



Research Article

JMR 2017; 3(5): 229-233

September- October

ISSN: 2395-7565

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www.medicinarticle.com

Received: 07-09-2017

Accepted: 23-10-2017

Sore throat after extubation: Perioperative risk factors in recovery room among malagasy patients

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Abstract

Background: Extubation after general anesthesia often causes postoperative sore throat (POST). Some factors are related to POST such demographic, anesthetic and surgical factors. **Aim:** To assess main risk factors of throat pain after extubation among Malagasy patients. **Materials and methods:** We conducted an observational, prospective, cross-sectional study at the CHU JRA - Antananarivo / Madagascar, from December 1st, 2013 to July 31st, 2014 (eight months), on adult patients who underwent general anesthesia with tracheal intubation, admitted to postoperative recovery room after surgery. The results were expressed by frequency and median [interquartiles]. The Spearman correlation test and the determination of relative risk (RR with 95% confidence interval (CI)) were used with realization of receiver operating characteristic (ROC) curves (SPSS®13.0). **Results:** We recruited 158 Malagasy patients, 43.5 [28-58] years, mostly women (sex ratio: 0.86). We found 47.5% of throat pain after extubation with low (31.6%), moderate (10.8%), severe (0.8%) intensity. Sore throat was increasingly related to Mallampati class II, delay of intubation exceeding one minute and presence of blood on tracheal tube or during extubation. To combine risk factors was more sensitive and more specific with the occurrence of pain after extubation (AUROC = 0.89). **Conclusion:** POST has a mild-high frequency among Malagasy patients with more risk factors. Those risk factors are related to patient characteristics, and intubation / extubation conditions. To consider all of them is important in purpose to assess POST.

Keywords: Airway extubation, Intratracheal intubation, Madagascar, Pain, Risk factors.

INTRODUCTION

The occurrence of pain after perioperative airways management has a middle (12-45% ^[1]) to a high frequency (up to 60 % ^[1, 3-5]). Pain after extubation, as a result of tracheal intubation, is part of the patient's frequent complaints ^[2]. It has been intensively studied in recent decades. It exposes to several adverse effects which can lead to postoperative complications.

Tracheal extubation logically follows tracheal intubation. Tracheal intubation is necessary, in intensive care (in front of unconsciousness or during major respiratory distress), but it is also performed during general anesthesia ^[6]. The conditions of tracheal intubation during anesthesia may differ according to the morphological and demographic characteristics of the patient, the drugs used during anesthetic induction, the conditions of intubation after induction and the duration of the anesthesia / surgery. In addition, extubation conditions may differ with the operator, the patient, and may lead to postoperative sore throat (POST). This pain remains a common complaint of patients after general anesthesia and deserves to be studied because it can be harmful for the patient ^[4].

In this observational study, the main aim was to assess the perioperative factors leading to postoperative sore throat (POST) after tracheal extubation in the context of general anesthesia, in postoperative recovery room.

MATERIALS AND METHODS

An observational, prospective, cross-sectional study was carried out at the CHU JRA - Antananarivo / Madagascar, over an eight-month period, from December 1st, 2013 to July 31st, 2014. Patients were all Malagasy. Sampling was exhaustive. The study involved adult patients who underwent general anesthesia with tracheal intubation and who were admitted to postoperative recovery room after surgery. The inclusion criteria were those patients who did not have difficult intubation criteria. Patients not included in the study were: patients with hearing impairment and / or mute or with mental disability, ASA (American

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Society of Anesthesiologists) III to V, patients considered to be potentially difficult to intubate (Mallampati 3 and 4 and Cormack and Lehane 3 and 4). Besides, were not considered in the study: intubations in the context of head and throat surgery, induction by halogen, thiopental or ketamine or after crash induction, an intubation with a double-lumen endotracheal tube and the patients extubated in theater. Patient informed consent was required for the study, before admission in theater. Patients who did not wish to be observed in the postoperative recovery room, after extubation, were excluded.

We analyzed the demographic and morphological data of the patient, the conditions of the intubation under general anesthesia, the conditions of extubation in the postoperative recovery room. General anesthesia was standardized for all patients with fentanyl (5 µg / kg), propofol (2.5 mg / kg). Neuromuscular blockade with pancuronium (0.08-0.1mg / kg) was indicated if necessary, according to the surgery.

Patient anonymity was respected when analyzing the data.

Statistic Analysis

The primary endpoint was throat pain after extubation. This pain was evaluated by the simple verbal scale in postoperative recovery room. Secondary endpoints were patient characteristics, induction and extubation criteria. The distribution was not Gaussian, the results were expressed by frequency for qualitative variables and median [interquartiles] for quantitative variables. The statistical tests used (SPSS®13.0) were the Spearman correlation test (with R as correlation coefficient) and the relative risk (RR with 95% confidence interval (CI)). A realization of receiver operating characteristic (ROC) curves was also carried out to determine the sensitivity and specificity of the different groups of risk factors. A value of p less than 0.05 was significant.

RESULTS

During the study period, 158 Malagasy patients were selected according to the inclusion criteria. Female gender was predominant (sex ratio: 0.86). The median age was 43.5 [28-58] years. Patients had

normal height with median body mass index (BMI) 22.3 [20.2-24.6] kg.m⁻². The frequency of throat pain after extubation was evaluated at 47.5%. It was low (31.6%), moderate (10.8%), severe (0.8%), according to the patients.

Patients characteristics (gender, ASA classification, BMI) were not correlated with occurrence of throat pain after extubation (p>0.05). Among these patients, 118 (74.7%) presented Mallampati classification I, and 116 (73.4%) Cormack and Lehane classification 1. Above classification 1 (Mallampati 2 and Cormack II), POST significantly appeared (p<0.05) (Table 1).

Some intubation conditions were significantly related to POST and determined risk factors of POST (Tables 1 and 2). Intubation conditions were characterized by short delay (2 minutes^[1-3]), and few aspirations before laryngoscopy, that was correlated with occurrence of POST (R=0.592, p<0.001 and R=0.331, p<0.001). The induction before laryngoscopy was performed with fentanyl (250[200-300] µg), and propofol (200[200-200] mg). No correlation were found between drug administration and POST. Moreover, neuromuscular blockade hadn't correlation with occurrence of throat pain after extubation. A median of 1^[1-2] laryngoscopy was realized for the intubation. It affected the onset of POST (R=0.528, p<0.001). The MAC (MAC 3 / MAC 4) of laryngoscope wasn't related to throat pain. Dental injury appeared in three patients and tracheal intubation was traumatic for six patients. This traumatic intubation was correlated with POST (R=0.209, p=0.00849), contrary to dental injury (p>0.05). Before ETT, esophageal intubation was done in five patients, correlated with POST (R=0.190, p=0.0168), but wasn't a specific risk factor of POST (RR=2.19 [CI 1.84-2.60], p=0.053).

Length of intubation were over two hours for 124 (78.5%) patients. Delay of extubation was 1^[1-2] minutes and 5^[3-6] aspirations were performed before extubation, with presence of blood in the endotracheal tube or during aspiration in 51 (32.3%) patients. These factors were related to POST and were specific risk factors of POST (Tables 1 and 2).

Table 1: Sore throat after extubation factors

		N	%	R*	p†		
FACTORS RELATED TO:	patient	Previous intubation	34	21.5	0.181	0.0231	
		Mallampati 2	40	25.3	0.321	0.0001	
		Cormack II	42	26.6	0.260	0.002	
		Cricoid pressure	56	35.4	0.409	<0.0001	
		Laryngoscopies					
		1 laryngoscopy	110	69.6	0.528	<0.0001	
		>1 laryngoscopy	48	30.4			
	intubation conditions	Endotracheal tube (ETT) size	6.5 ETT size	06	03.8	0.289	<0.0001
			7.0 ETT size	69	43.7		
			7.5 ETT size	83	52.5		
			Other device during intubation			0.481	<0.0001
			ETT guide	22	13.9		
			Eschman	12	07.6		
			Magill	02	01.3		
Time of intubation		One minute	55	34.8	0.592	<0.0001	
		> 1minute	103	65.2			
More than one aspiration			33	20.9	0.331	<0.0001	
	Time of extubation						
extubation	Lenght of intubation	One minute	111	70.2	0.183	0.0214	
		> 1minute	47	29.7			
	Lenght of intubation	<2hours	34	21.5	0.176	0.0267	
		>2hours	124	78.5			
	Presence of blood in tracheal tube	51	32.3	0.671	<0.0001		
	Aspiration during extubation	< 5 aspirations	75	47.4	0.356	<0.0001	
		≥ 5 aspirations	73	46.2			

*correlation coefficient. †p value with postoperative sore throat (POST)

Table 2: Risk factors (RF) of postoperative sore throat (POST)

			POST	No POST	RR	CI 95%	p
Patient RF	Previous tracheal intubation	Yes	22	12	1.51	1.1-5.4	0.038
		No	53	71			
	Mallampati	2	30	10	1.97	1.5-2.6	<0.001
		1	45	73			
	Cormack et Lehane	II	29	13	1.74	1.6-7.2	0.002
		I	46	70			
Time of intubation	>1minute	68	35	5.19	2.56-10.5	<0.001	
	1minute	07	48				
Intubation RF	Aspiration before intubation	≥1 aspiration	28	07	2.09	1.58-2.77	<0.001
		No aspiration	47	76			
	Laryngoscopies	≥ 2	42	06	2.92	2.15-3.96	<0.001
		1	33	77			
Other device during intubation	Yes	33	03	2.32	2.04-3.37	<0.001	
	No	42	80				
Traumatic tracheal intubation	Yes	06	0	2.20	1.85-2.62	0.027	
	No	69	83				
Time of extubation	>1 minute	29	18	1.49	1.08-2.04	0.031	
	< 1 minute	46	65				
Extubation RF	Lenght of intubation	> 2 hours	65	59	1.78	1.03-3.08	0.029
		< 2 hours	10	24			
	Aspirations before extubation	≥ 5	53	31	2.12	1.44-3.12	<0.001
		< 5	22	52			
Blood on ETT during aspiration	Yes	49	2	3.95	2.82-5.55	<0.001	
	No	26	81				

Several risk factors have been found (Figure 1), correlated with the occurrence of sore throat were related to patient characteristics, intubation and extubation conditions (Table 1). The more risk factors were present, the greater was the pain during extubation (Figure 2). The most important risk factors in the occurrence of POST were those related to the patient (especially Mallampati class II increasing the risk of occurrence of POST by 1.97), the conditions of intubation (5.19 times more POST if the delay of intubation exceeds one minute), and the extubation conditions (especially presence of blood on tracheal tube or during aspiration which caused 3.95 times more POST) (Table 2). The sensitivity / specificity of the risk factors was greater when all risk factors were combined (patient risk factors + intubation risk factors+ extubation risk factors) in the occurrence of pain after extubation (AUROC = 0.89; 95% CI [0.85-0.94]), (p <0.001) (Figure 3).

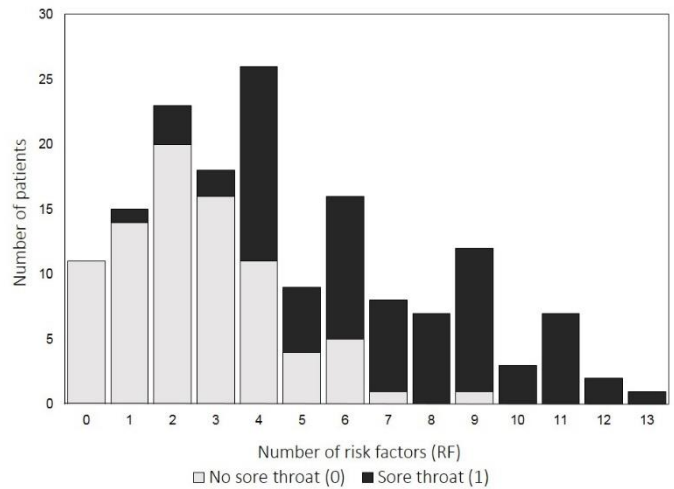


Figure 2: Risk factors and postoperative sore throat

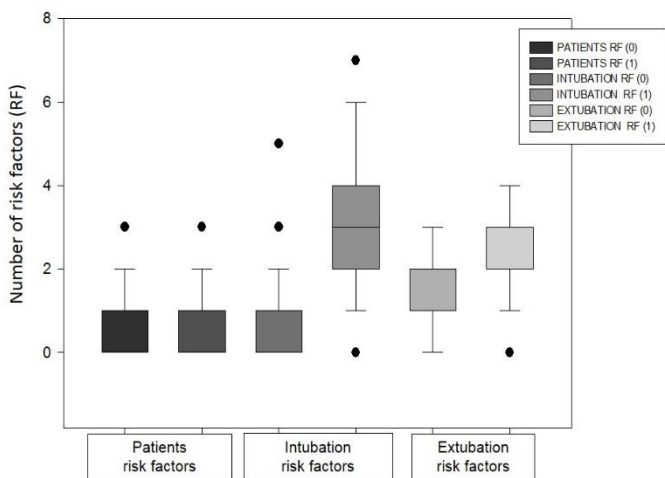


Figure 1: Patient, intubation and extubation risk factors

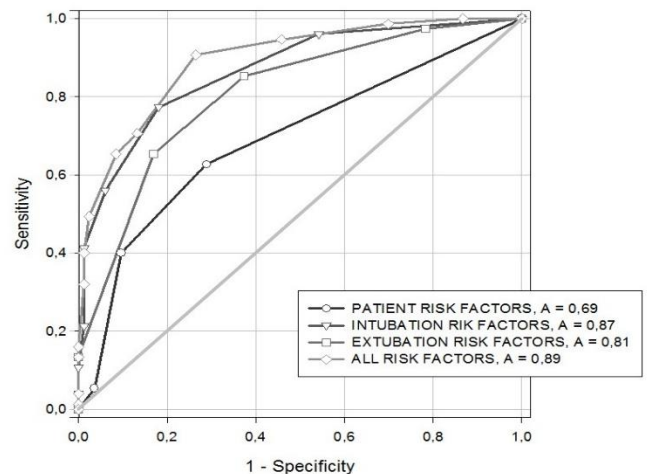


Figure 3: Sensitivity and specificity of POST risk factors

Apart of determination of risk factors of POST, pain during extubation manifested itself in clinical signs (teary eyes and sweating). They were significantly correlated with pain intensity ($R = 0.499$, $p < 0.01$). Consequences of this throat pain could be harmful to the patient. These consequences were hemodynamic (elevation of heart rate, $R = 0.420$, $p < 0.001$ and elevation of blood pressure, $R = 0.161$, $p = 0.0432$). This pain altered swallowing ($R = -0.315$, $p < 0.001$) and cough ($R = -0.455$, $p < 0.001$); also caused dysphonia ($R = 0.488$, $p < 0.01$) and desaturation ($R = 0.185$, $p = 0.02$).

DISCUSSION

The frequency of throat pain after extubation, in the postoperative recovery room, was 47.5%. It was variable according to the patients. It was intense for 10.8% of them. This pain manifested itself through sweating and tearing during extubation and led to a significantly correlated increase in heart rate and blood pressure. In addition, it altered the cough and swallowing postoperatively. The occurrence of extubation pain had risk factors as related to patient, intubation, extubation and anesthesia. All these added risk factors had a higher sensitivity / specificity in the occurrence of extubation pain (AUROC = 0.89).

Throat pain after extubation is a reality. The frequency found in our study is similar to the literature, which varies around 40 to 50% [1, 4]. This can be higher around 60% [7, 8]. It is necessary to assess POST because it can be intense in 1% to 7%, up to 24 hours after extubation, with an average duration of 16 hours [2, 4, 9]. The use of the endotracheal tube is an important factor in the occurrence of this pain compared with other upper airway management devices such as the laryngeal mask [1, 10].

The risk factors of POST vary with the studies, there are demographic [1, 2, 4, 11-13], anesthetic and surgical factors [2, 4, 5, 14]. But those last factors are inconstant or even absent [7].

Our study did not find demographic POST risk factors, though the female gender is a factor of POST [1, 2, 4, 11, 12]. Age also affects the occurrence of POST, either in young patients, or between 30 and 39 years, or even over 60 years [4, 9, 13]. The characteristics of surgery and anesthesia can cause POST. In cephalic surgeries, POST occurs more frequently [4]. In our study the type of surgery was not a factor related to POST. The duration of anesthesia and surgery can also promote the occurrence of POST. In our study, it was more frequent when the anesthesia exceeded two hours. Indeed, as soon as the duration of the anesthesia exceeds one hour [14, 15], for more than four hours [2, 4, 16] POST appears unavoidable. General anesthesia is also a risk factor for the occurrence of POST but not necessarily correlated with the duration of the intubation but more with the length of the anesthesia [9].

Intubation procedure, like the number of intubation attempts, affects the occurrence of POST [2, 5] but it is not constant [9, 15]. When intubation is difficult, it involves more POST [1, 16]. In the other side, the experience of physicians performing the tracheal intubation has no influence in the occurrence of POST [9, 14, 17]. The size of the endotracheal tube did not necessarily have a significant influence on the occurrence of this pain. The studies by Gustavsson *et al.* and Lee JY *et al.* do not find this parameter [3, 7]. However other studies consider that a higher size induces a POST [9, 13, 15]. We have also seen a significant impact on POST, of the Mallampati classification, the Cormack and Lehane grade, the duration of anesthesia, but they are not constant in other studies [7, 13].

The use of drugs (such as succinylcholine) during intubation may also result in POST [1, 12] because Sellick cricoid pressure, used in crash induction, may be more provider of POST.

Complementary devices, such as nasogastric tubes, have a significant influence on POST [5, 14], but this is inconstant [7, 9, 13, 15]. The presence of blood on tracheal tube or during extubation is an associated factor with POST [8, 9]. This was also found in our study.

All of these factors are not constant and may vary by population. Lee JY *et al.* [7] did not find any of these factors above. They found that a cuff pressure greater than 17 cmH₂O caused throat pain after extubation [7]. Endotracheal tube cuff pressure, especially if uncontrolled, and/or during a long anesthesia, leads to POST, that can persist until the 24th hour [11, 18].

The complications of extubation can be a stressor and affect patient satisfaction, plus harm the patient; to not miss them is necessary [2, 19]. In our study, these consequences were hemodynamic (elevated heart rate / blood pressure). This pain altered swallowing and coughing; and also resulted in dysphonia and desaturation.

Coughing and desaturation are more frequent after intubations [8]. Cough can be a result of tracheal intubation (12.8%) and is often included in pain after extubation [8, 20]. Dysphonia (about 20-30%) is more common after tracheal intubation compared to supraglottic devices, especially if the surgery exceeds 210 minutes, occurring around the 12th hour [20, 21]. Pain after extubation also resulted in dysphagia (over 11%) at the 24th hour [2]. Thus, looking for POST also helps to detect the various complications that may be associated.

Although our results, in Malagasy population, are similar with some literature data, the main limit is the monocentric character of the study. Other factors could also have been analyzed. However, we have identified other risk factors of POST. By our results, we could say that in order to assess the occurrence of POST, it is essential to consider all the factors: those related to the patient, the intubation and extubation conditions and the characteristics of the anesthesia. Plus, pain after extubation, in postoperative room, should be assessed for improving perioperative airways management.

Conflict of interest

All authors declare no conflict of interest.

AUTHORS' CONTRIBUTIONS

Concept and design of the study: RAKOTONDRAINIBE

Acquisition of data: LAHADY

Analysis and interpretation of results: RAKOTONDRAINIBE - RANDRIAMIZAO

Revising: RAJAONERA

Final approval: RAKOTOARISON - RAVELOSON

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