ECRONICON OPEN ACCESS

EC ANAESTHESIA
Research Article

Tracheal Intubation of Severe Traumatic Brain Injury in the Emergency Department and Intensive Care Unit of Tambohobe-Fianarantsoa Teaching Hospital

Rasamoelina Ndrantoniaina[1,2], Randriamanantena Tahiriarivelo[2,3], Ralahy Malinirina Fanjalalaina[4], Rajaonera Tovohery Andriambelo[5], Riel Andry Mampionona[5], Rakotoarison Nicole[5] and Raveloson Nasolotsiry Enintsoa[5]

[1]Multi-Purpose Resuscitation Unit, Tambohobe-Fianarantsoa Teaching Hospital, Madagascar

[2]University of Fianarantsoa, Madagascar

[3]Department of maxillofacial surgery CHU Andrainjato, Madagascar

[4]Department of Orthopedic Surgery and Trauma CHU Andrainjato, Madagascar

[5]Associate Professor in Anesthesia Resuscitation, Madagascars

***Corresponding Author:** Rasamoelina Ndrantoniaina, Multi-Purpose Resuscitation Unit, Tambohobe-Fianarantsoa Teaching Hospital, University of Fianarantsoa, Madagascar.

Received: February 12, 2018; **Published:** May 02, 2018

Abstract

Objective: To determine the immediate complications of a tracheal intubation to propose a preventive measure in the emergency department and intensive care unit of Tambohobe-Fianarantsoa Teaching Hospital.

Materials and Methods: This was a prospective observational study. Patients with severe head injury who benefited from tracheal intubation, were included in this study. Excel and IBM SPSS Statistics 20.0 were used for data processing. The Chi-square test was used to investigate the existence of association between two qualitative variables. A difference was considered significant for a value of p less than 0.05.

Results: We have collected 63 severe intubated brain trauma patients with an average age of 38.6 years divided into 51 men and 12 women. Mild sedation with a low-dose hypnotic was the most used anesthetic technique in 57 cases (90.5%). The complication rate was 88.9%. The main complications were coughing after insertion of the probe into the trachea (n = 36, 57.1%). Light sedation was significantly associated with bronchospasm, coughing, and reduced oxygen saturation (SPO_2 < 95%). One case of irreversible circulatory arrest was recorded (1.6%). In less than 24 hours, 7 patients (11.1%) had died. Arterial hypotension after intubation was significantly related to patient mortality (p < 0.0001).

Conclusion: Mild sedation with a low dose of hypnotic curare-free and vigilant intubation were responsible for the occurrence of complications such as coughing, bronchospasm and desaturation.

Keywords: *Complications; Intubation, Severe Traumatic Brain Injury*

Introduction

Performing tracheal intubation in emergency and intensive care units is more difficult compared to tracheal intubation in the operating room. In emergencies, the condition of intubation is not optimal. The intubation procedure is most often performed in the patient's bed in an unstable patient. In France, in 2006, a study reported a 28% complication rate of tracheal intubation in intensive care [1]. In

Mali, one study reported a 37.5% emergency intubation complication [2]. As a result, the intubation of the severely traumatized head patient should be performed according to the rapid sequence intubation protocol [3]. During our literature review, no study on intubation outside the operating theater was conducted in Fianarantsoa. Thus, the present study aims to determine the immediate complications of a tracheal intubation to propose a preventive measure.

Patients and Method

This was a prospective observational study carried out in the emergency and resuscitation department of the Tambohobe-Fianarantsoa Teaching Hospital for a period of 18 months from January 2016 to June 2017. Patients with severe head injury who benefited from tracheal intubation, were included in this study. Serious head trauma is a traumatized patient with a Glasgow score of 8 or less. Non-inclusion criteria were tracheal intubation of a traumatic brain injury in circulatory arrest and in pediatric patients. The data was collected using a survey card. The survey sheet was completed by department staff present during intubation. The following parameters were studied:

- The quality of the operator (resuscitative anesthetist doctor, emergency physician, nurse anesthetist),
- The difficulty of intubation (intubation requires more than two laryngoscopies for an experienced anesthetist),
- The use of another practitioner,
- The anesthetic protocol used,
- Aspiration during intubation,
- Immediate complications such as dental avulsion,
- Traumatic wounds,
- Bleeding;
- Esophageal intubation;
- Vomiting;
- Coughing after intubation;
- Reduced oxygen saturation (SPO_2 < 95%);
- Arterial low blood pressure;
- Circulatory arrest;
- The immediate death.

Data collection was done from the individual survey form. Data entry was done from the Excel software. The data was analyzed using the IBM SPSS Statistics 20.0 software. The Chi-square test was used to investigate the existence of association between two qualitative variables. A difference was considered significant for a value of p less than 0.05.

Results

During the 18-month study period, we collected 63 severe intubated brain trauma patients with an average age of 38.6 years divided into 51 men and 12 women.

The majority of intubation was performed by nurse anesthetists in 49 cases (77.8%). The nurse anesthetist required the intervention of a resuscitative anesthetist doctor in 8 cases (12.7%). Intubation was difficult in 15 cases (23.8%). The procedure for performing tracheal intubation is summarized in table 1. The operator used a vacuum in 17 cases (27%). None of the patients had rapid sequence induction. Mild sedation with a low-dose hypnotic was the most used anesthetic technique in 57 cases (90.5%). Thiopental was the most used hypnotic for sedation (n = 36, 57.1%). Intubation was vigilant in 6 cases (9.5%). Complications observed during intubation are shown in

table 2. At least one complication was found in 56 patients. The complication rate was 88.9%. The main complications were coughing after insertion of the probe into the trachea (n = 36, 57.1%). Light sedation was significantly associated with bronchospasm, coughing, and reduced oxygen saturation (SPO_2 < 95%) (Table 2). One case of irreversible circulatory arrest was recorded (1.6%). In less than 24 hours, 7 patients (11.1%) had died. Arterial hypotension after intubation was significantly related to patient mortality (p < 0.0001).

Parameters	Number (n)	Frequency (%)
Operator		
Nurse anesthesiologist	49	77.8
Anesthetist doctor	11	17.5
Emergency doctor	03	04.7
Pre-oxygenation		
Facial mask	55	87.3
Oxygen bezel	08	12.7
Anesthetic protocol used		
Light sedation	57	90.5
Intubation vigil	06	09.5
Fast sequence induction	00	00.0
Types of products used		
Thiopental	36	57.1
Propofol	16	25.4
Diazepam	05	07.9
Aspiration	17	27.0
Intubation difficult	15	23.8
Use of another operator	8	12.7

Table 1: *Procedure for Performing Tracheal Intubation.*

Parameters	All patients n = 63	Patients under mild sedation n = 57		
	Number (n)	Number (n)	Frequency (%)	P-value
Reactive cough	36	30	83.3	0.026
Bleeding	16	14	87.5	0.639
Arterial low blood pressure	14	13	92,9	0.731
Bronchospasm	13	07	53.8	0.0001
Reduced oxygen saturation (SPO_2 <95%)	12	06	50.0	0.0001
Esophageal intubation	06	05	83.3	0.531
Vomiting	06	06	100	0.403
Dental avulsion	02	02	100	0.641
Circulatory arrest	01	00	00	

Table 2: *Complication of intubation of severe traumatic brain injury.*

Discussion

This study allowed us to determine complications related to tracheal intubation in severe traumatic brain injury. The main complications of tracheal intubation in this study were coughing, bleeding, and low blood pressure. Sedation was significantly related to coughing, bronchospasm and desaturation. Hypotension after intubation was associated with mortality in less than 24 hours.

In our study, 77.8% of intubation was performed by a nurse anesthetist. This can be explained by the small number of the resuscitating anesthetist doctor. During the study period, the CHU Tambohobe had only one resuscitating anesthetist doctor. The lack of Resuscitative Anesthetist Physician is a common problem in Black Africa [4,5]. As a result, in Black Africa, anesthesia is mainly performed by specialized nurses or senior technicians, very often without supervision by a doctor [6]. Studies have reported that it is not initial training but rather training in the technique of intubation that is the determining factor in the success of the technique [7-9]. In our study, pre-oxygenation was performed primarily by a face mask. Pre-oxygenation in positive pressure by non-invasive ventilation (NIV) decreases the rate of desaturation during laryngoscopy [10].

In our study, mild sedation with a low dose hypnotic was the most used anesthetic technique (90.4%). The most used hypnotic agent was thiopental. In Mali, in 2014, one study reported that emergency intubation was performed under sedation with diazepam in 97.5% [2]. Jaber S., *et al*. in 2010 [11], recommends the combination of a fast acting hypnotic such as Etomidate or Ketalar and a fast sequence induction curare for the intubation procedure in intensive care. In the USA, in 1999, a study showed the interest of a rapid sequence induction on the reduction of immediate complications during intubation in emergencies [12].

The complication rate found in our patients was 88.9%, which is very high compared to the literature. In France, in 2006 and in Mali, in 2014, the complication rates were respectively 28% and 37.5% [1,2]. The immediate complications of intubation of severe traumatic brain injury in our study could be explained by the intubation procedure. In other words, no rapid sequence induction was performed in the severely traumatized skull intubated in our series. In our study, we found statistically significant associations between mild sedation and onset of bronchospasm, coughing and reduced oxygen saturation (SPO_2 < 95%). In fact, fast-sequence induction facilitates intubation and significantly reduces the frequency of esophageal intubation, inhalation, trauma and intubation [12].

In our patients, the very high reaction cough could be explained by the technique of intubation without curare. Intubation with curare suppresses coughing reactions and decreases the incidence of laryngeal lesions [13].

The incidence of esophageal intubation (9.5%) was high in our study compared to that of the literature. One study reported the incidence of esophageal intubation of 5% [11].

In our study, all patients intubated vigilantly had bronchospasm. Walz JM., *et al*. [7], in 2007, pointed out that vigilant intubation causes bronchospasm and increases intracranial pressure. This allows us to recommend the abandonment of vigilant intubation and the practice of rapid sequence induction in severe brain injury to intubate.

The difficult intubation in our study was 23.8%. Jaber S., *et al*. [11], in 2006, reported a difficult intubation incidence in ICU of 12%. The high incidence of difficult intubation in our study could be explained by the emergency intubation procedure without rapid sequencing. Li J., *et al.* [12], in 1999, demonstrated a significant decrease in the incidence of emergency intubation in the group of patients who experienced rapid sequence induction compared to the group of patients without rapid sequence.

In our study, a case of irreversible circulatory arrest (1.6%) was observed immediately after tracheal intubation. Li J., *et al.* [12], in 1999 observed two cases of death (3%) after intubation in the group without fast sequence.

The arterial hypotension found in our population after intubation was significantly related to patient mortality. The occurrence of arterial hypotension could be explained by the sympathetic depressant effect of thiopental. The existence of arterial hypotension is directly responsible for an increase in the mortality of severe traumatic brain injury patients [14].

Conclusion

This study allowed us to determine the complications of tracheal intubation of severe traumatic brain injury patients. Mild sedation with a low dose of hypnotic curare-free and vigilant intubation were responsible for the occurrence of complications such as coughing, bronchospasm and reduced oxygen saturation. The adoption of rapid sequence induction decreases the immediate complications of intubation of severe head trauma.

Bibliography

1. Jaber S., *et al*. "Clinical practice and risk factors for immediate complications of endotracheal intubation in the intensive care unit: a prospective, multiple-center study". *Critical Care Medicine* 34.9 (2006): 2355-2361.

2. Samake BMl., *et al*. "Tracheal intubation in the Emergency Unit: accidents and incidents in the teaching hospital of Gabriel Toure of Bamako". *Mali Médical* 19.2 (2014): 1-3.

3. Boulard G and Cantagrel S. "Prise en charge des traumatisés crâniens graves à la phase précoce. Agence Nationale d'Accréditation et d'Évaluation en Santé (ANAES)". *La Presse Médicale* 28 (1999): 793-798.

4. Rasamoelina N., *et al*. "Enquête préliminaire sur la pratique des anesthésies chez l'adulte au Centre Hospitalier Universitaire de Toamasina". *Revue d'Anesthésie-Réanimation et de Médecine d'Urgence* 2.1 (2010): 21-24.

5. Binam F., *et al*. "Pratiques anesthésiques à Yaoundé (Cameroun)". *Annales Françaises d'Anesthésie et de Réanimation* 18.6 (2001): 647-656.

6. Adnet P., *et al*. "Pratique de l'anesthésie par les infirmier(e)s en Afrique francophone subsaharienne". Annales Françaises d'Anesthésie et de Réanimation 18.6 (1999): 636-641.

7. Walz JM., *et al*. "Airway management in critical illness". *Chest* 131.2 (2007): 608-620.

8. Adnet F., *et al*. "Survey of out-of-hospital emergency intubations in the French prehospital medical system: a multicenter study". *Annals of Emergency Medicine* 32.4 (1998): 454-460.

9. Adnet F., *et al*. "A survey of sedation protocols used for emergency endotracheal intubation in poisoned patients in the French prehospital medical system". *European Journal of Emergency Medicine* 5.4 (1998): 415-419.

10. Baillard C., *et al*. "Noninvasive ventilation improves preoxygenation before intubation of hypoxic patients". *American Journal of Respiratory and Critical Care Medicine* 174.2 (2006): 171-177.

11. Jaber S., *et al*. "An intervention to decrease complications related to endotracheal intubation in the intensive care unit: a prospective, multiple-center study". *Intensive Care Medicine* 36.2 (2010): 248-255.

12. Li J., *et al*. "Complications of emergency intubation with and without paralysis". *American Journal of Emergency Medicine* 17.2 (1999): 141-143.

13. Mencke T., *et al*. "Laryngeal morbidity and quality of tracheal intubation: a randomized controlled trial". *Anesthesiology* 98.5 (2003): 1049-1056.

14. Chesnut RM., *et al*. "Early and late systemic hypotension as a frequent and fundamental source of cerebral ischemia following severe brain injury in the traumatic coma data bank". *Acta Neurochirurgica* 59 (1993): 121-125.

Volume 4 Issue 5 May 2018