

ENT SURGEONS AS MASTER TRAINERS OF CRICOTHYROIDOTOMY WILL SAVE PRECIOUS LIVES IN EMERGENCIES

Syed Muhammad Asad Shabbir Bukhari, Sohail Aslam, Naeem Riaz*, Asim Abbas**, Maqbool Raza***, Ghulam Fareed***

Pakistan Naval Ship Shifa, Karachi Pakistan, *Pakistan Naval Ship Hafeez, Karachi Pakistan, **Combined Military Hospital Malir/National University of Medical Sciences (NUMS) Pakistan, ***Combined Military Hospital Multan/National University of Medical Sciences (NUMS) Pakistan

ABSTRACT

Objective: To train young doctors and paramedical staff on needle cricothyroidotomy and surgical cricothyroidotomy and provision of kits in trauma centers, main operation theatres and medical reception centers of the hospitals.

Study Design: Quasi experimental study.

Place and Duration of Study: Combined Military Hospital Peshawar and Pakistan Naval Ship Shifa, Karachi Pakistan, from Nov 2017 to Oct 2020.

Methodology: Doctors and paramedical staff were selected on volunteer basis. Small groups were trained in 2-3hours. The participants were shown two videos of two procedures in Urdu language first and then were trained on mannequin.

Results: A total of 345 participants including 205 males and 140 females were trained with mean age was 28.2667 ± 6.24 (SD) years. Out of 61 residents, 54 medical officers, 143 house officers, 35 nurses and 52 paramedical staff were participants.

Conclusion: ENT surgeons must arrange mannequins and conduct training sessions of small groups after every 1 to 2 months.

Keywords: ENT surgeons, Master trainers, Needle cricothyroidotomy.

How to Cite This Article: Bukhari SMAS, Aslam S, Riaz N, Abbas A, Raza M, Fareed G. ENT Surgeons as Master Trainers of Cricothyroidotomy will Save Precious Lives in Emergencies. *Pak Armed Forces Med J* 2021; 71 (Suppl-3): S504-507. Doi: <https://doi.org/10.51253/pafmj.v1i1.7926>

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INTRODUCTION

The management of airways during emergency conditions are very challenging for the doctors and paramedical staff. The skill of endotracheal intubation is very important and should be taught regularly by the anesthesiologists to the young doctors and paramedical staff. Anesthesiologists are the medical specialists of airways and the master trainers of endotracheal intubations for young doctors and paramedical staff. ENT surgeons are surgical specialists of airways and trainers of emergency tracheostomies in the past in developing countries like Pakistan. Due to availability of good quality cricothyroidotomy mannequins, the role of ENT surgeons, as master trainers of needle cricothyroidotomy and surgical cricothyroidotomy will be beneficial to whole mankind. They will impart surgical skills to doctors and paramedical staff in peace and their trainees will save precious lives in wars, operational areas and in peace at emergency departments. Cannot ventilate, cannot intubate (CVCI) situations need emergent cricothyroidotomy, but lack of training of doctors can lead to brain deaths of the patients in five minutes. All over the world, few percentage of the patients should be managed by needle cricothyroidotomy or surgical cricothyroidotomy. This percentage is due to difficult intubation and multiple factors. In

Pakistan, the basic responsibility for training should be taken by otorhinolaryngologists. These skills were not easy to teach few years back due to lack of availability of good quality mannequins and proper guidelines. The model of teaching of such abilities is likewise not good in industrialized countries.¹ Emergency needle and surgical cricothyroidotomies are lifesaving procedures. Information based evaluation of preparing impacts and expertise levels are identified with all departments associated with airway management in emergencies.²

In a study, ultrasound was used to detect cricothyroid membrane, but we detected the membrane with palpation.³ The limiting factor for needle cricothyroidotomy was appropriate tube to connect the cannula with oxygen source. The author thought for several years to utilize the local tubing material available in emergent conditions particularly for needle cricothyroidotomy. The needle cricothyroidotomy was made effective by using intravenous tubing of 1000ml normal saline. It was attached to oxygen source like central oxygen or cylinder and an opening is made in tubing for passive CO₂ removal in 4 seconds, after 12-14 litres/min of oxygen in 1 second.

Needle cricothyroidotomy was made user friendly with few easy steps and mannequin. Surgical cricothyroidotomy was for all doctors and needle cricothyroidotomy was for all paramedical staff and doctors.

Correspondence: Dr Syed Muhammad Asad Shabbir Bukhari, Classified ENT Specialist, PNS Shifa, Karachi Pakistan

Many anesthesiologists, particularly during training, lack the surgical skills of cricothyroidotomy and seek help of ENT surgeons. Different commercially available kits of cricothyroidotomy are available, but these are expensive and not available for all medical centers of developing countries. Surgical cricothyroidotomy was made easy in this study by using only two surgical instruments like small curved artery forceps and BP handle with 15 number surgical blade.

The purpose of study was to train young doctors and paramedical staff on needle cricothyroidotomy and surgical cricothyroidotomy and provision of kits in trauma centres, main operation theatres and medical reception centres of the hospitals.

METHODOLOGY

It was quasi experimental study, carried out at Combined Military Hospital Peshawar and Pakistan Naval Ship Shifa Karachi, from November 2017 to October 2020. Ethical approval was taken for the study from hospital ethics committee.

Sampling technique was non probability convenience. Sampling size was according to availability of human resource for training. All the doctors and paramedical staff having age >18 years were included. These were volunteers to learn. All those were not interested in training sessions were excluded. <https://www.youtube.com/watch?v=IU8ogXOl1go&t=200s> (Needle cricothyroidotomy). <https://www.youtube.com/watch?v=0RvbiayZZtE> (Surgical cricothyroidotomy). The above mentioned videos were shown to participants before giving them training. The participant used their cell phone to watch these videos in 9 minutes.

A good quality mannequin was made available along with necessary equipment. The participants were trained by master trainer (author of article). After imparting training, feedback was taken by participants and recorded. Descriptive statistics of SPSS-20 were applied. Frequencies were analysed and mean and standard deviation were calculated.

RESULTS

A total of 345 participated in the study 205 (59.4%) were male and 140 (40.6%) were female. Male to female ratio is shown in Figure. Mean age of the study population was 28.2667 ± 6.24 years. Minimum age was 18 years and maximum age was 48 years. Various categories were involved to impart training. These were medical officers, residents, house officers, nurse and paramedic staff. These are shown in Table-I.

After the training, the feedback remarks of participants were recorded in Table-II. Out of 94.2% of participants strongly recommended these skills for the doctors and paramedical staff as effective for lifesaving in emergencies.

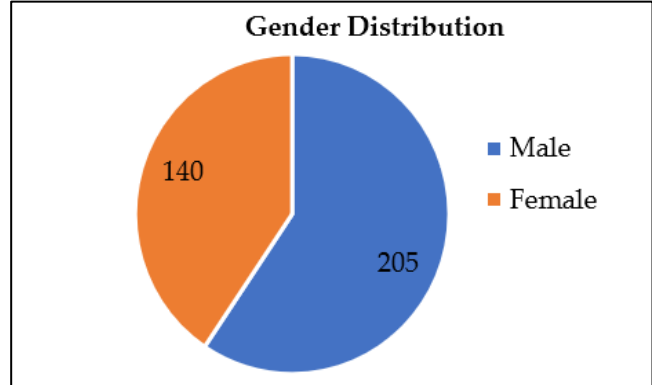


Figure: Gender distribution of study.

Table-I: Categories of participants of study (n=345).

Category	Frequency	Percentage
Residents	61	17.7
House officers	143	41.4
Medical officers	54	15.7
Nurse	35	10.1
Paramedic staff	52	15.1

Table-II: Feedback of participants (n=345).

Remarks	Frequency	Percentage
Strongly recommended	325	94.2
Recommended	10	2.9
Neutral	3	0.9
Indecisive	4	1.2
Not recommended	3	0.9
Total	345	100

DISCUSSION

Here are different systems to improve the abilities in youngsters of medical profession. The students were first instructed by talks and afterward they saw video. After wards, hands on exercise was given as in one of American specialist preparing program.⁴Our study followed the comparable way to show the members. Albeit reliable training, period of specialist and years from residency were related with diminished expertise.⁵In our study, inspiration of participant doctors and paramedical staff added to better aptitude. Practice on mannequin prompted decreases in cricothyroidotomy execution time and improvement in progress rates. After the fifth attempt, in an study, 96% of members had the option to effectively carried out the cricothyroidotomy in 40 s or less.⁶In our study, the members were offered freedom to rehearse the two skills however much possible. They were permitted to return

again in their extra energy and practice the abilities after few days of workshop.

Length of cricothyroid membrane differs and several studies were done to make the skills stress-free.⁷ An 80 mm incision commencing 30mm above the suprasternal notch would include all cricothyroid membrane locations in the extended position in patients without airway pathology in a study.⁸ The advised vertical midline incision length of 80mm was significantly long, and that it could cause excessive bleeding and potentially worsen an already high-risk situation.⁹

In emergency, vertical incision is recommended as in our study, we performed vertical incision for surgical cricothyroidotomy. The length on mannequin was kept about 40-50mm in extended position. We disagree with 80 mm incision for surgical cricothyroidotomy. It may lead to more bleeding and complications. Cricothyroidotomy has complication rates from 9-40% in many studies and can result in a "cannot intubate-cannot oxygenate" situations when the cricothyroid membrane is not properly recognized.¹⁰ Few doctors use "cannot intubate-cannot ventilate" (CICV) instead of "cannot intubate-cannot oxygenate" (CICO). We believe in same medical condition and same management for CICV or CICO but slight difference in terminology.

One of three strategies for recognizing the cricothyroid membrane (palpation of anatomical structures versus a guess dependent on four finger widths versus an assessment dependent on overlying skin wrinkles of the neck). A distinct master evaluator utilized ultrasound to recognize the superior and inferior lines of the cricothyroid membrane. Every one of the three techniques performed inadequately overall.¹¹

In our study, palpation of cricothyroid membrane was carried out, by fingers and most of members were victorious in identification. Success in performing surgical cricothyroidotomy might be improved by a superior comprehension of human neck structures, standard practice, improved needle cricothyroidotomy procedure, and the consistent utilization of ultrasound.¹² Success rates, for right proof of identity of the cricothyroid membrane, were additionally poor in a Canadian foundation.¹³ In reality, ultrasound may help the doctors in emergency departments in the identification of cricothyroid membrane.

Insufficiencies in airway management expertise and judgment add to reduced results. Worldwide training is inconstant in its delivery and need. Quality assurance is restricted in possibly life-saving skills.¹⁴

We recommend the role of otorhinolaryngologist in quality training of all doctors and paramedical staff. Small group (5-14 participants) workshops on both skills should be performed after 1-2 months in every medical institution of the world. Good quality mannequin and appropriate disposable material should be provided by head of institution. This most important training will develop basic component of the ENT specialty, in addition to general ENT and advanced ENT components, in all over the world. The motivated ENT specialists can bring the revolutionary change in participants and impart them confidence in emergency conditions. This practice will save precious lives in future.

We suggest distinguishing the cricothyroid membrane before enlistment of sedation in all patients by anesthesiologists. Despite the fact that palpation may help in many patients, the remaining patients will require ultra-sonographic recognizable proof. The ultrasound machine should be available in all areas where sedation is attempted and where patients with difficult airway could be faced.¹⁵

Training in surgical blade dealing with abilities and accentuating putting the surgical blade down before surgical cricothyroidotomy in the indistinct landmarks. Two recommendations could be made.¹⁶ The Anesthesiologists must be trained by ENT experts for subject skill. A negligibly obtrusive tracheal surgical blade bougie strategy is desirable over a long midline cut, when the trachea is tangible yet the cricothyroid membrane is not palpable. This choice was not made clear in the DAS rules. We suggest third option in "Cannot intubate cannot oxygenate" (CICO) situation which is easier and practical. The needle cricothyroidotomy with wide bore cannula (3 passes or 60 s) even in the impalpable situation, as it helps change to pronouncing a CICO, and maintains a strategic distance from the requirement for a profoundly intrusive open procedure in the event that it is fruitful. This skill is easy to learn and apply in real emergencies. The needle cricothyroidotomy is initial step which must be done by all doctors and trained paramedical staff in case of failed endotracheal intubation. This skill is life saving and can be utilized to gain time for surgical cricothyroidotomy. It prevents from brain death and gives 35-40 minutes to treating doctors for further management. An incorporated cannula first way to deal with CICO salvage procedures is a substantial methodology for anesthesiologists for their patients, and this should be revealed in the DAS Plan D recommendations.¹⁷ We recommend the call for help is made at the

earliest opportunity, and clearly after one unsuccessful intubation effort.¹⁸ The more qualified doctors in airway management must be called for early surgical cricothyroidotomy in adults. Knowledge with these skills of needle cricothyroidotomy and surgical cricothyroidotomy, transformed the doctors and medical staff, more confident and responsive to help others, in our study.

The DAS pediatric CICO rules remember Trans Tracheal Jet Ventilation (TTJV) as a possibility for kids, one to eight year old. Our study suggest that children less than 12 years should only be managed with needle cricothyroidotomy and surgical cricothyroidotomy should be performed in patients more than 12 years after initial needle cricothyroidotomy. TTJV has been suggested for over twenty years as a possibly life-saving strategy in a CICO emergency.¹⁹

LIMITATION OF STUDY

This study is new for Pakistan and developing nations of the world. This study require mannequins and number of mannequins are less. The mannequin was imported from Germany and we should manufacture it locally. A good number of doctors are required to train the majority of junior doctors and paramedical staff. The video was uploaded to youtube channel in Urdu language. This video should be translated and taught in various international and national languages for the benefit of humanity.

CONCLUSIONS

Needle cricothyroidotomy and surgical cricothyroidotomy are life saving skills and must be taught by simplified methods. Needle cricothyroidotomy must be done in all "Cannot intubate cannot oxygenate" (CICO) situations, followed by surgical cricothyroidotomy in patients more than 12 years of age.

ENT surgeons must arrange mannequins and conduct training sessions of small groups after every 1-2 months in all hospitals and medical centers. They can impart good quality training to participants leading to save precious lives. This most important practice will develop basic component of the ENT specialty.

Conflict of Interest: None.

Authors' Contribution

SMASB: Master trainer and collection of data, SA: Introduction, NR: Mathology, AA: Discussion, MR: Results, GF: Review of literature

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