Research Paper

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Study of Endotracheal Intubation in Emergency Room of a Tertiary Care Hospital of Ahemedabad City of Gujarat, India

Medical Science

KEYWORDS :

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ABSTRACT

Introduction: airway management is an important part of management of critically ill and injured patients in the Emergency Department. Numerous studies from developed country have demonstrated the competency of Emergency Physician in intubation. To date there have been no published data on intubation in ER by Emergency Physician

Method: Data on intubation is collected prospectively from July 2013 to 0ctober 2013.

Result: There were 114 intubation performed in 4 months duration. The main indication of intubation was respiratory failure (27.19%) followed by head injury (17.54%) and CVA/ICH (15.78%). All patients were successfully intubated. Almost all intubation 106(92.98%) are performed by Emergency Medicine Resident Doctor, and 8 (7.02%) intubation were performed by other residents. The most common pharmacological agent used in our study was propofol (54.38%), followed by benzodiezepines(13.9%). We are not performing RSI. And this might be the result of very high incidence (61.40%) of using gum elastic bougie during intubation. success rate of intubation at first attempt with use of gum elastic bougie is 77.19%. Total 38 patient (33.33%) had one or more complication, in total 57 complication were noted, the most common complication is trauma to teeth (9.64%).

Conclusion: Emergency Medicine residents have competency in doing intubation with acceptable complication rate and there is need of implementing RSI in ED.

INTRODUCTION:

"A" is the Airway management in the well-known Airway, Breathing, and Circulation (ABC) algorithm. Primarily used by all emergency medical personnel when dealing with critically ill or injured patients. This ABC algorithm is taught on all the basic and advanced emergency medical courses involved in the management of the critically ill or injured patient (e. g.Basic Life Support, Advanced Cardiovascular Life Support Course, Advanced Pediatric Life Support Course, Advanced Trauma Life Support Course, Fundamental Critical Care Support Course, and many others)

There is no clear list of indications for endotracheal intubation in the emergency room. Current indications are derived from studies done in other disciplines, such as anesthesiology [1,2]. The emergency room is unique due to the presence of clinically undifferentiated patients as well as the urgency accompanying the management of critically ill or injured patients. The need for an advanced airway and placement of endotracheal tube as the best option to manage the airway in a critically ill or injured patient is often the most difficult aspect of decision making for the emergency physician. A delay in decision making to intervene and secure an advanced airway early in medical management may lead to increased difficulty or even failure to secure an advanced airway later on.

In the emergency room with its urgent, dynamic and sometimes uncontrolled conditions and where various procedures must sometimes be undertaken simultaneously due to the clinical presentation of the patient, the decision to intubate can be difficult [3, 4]. The adverse effects of mismanaged airway include death and hypoxic brain damage [6]. A persistent and prolonged attempt at intubation is the most common cause leading to major catastrophes [7].

With the development of emergency medicine (EM) as a recognised medical specialty, airway management has become an essential skill for an Emergency Physician [5]. Its teaching is a mandatory component of the training curriculum, and in Canada and the United States, Emergency Physicians have already taken over this responsibility and deal with the majority of patients requiring emergency intubation [5,9]. The situation is significantly different in England and Wales where anesthetists perform the majority of RSI, and Emergency Physicians perform it in only a few teaching hospitals [9]. The data for successful intubation and its complication is sparse in developing countries. A study from Thailand reported overall success of 99.6% for orotracheal intubation (both RSI and crash intubation) and successful intubation on first attempt in 79.5% of patients [10]. Anesthetists performed most of these intubations. A similar situation exists in India where few teaching hospitals have qualified Emergency Physicians and even fewer have Emergency Medicine residency programmes. In fact, Emergency Medicine is still evolving as a specialty in the country and there is a need to have regional baseline data regarding Endotracheal Intubation, especially in Emergency Room setting, for future evaluation of training skills of Emergency Medicine residents and quality assurance practices.

The main aim of our study was to gather data on indications of intubation in patients coming to emergency department of our hospital. Also the method, success rate and complications of intubation are noted in our study.

OBJECTIVES:

The objectives of our study are to analyze

1) The indications of intubation in ER.
2) Method and agent used for intubation in ER.
3) Rate of difficult intubation and the reason for it.
4) Analyze immediate complication related to intubation in ER.

MATERIAL AND METHODS:

It is an observational study carried out in ER of Seth V.S.General Hospital , Ahmedabad, Gujarat, India.(a tertiary care hospital). Data in the form of name, age, sex, time of intubation, time taken for intubation, person doing and his/her qualification, agent and method used ,indication and immediate complication after intubation was collected in pre designed proforma by emergency medicine resident on duty during period of July 2013 to October 2013.

All patients are intubated after written informed consent by patient or patient's relatives. Pre-intubation and post-intubation vitals were noted. Immediate complications are noted and treated accordingly. Post-intubation chest x-rays were done in all patients.

For the purpose of study, definitive airway management is divided in to Orotracheal intubation, Rapid sequence intubation, Nasotracheal intubation, and Cricothyroidotomy. Orotracheal intubation was defined as oral intubation using direct laryngoscopy with or without sedative agent. Rapid sequence intubation was defined as oral intubation using direct laryngoscopy with the use of sedative and rapid onset neuromuscular blocking agent. Cricothyrodotomy was defined as emergency incision through cricothyroid membrane to secure airway.

Our Emergency Room is equipped with different types and sizes of laryngoscope blades, varying size of endotracheal tubes, different anesthetic and paralyzing agents, difficult airway ad-

juncts and equipments as well as material required for tracheostomy.

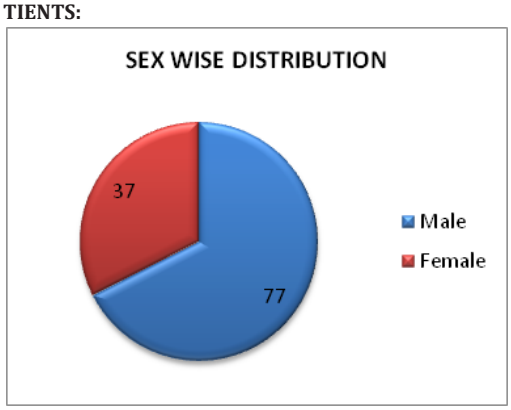
An attempt of intubation was defined as placement of a laryngoscope in to patients airway followed by insertion of an endotracheal tube. The method of confirmation is five point auscultation and direct visualization of tube passing through vocal cords. Difficult intubation is defined as either an intubation requiring more than two attempts or usage of alternative intubation technique.

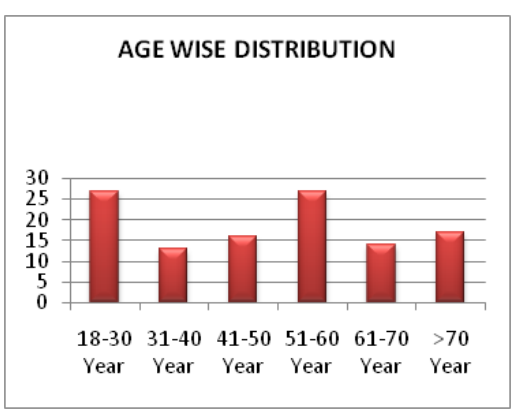
INCLUSION AND EXCLUSION CRITERIA:

- All patients above age of 18 year intubated in ER are included
- All patients below age of 18 year are excluded
- All patients with h/o difficult/failed intubation in the past are excluded
- All patients with history of tracheostomy are excluded.
- All patients who come intubated from other hospitals are excluded

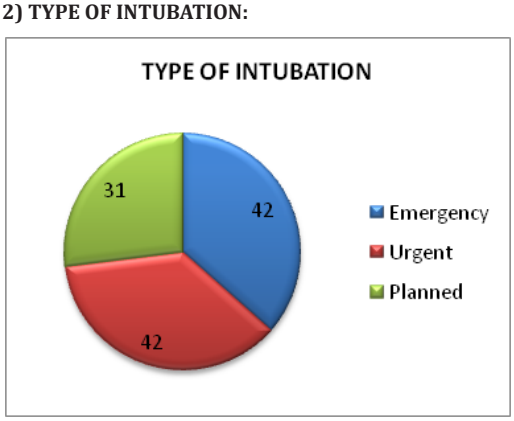
RESULT:

1) DEMOGRAPHIC CHARACTERISTICS OF INTUBATED PATIENTS:



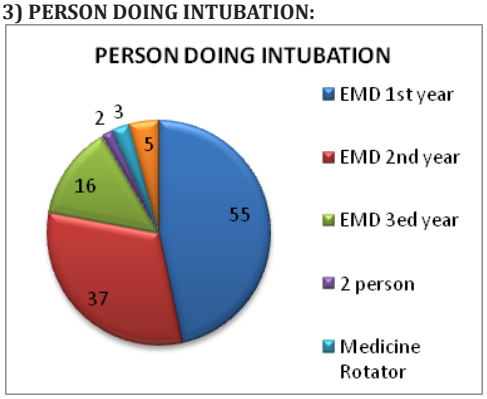


2) TYPE OF INTUBATION:



Emergency intubation is defined as protection and maintenance of patent airway is done as soon as patient arrives in emergency room like patient of respiratory arrest or in gasping. Urgent intubation is defined as protection and maintenance of patent airway done after addressing other issue like circulation for e.g. a patient of type 2 respiratory failures. Planned intubation is done for protection and maintenance of patent airway for prophylaxis of aspiration or some time by looking in to the prognoses of disease.

3) PERSON DOING INTUBATION:

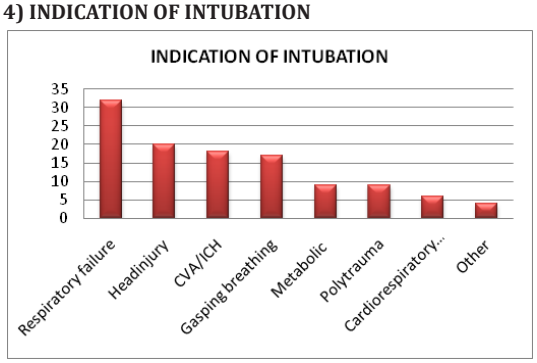


EMD residents are emergency medicine resident doctor who are working in emergency room and aspiring their MCI recognized degree of M.D. in Emergency medicine. First year are allowed to do intubation after a period of working in emergency room for more than 6 months.

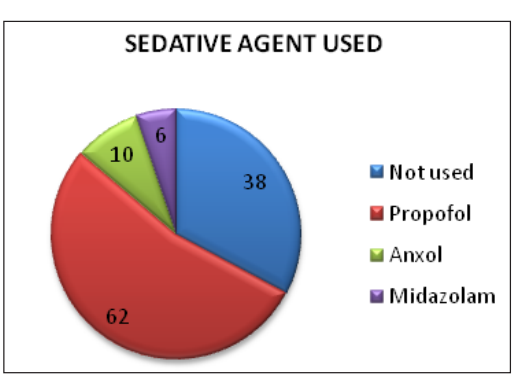
As there is very limited resident in emergency medicine, resident doctors of other faculty are given a rotational posting of 3-4 months in emergency room, for learning medical as well as traumatic emergencies.

However, all intubation were performed by emergency medicine resident, other residents performed intubation when emergency medicine resident was busy with other some patients.

4) INDICATION OF INTUBATION



5) SEDATIVE OR ANESTHETIC AGENT USED:



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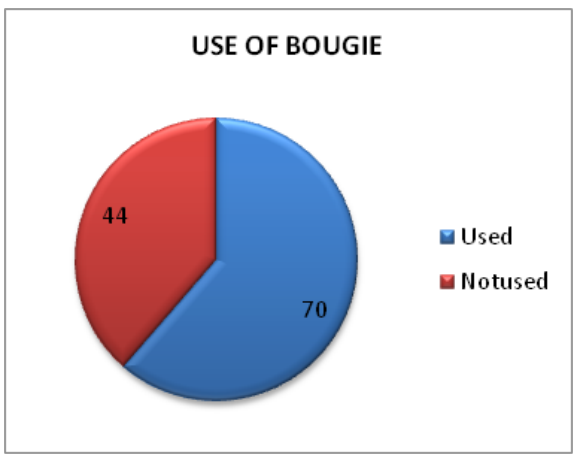
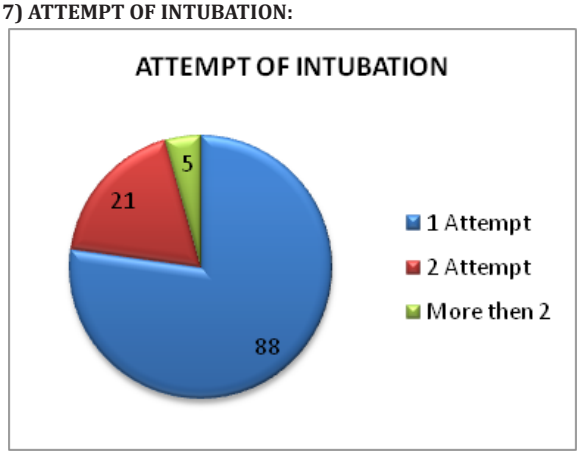
In our emergency room we are not performing RSI. As we are not familiar with using paralyzing agent. We are doing it under sedative agent like propofol or benzodiazepines. In some crash conditions, without any sedative or anesthetic agent.

6) USE OF GUM ELASTIC BOUGIE :



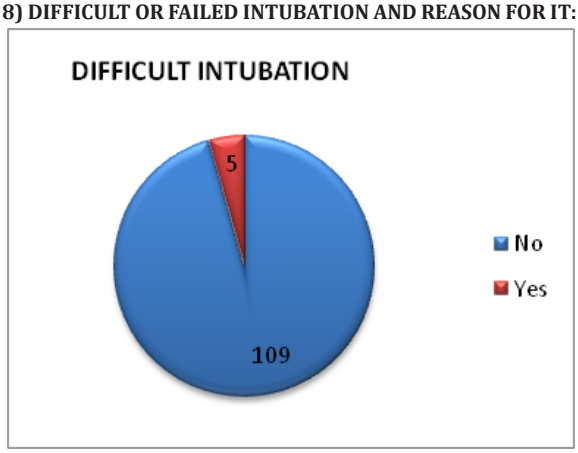
Residents are using bougie for saving time and reducing attempt of intubation,as we are not using paralyzing agents it sometime becomes difficult to visualize vocal cord and some time difficult to pass ET tube through it. And residents are themselves bit confident in doing intubation using bougie.

7) ATTEMPT OF INTUBATION:



An attempt of intubation was defined as placement of a laryngoscope in to patients airway followed by insertion of an endotracheal tube. Intubation requiring more than two attempts is defined as difficult intubation and is performed by other resident.

8) DIFFICULT OR FAILED INTUBATION AND REASON FOR IT:



Difficult intubation is defined as either an intubation requiring more than two attempts or usage of alternative.

Reasons for difficulty are

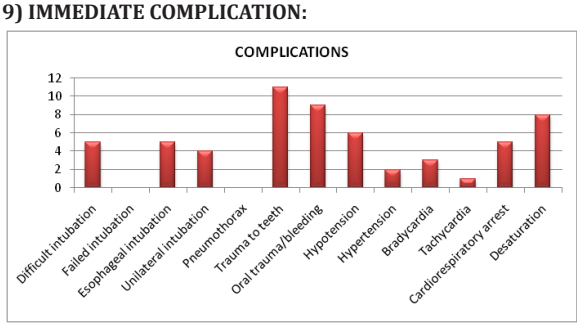
Two people were having sub mucous fibrosis, with narrow oral cavity opening.

Two people having facial bone fracture.

One person having anteriorly placed larynx.

All intubation are then done by either changing person doing intubation.

9) IMMEDIATE COMPLICATION:



Immediate complications are complications which are noted just after intubation, attributed to medication and procedure used for intubation. Those complications which are likely due to disease per se are excluded.

DISCUSSION:

There is no published data available in India regarding intubation in Emergency Room. In our study all patients with age more than 18 years were included. So, age ranges from 18 years to 102 years. There were two age groups 18-30 years and 51-60 years, showing maximum incidence of intubation, 23.68% in each age group. In age group 18-30 the main indication was trauma related and in age group 51-60 the main indication was cardio-respiratory failure. Out of 114 intubation done in Emergency Room 77 (67.5%) are male and 37 (32.5%) are female, this higher rate of intubation in male correlates with study done in south Africa by Anita Groenewald In 2011, The gender differentiation of their study population (183) was males 108 (59%) and females 75 (40%) [11]. Another study showing high rate of intubation in male is by Mort, Thomas C. MD 4-2004 with a sex distribution of 62:38 men:women [12]. This higher rate of intubation in male can be explained by high rate of traumatic injury, higher prevalence of chronic disease and particular in India high sex ratio of males than female.

Among 114 almost all intubation 106(92.98%) are performed by Emergency Medicine Resident Doctor, and 8 (7.02%) intubation were performed by other residents who are posted as their rotatory posting in Emergency Room. Other resident performed intubation for their learning purpose only under the observation of Emergency Medicine Resident. It should be noted here that no help was taken from anesthesia residents, who are available on call round the clock in Emergency Room, showing the competency of Emergency physician in endotracheal intubation. Though before introducing Emergency medicine as core branch of prost graduation (since 5 years) all intubation in our ER were performed by anesthetic resident on call, once decided by treating doctors. In university hospital in Glasgow, UK, only 31% of intubation in ER was undertaken by emergency physician, while majority were still performed by anesthetist in 1999. Intubation rate in the same hospital by emergency physician increased to 75% in 2003 [19]. In a 1 year survey carried out in United States (US) in 1995-96, emergency physician and emergency residents preformed 93% of total intubation in ER [18].

The main indication of intubation in our study was respiratory failure (27.19%) followed by head injury (17.54%) and CVA/ICH (15.78%). Total intubation performed in trauma patients were 20(25.43%). The most common indication of intubation in younger patients is trauma and in elderly it is respiratory failure, either primarily due to respiratory pathology or secondary

to cardiac pathology. In one study in which Forty-three consecutive patients requiring endotracheal intubation in an emergency room were studied prospectively, The indications for intubation were acute respiratory failure (ARF) in 22 patients and cardiopulmonary arrest (CPA) in 21 patients.[13]There are several indications for intubation. The first occurs when the patient is unable to protect or maintain his/her airway. The second indication is failure of oxygenation or ventilation as might occur in someone with asthma, COPD or pulmonary edema.[14]

The Fundamental Critical Care Support Course® (FCCS®) which originates from the USA (Society for Critical Care Medicine) and is presented to the resuscitation team members who react to medical emergencies within the hospital or any other healthcare provider who is responsible for the medical care of acutely or critically ill or injured patients. This course has little emphasis on airway management, but has the following indications for endotracheal intubation: airway protection, relief of obstruction, provision of mechanical ventilation and oxygen therapy, respiratory failure, shock, hyperventilation for intracranial hypertension, reducing the work of breathing as well as facilitation of suctioning which is a new indication not yet mentioned .

The Advanced Trauma Life Support Course, The ATLS course indications for endotracheal intubation in the acutely injured patient are based mainly on clinical findings and include:

- Presence of apnea (no spontaneous breathing)
- Inability to maintain a patent airway by other means
- Need to protect the lower airway from aspiration of blood and vomitus
- Impending or potential compromise of the airway
- Presence of a closed head injury requiring assisted ventilation (Glasgow Coma Scale < 8)
- Inability to maintain adequate oxygenation by face-mask oxygen supplementation [15]

The American Heart Association Airway Management Course® is designed for healthcare providers requiring proficiency in use of airway devices and techniques such as endotracheal intubation specifically in adults. According to the 36 page manual, it aims to teach students the primary and basic principles oxygenation and endotracheal intubation with emphasis only on the technique and equipment used with only a mere 3 pages on endotracheal intubation. Their criteria to intubate include:

- Cardiac arrest when bag-mask ventilation is not possible or ineffective,
- Responsive patient in respiratory compromise when unable to oxygenate adequately despite noninvasive ventilatory measures
- If the patient is unable to protect the airway [16]

It becomes clear that inability to maintain airway(CVA,ICH, Head injury with GCS <8, poisoning etc..) remains the main indication of intubation followed by respiratory failure due to respiratory or cardiac pathology, same result was obtained in our study also.

The most common pharmacological agent used in our study was propofol (54.38%), followed by benzodiezepines(13.9%). 33.33% were intubated without using any of the pharmacological agent. Etomidate and muscle relaxant were not used in any of the patients, reflecting a fact that in our emergency room we are not performing RSI. And this might be the result of very high incidence (61.40%) of using gum elastic bougie during intubation. However success rate of intubation at first attempt with use of gum elastic bougie is 77.19%, is equal or slightly lower as compared with other study in which RSI is performed without using bougie. A study done in ED UKMMC, revealed success rate of intubation in first attempt by EM trainees is 80.6% and in another study done by Sagarin in North American EM residents is 83%[20].

Out of 114 patient intubated 38 patient(33.33%) had one or more complication, in total 57 complication were noted, the most common complication is trauma to teeth (9.64%), other oraltrauma (7.89%). In one study Thirty-eight complications occurred in 24 of the 43 patients. The department or level of training of the intubator did not affect the rate of complications. [13] and in one study There was a significant increase in the rate of airway-related complications as the number of laryngoscopic attempts increased (≤2 versus >2 attempts): hypoxemia (11.8% versus 70%), regurgitation of gastric contents (1.9% versus 22%), aspiration of gastric contents (0.8% versus 13%) bradycardia (1.6% versus 21%), and cardiac arrest (0.7% versus 11%)[12] the most common complication in other studies were esophageal intubation, desaturation and hypotension[17,18,20] as compared to our study. This difference can be explained by the difference in technique of intubation.

CONCLUSION:

Emergency medicine residents of Seth V.S.G.H. Ahmadabad, Gujarat, India. Have high competency level in intubation with acceptable complication rates. RSI should be taught and implemented as a choice of technique of intubation in ER.

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