

## Klinik Çalışma

# ADVERSE OUTCOMES DURING AIRWAY MANAGEMENT EVALUATED BY COUNCIL OF FORENSIC MEDICINE

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### ABSTRACT

**Objective:** Unsuccessful airway management at anesthesia practice can result with death or permanent brain damage. In this study we investigate the cases which are in dispute by the accusation of problematic airway control during anesthesia and that sent to Council of Forensic Medicine for expertise by court.

**Method:** We retrospectively analyzed 37 case files between the years of 2006-2012 which were in dispute by the accusation of problematic airway control during anesthesia and that were evaluated by Council of Forensic Medicine.

**Result:** 27 (72.98%) of the cases were female, 10 (27.02%) of the cases were male. The distribution of cases were as follows: 16 of cases (43.23%) were from Obstetrics and Gynecology, 7 of cases (18.91%) were from ENT, 6 of cases (16.21%) were from general surgery. The airway management in 27 cases (72.97%) were planned intervention, and 10 of the cases (27.03%) were urgent. While the preoperative preparations in 20 cases were adequately completed, the preparations in 17 cases were inadequately completed. The number of cases that the anesthesia was performed by anesthesiologist or by anesthesia technicians with anesthesiologist supervision seems to higher than the cases that the anesthesia was performed

by anesthesia technicians with surgeon supervision. It was found that most frequent adverse outcome was the difficult intubation with difficult ventilation (37.83%). Tracheal injuries ( 18.91 %) and esophageal injuries ( 10.81 %) followed this respectively. Patients who underwent tracheostomy because of difficult intubation was 16.21% of all cases.

**Conclusion:** It is necessary to be prepared for difficult airway possibility even if difficult intubation criteria aren't detected. We suggest that training program on the recognition and management of difficult intubation and must be generalized. We predict that, with this generalized training program, the adverse outcomes and lawsuits might decrease.

**Key words:** Airway Management; Malpractice; Forensic Medicine, General Anesthesia

### ADLİ TIP KURUMU'NDA DEĞERLENDİRİLEN HAVAYOLU YÖNETİMİ SIRASINDA ORTAYA ÇIKAN İSTENMEYEN DURUMLAR

#### Özet

**Amaç:** Ülkemizde, genel anestezi uygulamaları esnasında oluşan hava yolu yönetimi ile ilgili sorunları adli yönden inceleyen bir çalışma bulunmamaktadır. Bu çalışmada hava yolu yönrtimi sırasında istenmeyen durumların yaşandığı iddiası ile dava konusu olan ve bilirkişi incelemesi için Adli Tıp Ku-

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rumu'na gönderilen olgular incelenmiştir.

**Yöntem:** Adli Tıp Kurumu'nda 2006-2012 yıllarına ait hava yolu yönrtimi sırasında istenmeyen durumların yaşandığı iddiası ile dava konusu olan ve görüş bildirilen 37 dosya retrospektif olarak incelendi.

**Bulgular:** Olguların 27'si (% 72.98) kadın, 10'u (% 27.02) erkekti. Klinik branşlara dağılımı incelendiğinde; 16 olgu Kadın Hastalıkları ve Doğum (% 43.23), 7 olgu Kulak Burun Bogaz (%18.91), 6 olgu Genel Cerrahi (% 16.21) 'yi ilgilendiriyordu. Olguların 27'sinde (% 72.97) müdahale planlı, 10'unda (% 27.03) acil idi. Olguların 20'sinde preoperatif hazırlığın tam olarak yapıldığı, 17 olguda da bu hazırlıkta eksiklikler olduğu saptandı. Anestezi uzmanı veya anestezi uzmanı ile birlikte anestezi teknisyeninin anestezi uyguladığı olguların (% 75,67) oranının cerrahın kontrolünde anestezi uygulayan anestezi teknisyeninkilere göre daha fazla olduğu görülmektedir. Zor entübasyon ile birlikte zor ventilasyon (% 37.83) en sık karşılaşılan istenmeyen durum olarak bulundu. Bunu trakeal yaralanmalar (% 18.91) ve özefagus yaralanmaları (% 10.81) takip etti. Zor entübasyon nedeniyle entübe edilemeyen ve trakeostomi açılan olgular tüm olguların %16.21' ini oluşturmaktadır.

**Sonuç:** Zor entübasyon kriterleri saptanmasa bile zor hava yolu gelişme riski göz önünde bulundurularak gerekli hazırlıklar yapılmalıdır. Ayrıca zor havayolunun tanınması ve yönetilmesine yönelik eğitimin yaygınlaştırılması gerektiğini düşünüyoruz.

**Anahtar Kelimeler:** Havayolu Yönetimi; Malpraktis; Adli tıp

## Introduction

The challenges or failure at airway management is the most important cause of morbidity and mortality in anesthesia practice. Difficult intubation is defined as difficulties at ventilation of a patient during endotracheal intubation or laryngeal mask performing by an experienced anesthesiologist. The reported incidence of difficult laryngoscopy and tracheal intubation varies from 0.01% to 13% in patients undergoing surgery. Difficult intubation could cause adverse outcomes such as death, hypoxic injury, myocardial infarction, cardiopulmonary arrest, airway and dental injury.<sup>1-4</sup> These outcomes can be rea-

son for a lawsuit and eventually these cases are sent to Council of Forensic Medicine for expert view. In our country, there is no study which analyzes problems at airway management during general anesthesia practice. In this study we investigated the cases which were in dispute by the accusation of problematic airway control during anesthesia and that were sent to institution of forensic medicine for expertise by court.

## Material and Methods

We analyzed 37 of case files which were in dispute by the accusation of problematic airway control during anesthesia and were evaluated by Council of Forensic Medicine at First and Second Specialization Board between the years of 2006-2012. These 37 cases were analyzed from the viewpoints of health unit, clinics, preoperative preparation, qualification of healthcare provider who manage the airway and adverse outcomes occurred during airway management.

## Result

There were 37 case files between the years of 2006-2012 which were in dispute by the accusation of problematic airway control during anesthesia and that were evaluated by Council of Forensic Medicine. 27 (72.98%) of the cases were female, 10 (27.02%) of the cases were male. The age range was between 3-63 years. The charged health care organizations were mostly public hospitals (54.05%) and second mostly were private hospitals (35.13%). We detected fewer cases at university hospitals (2.7%), private university hospitals (2.7%) and training research hospitals (5.4%) (Table 1). The distribution of cases according to the clinic branches were as follow; 16 cases (43.23%) were from gynecology and obstetrics, 7 cases (18.91%) were from ENT (Ear Nose Throat), 6 cases (16.21%) were from general surgery. Operations were planned in 27 cases (72.97%) and urgent in 10 cases (27.03%) (Table 2). It is seen that the cases (75.67%) whose airway managements were operated by anesthesiologists or by anesthesia technicians accompanied by anesthesiologist constituted the the majority of the cases. The cases (24.32%) whose airway managements were operated by anesthesia

technicians accompanied by surgeon were less frequent (Table 3). It was found that most frequent adverse outcome was difficult intubation with difficult ventilation (37.83%). The other adverse outcomes were followed by tracheal injuries (18.91%) and esophageal injuries (10.81%). The cases who were ventilated by tracheotomy due to difficult intubation, were 16.21% of all cases. The dislocation of airway tube during undergoing surgery occurred in the 5.4% of all cases. We detected bronchospasm occurred during the time between anesthesia induction and intubation in one case (2.7%), and in another one case (2.7%) occurred after intubation (Table 4).

**Discussion**

Many causes exist for difficult intubation and difficult ventilation such as anatomic,

congenital and acquired. Difficulties or failure at airway management is most important morbidity and mortality cause at anesthesia practice. These show us how important of airway management for anesthesiologists.<sup>5-7</sup>

In this study, the charged healthcare organizations were mostly public hospitals (54.05%) (Table 1). When both the number of surgeons in Turkey as well as the number of hospital are considered the superiority of public hospitals both for the number of surgeons and the number of hospitals in Turkey. For this reason the majority of surgical procedures operate in public hospitals at Turkey. The number of cases at university hospitals, which care more risky patients, was lesser than other hospitals. These high number of cases at public hospitals could be explained by the reasons such as excessive patient numbers, numerical superiority

**Table 1: Healthcare units of cases (number/percentage)**

| Healthcare unit                | Case number | Percentage(%) |
|--------------------------------|-------------|---------------|
| State Hospital                 | 20          | 54,05         |
| Private Hospital               | 13          | 35,13         |
| Research and Training Hospital | 2           | 2,7           |
| University Hospital            | 1           | 2,7           |
| Private University Hospital    | 1           | 5,4           |
| Total                          | 37          | 100           |

**Table 2: Clinics of cases (number/percentage)**

|                                       | Case number | Percentage (%) |
|---------------------------------------|-------------|----------------|
| Obstetrics and Gynecology (C-section) | 16 (10)     | 43, 24 (27,02) |
| ENT (Ear, Nose, Throat)               | 7           | 16,21          |
| General Surgery                       | 6           | 18,91          |
| Plastic and Reconstructive Rurgery    | 4           | 10,81          |
| Neurosurgery                          | 1           | 2,7            |
| Orthopedics and Traumatology          | 1           | 2,7            |
| Urology                               | 1           | 2,7            |
| ICU                                   | 1           | 2,7            |
| Total                                 | 37          | 100            |

**Table 3: Healthcare provider (number/percentage)**

| Healthcare unit                | Case number | Percentage(%) |
|--------------------------------|-------------|---------------|
| State Hospital                 | 20          | 54,05         |
| Private Hospital               | 13          | 35,13         |
| Research and Training Hospital | 2           | 2,7           |
| University Hospital            | 1           | 2,7           |
| Private University Hospital    | 1           | 5,4           |
| Total                          | 37          | 100           |

**Table 4: Adverse outcomes which occurred during airway management (number/percentage)**

| Adverse outcomes                             | Case number | Percentage (%) |
|--|-------------|----------------|
| Difficult intubation + Difficult ventilation | 14          | 37,83          |
| Trachea injury                               | 7           | 18,91          |
| Difficult intubation + Tracheotomy           | 6           | 16,21          |
| Esophageal injury                            | 4           | 10,81          |
| Esophageal intubation                        | 2           | 5,4            |
| Dislocation of intubation tube               | 2           | 5,4            |
| Bronchospasm after induction                 | 1           | 2,7            |
| Bronchospasm after intubation + Laryngospasm | 1           | 2,7            |
| Total  | 37          | 100            |

of public hospitals, and inadequate environment and equipment of public hospitals. The findings at Table 1 shows that the problems which occurred during airway management are controlled more professionally with better anesthesia team and equipment, and thus the number of lawsuits are decreased at the hospitals.

Airway management problems may occur at pregnancy due to anatomic and physiologic changes.<sup>8</sup> Besides that it was detected that difficult intubation risk at obstetric cases is 8 times more than other surgical cases.<sup>9</sup> Our case percentage was higher at obstetri-

cs and gynecology department so that data of this study is compatible with literature.

Until recently the anesthesia technician could intubate the patient with the supervision of the surgeon. Job definition of anesthesia technicians was clarified with 'Job definition regulations of healthcare providers and members of other profession who service at healthcare sector' that published at 22.05.2014 dated Official Gazette of the Republic of Turkey. With this regulation, that application was abolished. Our 9 cases' (24.32%) airway managements were operated by anesthesia technicians with surgeon

supervision (Table 3). It is seen that cases (75.67%) whose airway managements were operated by anesthesiologists or by anesthesia technicians accompanied by anesthesiologist had the majority. We also detect that half of the cases (50.05%) had been evaluated by anesthesiologist before surgery and anesthesia induction. It was seen that more than half of the cases (56.75%) were elective surgeries. Evaluation before anesthesia induction and maintaining necessary precautions must be done.<sup>10, 11</sup> This table may show that there is some deficiency at difficult intubation training. For this reason, we suggest that the difficult intubation training program must be reevaluated.

A study which analyzes malpractice lawsuits between the dates of 1990-2001 at supreme council of health, detected that most frequent reason for lawsuit was ventilation problems (40.04%).<sup>12</sup> Besides that Ertan et al proved that malpractices were due to lack of or inadequacy of preoperative preparations.<sup>13</sup> Esophageal rupture due to esophageal intubation was reported.<sup>14</sup> Tracheal rupture during endotracheal intubation was also reported.<sup>15</sup> It was seen that in our cases most frequent lawsuit subject was difficult intubation and difficult ventilation (Table 4). There were esophageal (10.8%) and tracheal (18.91%) injuries among our cases. In this study the airway problems were mostly seen after anesthesia induction and before intubation. It should not be forgotten that dislocation of intubation tube during surgery and airway problems after extubation are possible.

Patient evaluation in the aspect of difficult airway at anesthesia procedures before surgery is one of the important steps for preventing adverse outcomes. The necessary preparations must be done for possible difficult airway even though there was not any detected difficult intubation. We also think that education program about difficult intubation recognition and management must be generalized. We predict that, with this generalized education program, adverse outcomes and lawsuits will be decreased.

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