Difficult during intubation in the pediatric emergency department of a tertiary care childrens hospital

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Abstract: Emergency department intubation (EDI) is frequently the primary life-saving intervention in the management of critically ill children. RSI (rapid sequence intubation) is the method of choice for intubation in ED. But it requires enormous expertise and training, but this is not feasible always in a resource limited setting like ours. So modified RSI and facilitated intubation are practiced in many EDs. This study was done over a period of two months in a tertiary care pediatric emergency department to identify the difficulties arising during intubation using non RSI protocol (modified RSI, facilitated intubation) compared to that of RSI. 68 children were intubated by the modified RSI facilitated intubation during the study period. 54.4 percentage (n-37) of the intubated children were below the age group of 1 year. 91.1 percentage (n-62) of the children were intubated on the first attempt. The difficulties encountered during intubation of these 68 children were difficult intubation 8.9 percentage (n-6), failure to visualize glottis 5.9 percentage (n-4), airway bleeding 4.4 percentage (n-3). Both Modified RSI and facilitated intubation appeared to be practically feasible and safe methods for intubation in critically ill children without much difficulty compared to RSI.

Keyword: Emergency, Rapid sequence intubation, Facilitated intubation

INTRODUCTION:
Airway management is the priority in the evaluation and management of critically ill children in the emergency department. The goal is that the ventilation and oxygenation should meet the metabolic demands of these children. Endotracheal intubation (EDI) is the definite component in optimal management of airway. The skill requires a combination of knowledge, technical expertise and sound clinical judgment to reduce the risk for adverse effects. Rapid sequence intubation (RSI) is the method of choice for intubation of ED patient [1]. RSI can be defined as ‘the virtually simultaneous administration of a sedative (induction) agent and a neuromuscular blockade agent for the purpose of intubation’[1].

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RSI facilitates airway visualization through muscle relaxation, control of agitation and seizures, and the stunting of involuntary reflexes (e.g., gag reflex) associated with laryngoscopy. RSI provides excellent intubating conditions within 60 seconds. Also, RSI potentially minimizes complications of EDI such as aspiration and to counteract the increase in systemic arterial blood pressure, heart rate, plasma catecholamine release, intracranial pressure (ICP), and intraocular pressure (IOP) that occurs with endotracheal intubation [2,3]. The purpose of RSI is to make emergent intubation easier and safer, thereby increasing the success rate of intubation and decreasing the complications of intubation [4]. RSI requires enormous expertise and training, but this is not feasible to avail such expertise round the clock in a resource-limited setting like ours. "Facilitated intubation" refers to the use of a sedative drug only (without a paralytic agent) to pharmacologically assist with intubation [4]. For facilitated intubation, the most common sedative agent used has been etomidate, although midazolam has also been used [5, 6, and 7]. In our ED, training postgraduates perform facilitated intubation using midazolam as a sedative.

Acutely ill child is presumed to have a full stomach and risk of aspiration of gastric contents during intubation. Moreover, the children are brought in various stages of cardiopulmonary dysfunction which may be further jeopardized by the intubation procedure i.e., they become hypoxic rapidly. Protocol followed in our ED is to decompress the stomach by nasogastric aspiration and preoxygenate children with bag valve mask following administration of RSI medications prior to intubation, since all critically ill children are profoundly hypoxic on arrival ("Modified RSI") [8]. The modified RSI is done by the ED physicians who have undergone rigorous training in the RSI protocol. Classical RSI recommendation is to avoid bag valve mask ventilation prior to intubation and nasogastric tube insertion [1, 3, 9]. This study was undertaken to assess the difficulties during intubation using the modified RSI/facilitated intubation protocol in the management of critically ill children compared to that of RSI.

OBJECTIVE:
To study the difficulties arising during intubation of critically ill children in the pediatric emergency department of a tertiary care children hospital using "Modified RSI" and "Facilitated intubation" compared to that of RSI.

MATERIAL AND METHODS
This is a retrospective study done in the pediatric emergency department, tertiary care hospital, Chennai over a period of two months (May-June 2010). All children in the age group of 1 month to 12 years who required intubation in the ED were included in the study. Case records of the study participants were analyzed for details of intubation viz., protocol followed, person who intubated, number of attempts at intubation, difficulties encountered during intubation. Ethical committee approval was obtained prior to the study.

RESULTS:
During the study period, 68 critically ill children were intubated in the emergency department. ED physician used modified RSI for intubation while trainees used facilitated intubation. Among these children, 54.4% (n=37) were aged less than 1 year; 32.4% (n=22) were aged between 1-5 years,
13.2% (n=9) were above 5 years of age. The ED physician intubated 52.9% (n=36) of the critically ill children using modified RSI protocol while postgraduates intubated 44.1% (n=30) using facilitated intubation. 2 of the children were intubated by the anesthetist (2.9%) in view of difficult airway. 62 children were intubated on first attempt (91.1%). The failed first attempts to intubate were by trainees using facilitated intubation. The most common difficulties encountered during intubation using modified RSI/ facilitated intubation were difficult intubation i.e. more than 1 attempt to intubate 8.9% (n=6), failure to visualize glottis 5.9%(n=4) followed by airway bleeding 4.4% (n=3); anatomically difficult airway 2.9%(n=2) [viz. Pierre robin syndrome, cleft palate] and obstructed airway 2.9%(n=2) [viz.2 cases of foreign body in trachea]. No child desaturated (i.e. SpO2 < 92%) during the intubation procedure.

DISCUSSION

Intubation is a critical stage in the management of emergencies, since it should be completed quickly and safely in patients with limited circulatory, pulmonary or cerebral reserves. Securing the airway in an emergency can represent the difference between a satisfactory outcome and permanent sequelae or death, for which reason it should be performed by adequately trained professionals. It is well documented that airway management in the ED is at the opposite spectrum from the controlled environment of the operating theatre. The need to intubate in the ED is usually unpredictable and often promptly required, with the frequency of difficulties during rapid sequence intubation ranging from 15% to 38% [10]. The present study showed the frequency of difficulty during modified RSI / facilitated intubation to be 25%. A study done by Frank J et al. [11] found the failure to visualize the glottis (2-16%) as the most frequent difficulty arising during RSI followed by difficult intubation(2-4%) i.e. more than two attempt to intubate, desaturation(3.6%). Our study found that the failure to intubate on the first attempt (8.9%, n=6) as the most common difficulty while intubating critically ill children using the modified RSI/ Facilitated intubation followed by failure to visualize the glottis (5.9%, n=4). But none of the children in the study group were found to desaturate (i.e. SpO2 < 92%) during modified RSI/facilitated intubation. In our study 91.1% (n=62) of the children were intubated at the first attempt by modified RSI/ Facilitated intubation. 6 of the children (8.9%) in whom facilitated intubation was attempted by trainees were unsuccessful in the first attempt. For ED intubations, the results of the NEAR (National Emergency Airway Registry) studies for pediatric patients show the first attempt intubation success rates were 78% for RSI; 44% for sedative agent only (i.e. facilitated intubation); and 47% for no medication used during intubation[1]. A study done by Sangarin et al. [1] showed a first attempt intubation success rate of 99% for RSI and 97% for the other protocols (modified RSI/ Facilitated intubation). Pediatric data from the NEAR noted that 77% and 50% of EDIs were successful on the first attempt when performed by pediatric emergency medicine residents and pediatric residents, respectively, suggesting improvement with experience[1]. Analysis of pediatric data from the NEAR noted a higher rate of successful intubation on initial attempt with the use of a paralytic agent (78%) (i.e. RSI) compared with no medications (47%) or the use of a sedative alone i.e. facilitated.
The use of the RSI technique results in fewer attempts, more rapid intubations, and higher success rates when compared to intubation with no sedation or sedation alone, both in the hospital and in the pre-hospital setting (Hung and Murphy, 2008).

Majority of the intubation were done by the ED physician in the study participants (52.9%) using modified RSI. According to Taryle et al. [11] the initial intubation attempts were by emergency medicine residents (59%), pediatric emergency medicine fellows (17%), and pediatrics residents (10%). With above data Modified RSI seems to have similar success rate on initial attempts to intubate a critically ill child like that of RSI unlike facilitated intubation. There are no other significant difficulties in using modified RSI/ facilitated intubation in emergency situations. Even though RSI is deemed to be the superior for EDI, there are no major drawbacks in using modified RSI and facilitated intubation for the same in a resource limited setting like ours. Anyway measures need to be initiated in near future to train the physicians involved in emergency care in rapid sequence intubation for a much better outcome.

STUDY LIMITATIONS
A larger population study is vital to validate results. This study, which was conceived as a pilot project, attempts to direct the course of a larger work.

CONCLUSION
There were no obvious difficulties in using “Modified RSI”/ “Facilitated intubation” in critically ill children in the emergency department compared to that of RSI.

REFERENCES


