

UPPER AIRWAY MANAGEMENT IN PATIENTS WITH CRANIO-MAXILLOFACIAL TRAUMA. RETROSPECTIVE STUDY FOR 2006-2009

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Abstract: Maxillofacial trauma presents a high incidence. The upper airway management is difficult in the case of patients having suffered maxillofacial trauma. The study is retrospective and analyses the management of the upper respiratory tract in 247 patients with maxillofacial traumas. We analysed complications occurring during the process of securing the functioning of the upper airway and the solutions applied to the complications.

Cuvinte cheie:

traumatisme maxilofaciale, mască laringiană, complicații

Rezumat: Traumatismele maxilofaciale au o incidență crescută. Controlul căii aeriene este dificil în cazul pacienților cu traumatisme maxilofaciale. Studiul a fost retrospectiv și a analizat managementul căii aeriene la 247 pacienți cu traumatisme maxilofaciale. Au fost analizate complicațiile legate de asigurarea căii aeriene și modul de rezolvare a acestora.

INTRODUCTION

The number of maxillofacial trauma is ever increasing, closely related to an increase in the number of road accidents, work or domestic accidents and violent acts. Many of the registered maxillofacial traumas comprise brain damage, to a smaller or higher degree.

Upper airway management in patients with maxillofacial trauma is difficult and dependent of the nature of the lesion, the existing or non-existing haemorrhage, the oedema, any modifications in the anatomy of the upper airway in question, the potential cranial lesions and the possibility that the patient has a full stomach. General anesthesia might present the risk of losing the airway (1, 2).

THE AIM OF THE STUDY

This retrospective study analyzes specificities of maxillofacial trauma operated under general anesthesia, the solution chosen in order to manage the upper airway in patients with maxillofacial trauma, as well as the main problems occurring from this process.

MATERIAL AND METHOD

The retrospective study was conducted on a group of 247 patients hospitalized at the Clinical Hospital for Cranio-Maxillofacial Surgery of Cluj-Napoca, during the period 2006-2009. Admission criteria included: adult patients, operated for trauma suffered in the maxillofacial region, under general anesthesia. Patients operated with local anesthesia, as well as patients lacking part of data taken into account from the patient anesthesia form were excluded from the study.

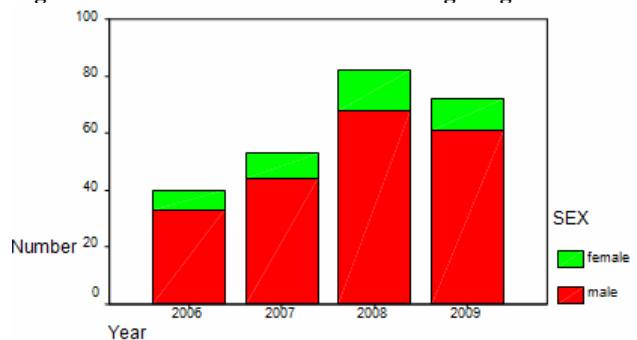
We analysed the demographic details of patients admitted to the study, their matching with the ASA risk-scale, the option adopted by the medical team to manage the upper airway, problems regarding the managing of the upper airway.

RESULTS

A high percentage of the 247 patients with

interventions for maxillofacial trauma between 2006 and 2009 were male patients (206 male patients and 41 female patients included in the study). Patient distribution according to age and sex is shown in figure no. 1.

Figure no. 1. Patient distribution according to age and sex



Most patients included in our study were young and each year the highest percentage of patients belongs to the age category under 40 years. Overall, 68.4% of the total number of patients were younger than 40 years, 25.5% were between 40 and 65 years and only 6.1% of them were over 65 years. Also, most patients operated for maxillofacial trauma matched with category I and II of the ASA risk-scale.

Of the total number of patients included in this study, 26 presented Le Fort II or Le Fort III fractures (meaning 10.5%).

In interventions for maxillofacial trauma, the management of the upper airway is very important in induced general anesthesia. Moreover, in maxillofacial surgery in general and in the surgery of maxillofacial trauma in particular, the option chosen for securing the functioning of the upper airway must not interfere with the surgical equipment and must hinder as little as possible the surgical team during the intervention.

The control technique most opted for was the nasotracheal intubation, followed by orotracheal intubation, for

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patients included in this study. The laryngeal mask was used in order to secure the functioning of the upper airway in 5 cases, in 2 cases the medical team performed tracheostomy and 4 patients required complex techniques in order to manage the upper airway (change of upper airway control technique during ongoing surgical intervention: orotracheal with nasotracheal or vice versa, or tracheostomy after orotracheal or nasotracheal control, initially (Chart 2).

Figure no. 2. Ways to secure the upper airway

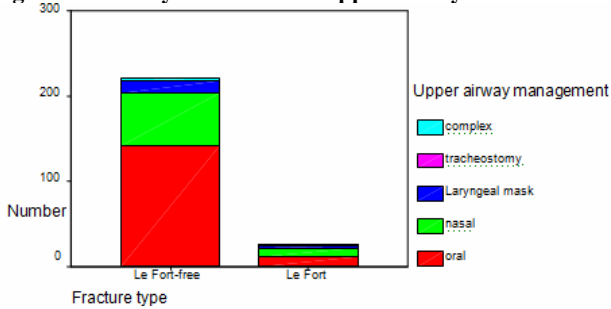
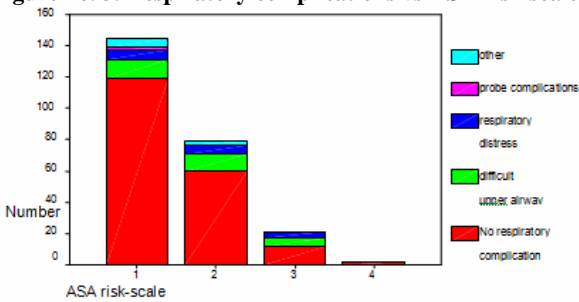


Figure no. 3. Respiratory complications vs ASA risk scale



Regardless of the type of fracture (with or without Le Fort fracture), the preferred way to manage the upper airway was the nasotracheal intubation. All Le Fort fractures were tracheostomy-free.

Despite the high number of patients included in the low-risk ASA category for anesthesia, the complexity of lesions triggers a high percentage of respiratory complications in these patients (Chart 3). One of the most frequent types of complications is difficult airway course (11.3% of the total number of patients) and a high percentage occurs in young patients and in patients under low-risk ASA category for anesthesia (Chart 1). Respiratory distress occurred in 6.1% of the total number of cases included in the study.

In this study, the laryngeal mask was used in order to secure both the airway during the surgical intervention, and the management of complications: difficult airway course or respiratory distress.

DISCUSSIONS

The study presented herein included many young patients. This result is similar to the data reported by the literature, which indicates a high percentage of trauma in young individuals. Due to the young age, anesthetic-related risks outside the traumatic lesions were low. Nonetheless, in these patients any control manoeuvre of the upper airway may be dangerous and difficult. Many times, intubation on a patient in an awake state by means of a fibroscope is either impossible to perform - due to the blood in the upper airway - or not recommended (3).

The obstruction of the upper airway is a complication which can be lethal in facial fractures, 27% of the patients suffering from Le Fort fractures requiring a tracheostomy or intubation for the treatment of respiratory depression or obstruction (4, 5, 6). In our study, only 0.8% of the patients were tracheostomized none of whom were suffering from Le Fort fractures. Unlike the data reported in the literature, which revealed a high number of tracheostomies, our study tried to find a less-invasive airway control method. Another aspect of the study was the low rate of patients with neurological or other types of lesions who required prolonged postoperative mechanical ventilation.

Table no. 1. Respiratory complications vs age

			Age category			Total
			Under 40	40 - 65	Over 65	
respiratory complications	No complication	No.	136	48	9	
		% in subcategory	70.5%	24.9%		100.0%
		% out of total	55.1%	19.4%	3.6%	78.1%
	Difficult upper airway	No.	14	11	3	28
		% in subcategory	50.0%	39.3%	10.7%	100.0%
		% out of total	5.7%	4.5%	1.2%	11.3%
Respirator distress	No.	10	2		15	
	% in subcategory	66.7%	13.3%	20.0%	100.0%	
	% out of total	4.0%	.8%	1.2%	6.1%	
Probe complications	No.	2			2	
	% in subcategory	100.0%			100.0%	
	% out of total	.8%				
Other	No.		2		9	
	% in subcategory		22.2%		100.0%	
	% out of total	2.8%	.8%		3.6%	
Total	No.	169	63	15	247	
	% in subcategory	68.4%	25.5%	6.1%	100.0%	
	% out of total	68.4%	25.5%	6.1%	100.0%	

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Table no. 2. Laryngeal mask insertion vs anesthesia induced

			LARYNGEAL MASK				Total
			induction	Wake-up	maintain		
Type of fracture	Le Fort free	No.	193	23	1	4	221
		% / type interventions	87.3%	10.4%	.5%	1.8%	100.0%
		%out of Total	78.1%	9.3%	.4%	1.6%	89.5%
	Le Fort	No.	22	1	2	1	26
		% / type interventions	84.6%	3.8%	7.7%	3.8%	100.0%
		%out of Total	8.9%	.4%	.8%	.4%	10.5%
Total		No.	215	24	3	5	247
		% / type interventions	87.0%	9.7%	1.2%	2.0%	100.0%
		%out of Total	87.0%	9.7%	1.2%	2.0%	100.0%

In patients with complex lesions, intermaxillary immobilisation and fixation may be required during surgery, which is why when nasal intubation cannot be performed, one should resort to tracheostomy or laryngeal intubation. Tracheostomy and laryngeal intubation increase the risk of infection and tube misplacement and lead to increased costs of intensive care. It is preferable to use a less aggressive strategy of upper airway control, especially now that nasotracheal intubation is no longer strictly contraindicated in patients with Le Fort fracture.

Nasotracheal intubation was contraindicated in the past in patients with Le Fort III fractures due to the risk of fracture of the cribriform plate of the ethmoid bone through cranial intubation and of meningitis. Recent results suggest that nasotracheal intubation may also be performed in patients with Le Fort III fractures without complications if it is done by physicians experienced in upper airway management methods after thorough investigation of the imaging data. Cases of successful nasotracheal intubation by means of a fiberoptic have also been reported.

Ideally, airway control should ensure protection against gastric aspiration, stability of the airway, minimal interference with the surgical site and a low incidence of perioperative complications (4, 7).

The difficulty of ventilation with facial mask occurs in 5% of the operated patients (8) and it is linked to a high body mass index, macroglossia, edentation, a history of snoring, a high Mallampanti score and a small thyromental distance. It is very important to anticipate difficult ventilation on the mask in the induction process (9).

In maxillofacial trauma, the difficult airway course may not be manifest in the awake patient. During anesthesia this situation may change and the airway may be lost. In our study, we used the laryngeal mask for inducing anesthesia in patients with difficult airway course (75% of the patients with difficult airway had a laryngeal mask on during the induction of anesthesia). Thus, ventilation during induction could be made without complications. Overall, upon induction of anesthesia, a laryngeal mask was applied to 8.5% of the patients with difficult airway course and 1.2% of the patients with respiratory depression. This high percentage of laryngeal mask usage is considered to be an argument for implementing a routine usage of laryngeal masks upon anesthesia induction in patients with

maxillofacial trauma, if the use thereof is not contraindicated. The risk of aspiration with laryngeal mask is of 2/10,000 (10).

Asai and collaborators used the laryngeal mask in patients with immobilized spine (11). The dilemma regarding the best method of controlling and maintaining the airway can be solved by taking into account the particularities of each case, the experience of the anesthesiologist and of the surgical team as well as the technical equipment. One should consider the risks of cervical and neurological lesions. There need to be alternative solutions to classical intubation as well as the possibility to urgently establish a surgical airway (1, 7, 12).

The laryngeal mask may be considered as an alternative to tracheal intubation in traumatised patients.

It is considered that paramedics, even in ideal conditions, are not able to perform proper tracheal intubation in 30% of non-difficult cases but should be able to successfully apply the laryngeal mask (13). In the Romanian literature there are no studies about the use of laryngeal masks for the control of the airway in emergency situations. It is believed that even situations of "unable to ventilate - unable to intubate" may be controlled by using the laryngeal mask (14).

Preis and collaborators, as well as Kannan and collaborators used the laryngeal mask to facilitate intubation by means of a bronchoscope in patients with hemorrhage (1, 15).

In our study we used the laryngeal mask for the control of the airway in 2% of the cases (5 patients, one of which failed to undergo tracheal intubation but was successfully operated on with a laryngeal mask).

The main contraindication of laryngeal masks in maxillofacial surgical interventions is the risk of dislocation (16, 17).

Upon awaking, these patients may experience respiratory issues. In the study presented herein, 6.1% of the patients experienced respiratory depressions. If the trauma is severe, the patient may spend several days with his upper airway secured.

The anesthetic techniques of our choice were general anesthesia with propofol or sevoflurane.

These are the usual techniques for maxillofacial surgical interventions since they help patients awake quickly - a very important issue in such interventions. They also protect the patient from experiencing secondary neurological lesions (18). In this study, there have been no complications leading to

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immediate or tardive undesired effects due to the impossibility of upper airway management.

CONCLUSIONS

- The majority of patients with maxillofacial traumatic lesions are young.
- Trauma frequently leads to difficult airway course issues.
- Cases of difficult airway course occur frequently in young patients with low ASA anesthetic risk. The complexity of the traumatic lesion may increase the anesthesia related risk through airway management related issues.
- It is important to carefully assess traumatic lesions, while maintaining the airway and controlling the hemorrhage should be a priority.
- The laryngeal mask is a useful means of controlling the airway in induction, when its use is not contraindicated.
- Problems could also occur upon awaking; sometimes the patient may remain intubated.
- The management of the upper airway in maxillofacial trauma is difficult. In order to decide upon the best solution for the control of the airway, it is very important to consider the experience of the physician, to thoroughly analyze each case and to assess the advantages and risks. Without proper control of the airway, any therapeutic manoeuver can prove to be useless.

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