; more than 50% cases proceeded under general anaesthesia with a supraglottic airway. Thus continuing anaesthesia may not be the correct decision, only this is done more frequently as per the editorial after DAS guidelines were published [13]. Because even though our priority is to the mother, it is extremely difficult to allow a baby to die. Nowadays it is a trend in UK to continue GA. after failed intubation

in most cases whether elective or emergency [13, 14] Irreversible causes of fetal distress include major abruption placentae [15], fetal haemorrhage [16], and ruptured uterine scar [17] cord prolapse with persisting bradycardia. In these cases if ventilation is adequate it is safer to proceed with surgery. 73% of cases were continued in a UK study [1]. Emergency vs elective there was no difference. The change in trend from wake up to continue was chiefly due to experience with LMAs and SGA , publications of the use of SGA in DAS guidelines 2004, publications of SGA for elective CS and pressure to deliver the baby.

In another survey [18] ninety-three percent of anesthetists surveyed would proceed with surgery in the case of failed intubation for emergency CS performed for fetal compromise. In this situation there is an inherent risk of aspiration and loss of ventilation. Alternatively choosing to wake the patient carries the risk of fetal hypoxia and death. Kinsella *et al* [1] stated that anesthetists who indicated they would wake the mother felt that mother comes first, medicolegal factors or the fear of being condemned by peers. The firm indications to wake the mother up are airway edema, presence of stridor and continuing airway obstruction in the presence of SGA or facemask management.

Regarding opting for controlled or spontaneous ventilation 89% of our participants would proceed with controlled ventilation during rest of period of surgery and 11(11%) would proceed with surgery with spontaneous ventilation. Controlled ventilation along with muscle relaxant has additional advantage of reducing the incidence of coughing, laryngospasm , straining ,improving chest wall compliance as well as optimize conditions for surgery such as abdominal muscle relaxation Another survey conducted in 148 UK obstetric units had details of 41 failed intubations where 32% patients were woken up and surgery was continued in 28 out of 41 cases(68%).Controlled ventilation was given in 18 cases of which 10 reieved muscle relaxant(56%) [19]. Neonatologist should be available whenever failed intubation occurs, as this is a separate indicator of neonatal intensive care unit admission [2].

A maximum of two attempts via SGA is recommended in the guidelines once the foetus is delivered, the anaesthesiologist may consider intubating through the SGA should maternal hemorrhage; imminent seizures and high risk for aspiration exist. Intubation through the SGA should be done only using fibreoptic bronchoscopy provided expertise is available. Blind intubation via SGA is not recommended.

In case of can't intubate, can't oxygenate (CICO) scenario it is mandatory to secure airway through cricothyroid membrane immediately. However it is easier said than done. Mainly on the basis of the findings of NAP4 [20], the DAS guidelines have now been simplified to remove needle/cannula cricothyroidotomy and proceed directly to a surgical cricothyroidotomy. Results of cannula cricothyotomy are disappointing, especially in obese patients. A surgical airway provides a definitive airway and has shown to be more successful [21]. String of pearls appearance of the trachea can be confirmed by sonography even in emergencies [22]. The removal of cannula cricothyroidotomy from the guidelines has not been easily accepted. Other reasons being that equipment for surgical cricothyrotomy is not always immediately at hand, whereas a large bore IV cannula is always close by. Furthermore anaesthetists are more used to cannulae and syringes rather than scalpel and blade. Not every cricithyroid membrane is easily recognized. Recent work has shown that practitioners in an emergency crisis often fluctuate between needle and scalpel when offered the choice. By simplifying the algorithm and providing one didactic scalpel technique, the confusion is diminished. However, the guidelines do suggest that anaesthetists need frequent training and simulation on CICO situations.

In our study 17 delegates (16%) could perform cricothyrotomy in case required whereas 87(84%) had not been trained to perform cricothyrotomy. Such a situation in our study highlights the need for formal training in this procedure so the the anaesthetist does not land up in a helpless situation when faced with a CICO scenario. It may happen once in lifetime but two precious lives can be saved. Among the delegates only 8 of them had faced such a situation before and were fortunate enough to have managed it effectively. 1 delegate resorted to cannula cricithyrotomy, 4 of them overcame the problem by inserting an LMA, 2 called for senior expert help and 1 called for ENT surgeon.

Limitations of this survey - Only Haryana state anesthetists who participated in the survey in the 13th Haryana Chapter of ISA were included and so the sample size is relatively small. This survey does not recommend continuing surgery with a supraglottic

airway device in case of failed intubation for emergency CS for fetal distress. Finally each case must be decided individually.

CONCLUSION

Our results do reveal that a sustantial number of anesthetists (88%) would opt continue with anesthesia and surgery with a supraglottic airway device in case of fetal distress. It is necessary for every institute to prepare its own protocol depending on the existing airway equipment. Videolaryngoscope is a valuable device in recent times. Scoline should be given only once thereby restricting intubation attempts to 2 or 3 and focus on other measures to ensure ventilation and oxygenation. A WHO surgical checklist should include discussion of what the anesthetist plans to do if failed intubation occurs. Front of neck access when performed early and confidently, may be life-saving. Imparting training in these techniques, especially surgical cricothyroidotomy, is the need of the hour. Our sincere suggestion is to incorporate formal training of surgical (scalpel) cricothyrotomy during our MD/DNB/DA curriculum so that the anaesthetist does not hesitate in saving two precious lives. A protocol for failed intubation in obstetrics is outlined in Table 2.

Table−2: Failed Intubation Protocol

• Premonition
• Preparation-Airway assessment unfailingly,aspiration prophylaxis
• WHO checklist-discuss plan
• Difficult airway cart –equipment functioning
• Preoxygenation and nasal oxygen
• Positioning
• RSI,Scoline given only once
• Cricoid pressure
• Videolaryngoscopy
• Maximum 2 attempts,
• If fail,continue bag mask ventilation
• Insert 2 nd gen SAD,if can ventilate
• Give NMB-Rocuronium
• Continue with surgery
• Inhalational agent sevoflurane until delivery then TIVA
• Otherwise declare CICO,CALLFOR SURGEON,ENT,INTENSIVIST

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