

Rapid Sequence Intubation Method For Emergency Endotracheal Intubation



Medical Science

KEYWORDS :

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ABSTRACT

Background :Rapid sequence intubation(RSI) is defined as a technique in which a potent sedative or induction agent is administered virtually, simultaneously with a paralyzing dose of a neuromuscular blocking agent to facilitate tracheal intubation. The technique includes specific protection against aspiration of gastric contents, provides excellent access to the airway for intubation, and permits pharmacological control of adverse responses to illness, injury and the intubation itself.

Aims and Objectives :

- To study different indications for Endotracheal Intubation.
- To study the success rate of Rapid Sequence Intubation (RSI).
- To observe benefits & complications with ETI performed using RSI.

Results :Common indication for intubation was anticipated clinical course of deterioration (129 patients - 64.5%), which clearly gives idea that we were more concerned about early and good clinical outcomes of patients. We used RSI method in 101 patients (50.5%) and sedation only method in 73 patients (36.5%) to intubate patients. Overall success rate for intubation was 100%. In this study 1st attempt success rate with RSI was 98% while sedation only method showed only 83.5% success. Complication rate with RSI method was (1 patient - 0.5%) whereas complication rate with sedation only and crash airway method was (18 patients - 9%) & (4 patients - 2%) respectively.

Conclusion :This study suggests that RSI method for intubation can be safely performed under observation in critically ill patients by trained emergency physicians. In our study, success rate was higher & complication rate was lower with RSI method.

Introduction

Airway control and adequate ventilation are of paramount importance to the management of acutely ill patients and bear significant impact on the course of their disease. This task, mostly accomplished with endotracheal intubation (ETI), enables delivery of specific inspired oxygen concentration and institution of positive pressure ventilation.^[1] However, this highly skilled life-saving procedure involves risks especially when performed in an emergency situation compared to performing it in elective conditions of an operating room.^[2,3] These differences are due to setting, patient characteristics, method used for intubation and timely availability of experienced personnel. The risk of complications with intubation has been reported to be 14-28% and it increases with the number of attempts as well as depends on the method of intubation.^[4] Rapid sequence intubation (RSI) and crash intubations are two different approaches for ETI in an emergency situation. Between the two, RSI is more common and safer for patients presenting to an emergency department (ED).^[5] Significance of ETI mandates that all physicians with acute care responsibilities, especially emergency physicians (EPs), should be competent in its institution and have the expertise to handle full spectrum of airway problems. Emergency medicine is an emerging branch in India & there is not a much clinical data regarding Emergency Physician performed Endotracheal Intubation. Hence we decided to conduct a study on emergency ETI performed by EPs in Emergency Department.

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Procedure

- Rapid sequence intubation (RSI) is a technique for achieving intubation using a series of discrete steps, including administration of pharmacologic agents, which maximize likelihood of success and minimize complications.
- RSI is not indicated in a patient who is unconscious and apneic. This is considered the "crash" airway and immediate BVM ventilation and endotracheal intubation without pretreatment, induction or paralysis is indicated
- **Preparation**^[6]- Equipment to be assembled and ensure all is

operational. Airway should be assessed upon patient arrival, the mnemonic LEMON helps to predict a difficult intubation.

- **Pre-oxygenation**^[7]- The purpose of pre-oxygenation of a patient before induction and paralysis is to provide a maximum time that the patient can tolerate apnea. For this purpose patient should be pre-oxygenated with either Bain's circuit or Bag Valve Mask (BVM) device with 100% O₂ for 3-5 minutes. Method of 8 vital capacity breaths can also be used for the same.
- **Pre-treatment** - Pretreatment phase of RSI involves the delivery of medications to modify the physiologic response during and after intubation. Numerous agents have been used for attenuation of the pressor response, including lidocaine, fentanyl, sufentanil, alfentanil, and esmolol.
- **Paralysis (with Induction)**^[9]
 1. Do not ventilate until patient is intubated or preoxygenation is required as indicated by oxygen saturation falling below 90%.
 2. **Induction agents** Induction agents provide a rapid loss of consciousness that facilitates ease of intubation and avoids psychic harm to the patient.
 - a. Ketamine (1-2 mg/kg IV) - Ketamine, a phencyclidine derivative, has been widely used as a general anesthetic agent since 1970. After an IV dose of 1 to 2 mg/kg, ketamine produces loss of awareness within 30 seconds, peaks in approximately 1 minute, and has a clinical duration of 10 to 15 minutes.
 - b. Propofol (1-2 mg/kg IV) - Rapid onset, short duration, cerebral protective. However, propofol is a myocardial depressant and also decreases systemic vascular resistance.
 - c. Midazolam (0.3 mg/kg IV) - Slower onset (2-3 min without opioid pretreatment) and longer duration (up to several hours) than etomidate.
 3. **Paralysis agents** are administered immediately after induction agent.
 - a. Succinylcholine (1- 1.5 mg/kg IV) - rapid onset (45-60sec), shortest duration of action (8-10 minutes).
 - b. Rocuronium(0.6-0.9 mg/kg IV) - slightly longer onset of action (60-75 sec) and longer duration of action (30-60 minutes).
- **Positioning**^[8]
 1. In cases where cervical spine injury is suspected, intubation

must be performed without movement of the head, best provided by an experienced assistant.

- Place patient in sniffing position to help align the axes & facilitate visualization of the glottic opening

- Prove placement^[9]**

- Visualize the ET tube passing through the vocal cords
- Confirm tube placement (essential)
 - Observe colour change on colorimetric end-tidal CO₂ detector
 - If available, utilize wave-form capnography
 - Use 5-point auscultation method; listen over each lateral lung field, the left axilla & left supraclavicular region for presence of good breath sounds. There should be no sounds of air movement over the stomach

- Plan for failed intubation**

- Return to bag-valve-mask with adjuncts to maintain oxygenation
- A further good attempt may be undertaken provided deliberate steps have been taken to identify and rectify the problem causing the failure and that oxygenation can be maintained between attempts.
- The key to the management of failed intubation is early recognition of the problem and not persevering in the face of a desaturating patient

- Post-intubation management^[10]**

- Secure ET tube, note depth of initial tube placement on documentation
- Initiate mechanical ventilation if there is no spontaneous respiration
- Keep patient on monitors
- Obtain a CXR
- Administer sedative/analgesia for patient comfort, decreased oxygen demand and to decrease ICP, especially if patient is paralyzed with longer-acting paralytic agent (atracurium).
- Obtain arterial blood gases.

Material & Method

After obtaining institutional ethical committee approval, a prospective, single centre study was carried out on 200 patients requiring endotracheal intubation, admitted to emergency department in a Government Medical college & hospital from 1st May 2013 till 17th September 2013. Every patient attending to emergency department was examined clinically and history was elicited when possible. Patients found to be critically ill were given priority.

The inclusion criteria were as follows:

- Age – ≥ 18 years
- Patients in whom intubation was indicated:
 - Failure to maintain or protect airway
 - Failure to ventilate or oxygenate
 - Anticipated clinical course of deterioration

The exclusion criteria are as follows:

- Patients with age < 18 years
- Obstetric and gynaecological emergencies
- Refusal for consent to participate in the study.

We performed intubation using either RSI or sedation only method and for apnoeic or cardiac arrest patients, crash airway management was done.

While patient was being oxygenated, pretreatment was given in the form of Inj. Glycopyrrolate – 5-10 µg/kg IV and Inj. Lignocaine – 1.5 mg/kg IV or Inj. Fentanyl – 1-1.5 µg/kg IV to attenuate physiologic response during laryngoscopy and intubation. After pretreatment, patients were given various sedative agents like, Inj. Midazolam – 0.3 mg/kg IV or Inj. Propofol – 1-2 mg/kg IV to provide a rapid loss of consciousness except for patients who required crash intubation. This was followed by administration of paralytic agents Inj. Succinylcholine – 1-1.5 mg/kg IV

or Inj. Rocuronium – 0.6-0.9 mg/kg IV when RSI was preferred. Succinylcholine was avoided in patients suspected of hyperkalaemia, raised ICT and raised IOP. Rocuronium was avoided in patients suspected having difficult airway. After confirmation, ET tube was fixed at appropriate length using adhesive tape. Every patients were closely monitored and observed for any immediate complication like hypotension, hypertension, arrhythmias, hypoxia, bronchospasm, laryngospasm and any injury to lip-tongue-teeth. After completion of procedure, patients were sifted either to intensive care unit (ICU) or operation theatre (OT) for further management, some patients were observed for their clinical course in high dependency unit (HDU). Follow-up of intubated patients was done for 24 hours. Proforma was filled by emergency physician performing the procedure. Data was entered in Microsoft excel sheet (2013) and analysed using Epi Info 7 software.

Results

Table : 1 : Age distribution

Age group (years)	No. of cases	Percentage
18-20	20	10.00%
21-30	32	16.00%
31-40	36	18.00%
41-50	33	16.50%
51-60	41	20.50%
61-70	22	11.00%
71-80	13	6.50%
81-90	3	1.50%
Total	200	100.00%

Table : 2 : Type of emergency

Type of emergency	No. of cases	Percentage
Medical	128	64.00%
Surgical	11	5.50%
Trauma	61	30.50%
Total	200	100.00%

Table : 3 : Indications for ETI

INDICATION FOR ETI	No. of cases	Percentage
Failure to maintain or protect airway	24	12.00%
Failure to ventilate or oxygenate	47	23.50%
Anticipated clinical course of deterioration	129	64.50%
Total	200	100.00%

Table : 4 : Method of intubation

Method used	No. of cases	Percentage
RSI	101	50.50%
Sedation only	73	36.50%
Crash airway	26	13%
Total	200	100%

Table : 5 : Attempts required to insert ET tube

ATTEMPTS	No. of cases			Percentage
	RSI	Sedation only	Crash airway	
1st	99	61	26	93.00%
2nd	2	12	0	7.00%
Total	101	73	26	100.00%

Table :6 : Immediate Complications observed

COMPLICATIONS	No. of cases (N=200)			Percentage
	RSI	Sedation only	Crash airway	
Aspiration/regurgitation	0	1	1	1.00%
Bradycardia	0	2	0	1.00%
Tachycardia	0	3	0	1.50%
Cardiac Arrest	0	1	0	0.50%
Hypotension	1	2	0	1.50%
Hypertension	0	3	0	1.50%
Endobronchial intubation	0	2	0	1.00%
Esophageal Intubation	0	1	1	1.00%
Teeth Injury	0	2	0	1.00%
Bronchospasm	0	2	1	1.50%
Total	1	19	3	11.50%

Discussion

In this study the mean age of patients was 46.15789 ± 21.3 years and most common age group requiring intubation was 51-60 years. Common indication for intubation was anticipated

clinical course of deterioration (129 patients - 64.5%), which clearly gives idea that we were more concerned about early and good clinical outcomes of patients. We used RSI method in 101 patients (50.5%) and sedation only method in 73 patients (36.5%) to intubate patients. Overall success rate for intubation was 100%. Success rate on 1st attempt of intubation was 93%. In this study 1st attempt success rate with RSI was 98% while sedation only method showed only 83.5% success. Not a single patient required surgical cricothyrotomy for airway management. In the study common complications were hypertension (3 patients - 1.5%), hypotension (3 patients - 1.5%), tachycardia (3 patients - 1.5%) and bronchospasm (3 patients - 1.5%). Over all complication rate was 11.5%. Complication rate with RSI method was (1 patient - 0.5%) whereas complication rate with sedation only and crash airway method was (18 patients - 9%) & (4 patients - 2%) respectively. After completing procedure, patients were stabilised and observed in emergency department and most of them shifted to ICU or OT for further management.

Conclusion

This study suggests that RSI method for intubation can be safely performed under observation in critically ill patients by trained emergency physicians. In our study, success rate was higher & complication rate was lower with RSI method.

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