

Emergent Surgical Airway Management in Bleeding Airway Tumor-Two Different Settings

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Received date: March 22, 2016; Accepted date: April 25, 2016; Published date: April 29, 2016

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Abstract

Expertise in surgical airway management is one of the key requirements in a difficult airway scenario. We describe two different surgical airway approaches in two similar scenarios of a bleeding airway.

A 77-year-old man was proposed for an urgent femoral-popliteal bypass. During laryngoscopy, a friable vallecular tumor was recognized, resulting in a copious bleeding. After several unsuccessful attempts to establish a patent airway, a tracheostomy was performed in 10 minutes by a surgeon.

A 43-year-old man with a known laryngeal epidermoid carcinoma, was admitted in the emergency room with an active bleeding airway, resulting in a 'Can't Intubate Can't Oxygenate' situation. A scalpel cricothyroidotomy was achieved in 45 seconds by an anaesthesiologist.

In the presence of a difficult airway, the anesthesiologist must be prepared to establish an effective surgical airway in a timely fashion. Training in simulation scenarios is essential to improve these specific technical and non-technical skills.

Keywords: Bleeding airway tumor; Emergent airway management

Introduction

Expertise in airway management is one of the key requirements in routine anaesthesia [1]. Albeit rare, failing to establish a patent airway can have serious consequences, such as death and brain injury [2]. Respiratory events, which include airway events, are also responsible for a considerable amount of litigation cases and are more likely to be assessed as 'preventable' and involve 'substandard care' [3].

Tracheal intubation fails in around 1 in 1,000 to 2,000 routine surgical cases [4,5] and in approximately 1 in 300 to 800 cases in the emergency department (ED) [6,7].

A 'Can't Intubate Can't Oxygenate' (CICO) situation arises when attempts to manage the airway by tracheal intubation, face-mask ventilation, and supraglottic airway devices (SAD) have failed. The incidence of CICO in routine anaesthesia is 1 in 50,000 [4] and in the emergency department is 1 in 500 [7-9]. It is a clinical circumstance in which waking up the patient is not an immediate option and progression to an invasive airway should be declared [6,9].

The role of emergency percutaneous tracheostomy is not well established yet. A surgical tracheostomy is an elective procedure [6,9,10].

In an emergency setting, an invasive airway should be either a surgical or cannula cricothyroidotomy [6,9]. Cannula techniques can be either wide or narrow bore. Scalpel cricothyroidotomy is the fastest and most reliable method of securing the airway in the emergency

setting [6,9,11]. There is a high failure rate of emergency cannula cricothyroidotomy when compared to scalpel cricothyroidotomy [6,9]. Anaesthesiologists tend to choose cannula techniques to try to rescue the airway [6].

We describe two different surgical airway approaches in two similar scenarios of a bleeding airway tumor.

Case Reports

Case 1

A 77-year-old man, ASA IV, heavy smoker, hypocoagulated with warfarin for auricular fibrillation and severe peripheral arterial disease was proposed for an elective femoral-popliteal bypass. During his hospitalization the patient was evaluated by the anaesthetic team and bridging with low-molecular-weight-heparin was initiated. Clinical examination of the airway was normal.

The patient had a critical limb ischemia the day after and was proposed for an urgent femoral-popliteal bypass. Reversion of hypocoagulation was performed with prothrombin complex concentrate.

During the anaesthetic induction, a friable vallecular tumor was recognized, resulting in immediate copious bleeding. An unsuccessful sequential approach to airway by a senior anaesthesiologist was held with direct laryngoscopy, videolaryngoscopy with GlideScope® and Frova®. Assistance of another senior anaesthesiologist and a surgeon was requested and four-handed face mask ventilation was started, maintaining oxygen saturations above 90%. The decision to proceed

with wide bore cannula cricothyroidotomy (TracheoQuick Plus®) was made, but proved unsuccessful. The establishment of a secure airway with a tracheostomy was done in 10 minutes by the surgeon. Severe hypoxia (oxygen saturations less than 70%) occurred during 1 and a half minute.

The patient was admitted to the intensive care unit and showed gradual recovery without any neurologic deficits.

Case 2

A 43-year-old man, ASA IV, with a known laryngeal epidermoid carcinoma (T3N2M0), previously submitted to radiotherapy and with repeated small airway bleeding episodes, was admitted to the emergency room with a spontaneous copious bleeding airway [12].

Initially a fiberoptic intubation was attempted by an otorhinolaryngologist with the patient in spontaneous ventilation, which failed. After more than three unsuccessful attempts with direct laryngoscopy made by an intensivist, it was decided to request help of a senior anaesthesiologist. Due to a CICO situation, it was decided to perform a surgical cricothyroidotomy using a scalpel, a Laborde dilator and an orotraqueal tube size 6. A safe airway was achieved in 45 seconds on the first attempt.

The patient was transferred to an intensive care unit and an elective definitive tracheostomy was performed. The patient was discharged from the hospital without clinical evidence of neurological injury.

Discussion

Several acute and chronic disease processes in the head and neck or trachea account for a significant proportion of difficult airway cases. Most of these can be termed as 'obstructed airway' [6].

The elective perioperative management of these patients allows the anesthesiologist complements the evaluation of the airway with additional studies, such as airway imaging or nasendoscopy. Since the airway tumors tend to remain asymptomatic until they gain considerable bulk, a history of heavy smoking or alcoholism, or hemoptysis should raise the suspicion of an airway disease and if necessary, shall determine the request of these complementary exams [6,13,14]. In case 1, the patient denied any symptoms suggestive of airway disease and clinical examination of the airway was innocent.

However, in the management of a predictable or unpredictable difficult airway in an urgent setting, the patient may be deteriorating rapidly and high skill levels are required to successfully accomplish intubation or an invasive airway [6].

Early identification of a difficult airway is essential [15]. Even in the emergency setting, when facing a predictable difficult airway the *fiberoptic intubation* should be considered. Nevertheless, when choosing this technique, one must consider the site of obstruction (oral cavity, tongue base, supraglottic, glottic or infraglottic) and the technical difficulties associated with an active bleeding airway [6].

It is crucial to limit the number of attempts at laryngoscopy in order to prevent airway trauma. Furthermore, airway tumors may be associated with bleeding, soiling, increasing oedema and fragmentation, which can dramatically worsen the ability to face mask ventilate between direct laryngoscopy attempts [6,9].

When facing a difficult airway situation, the assistance of another airway expert must be requested early and priority should be given to

oxygenating the patient [6,9]. In both cases a SAD was not attempted, since there was concern it could dislodge an already bleeding and fragmented airway tumor, jeopardizing the establishment of an invasive airway.

In the first case, oxygenation was possible with four-handed face mask ventilation. However, waking up the patient was not an option, determining the need to proceed with an invasive airway. On the second case, the evolution to a CICO situation demanded an invasive airway.

Surgical and wide bore cannula cricothyroidotomy both protect the airway from aspiration due to a cuffed tube in the trachea, provide a secure route for exhalation, allow low-pressure ventilation using standard breathing systems and permit end-tidal carbon dioxide monitoring [6,9]. In contrast, ventilation through narrow bore cannula cricothyroidotomy does not protect the airway from aspiration and can only be achieved by using an high-pressure source, increasing the risk of barotrauma and failure due to kinking, malposition, or displacement of the cannula [6,9]. Whilst a wide bore cannula cricothyroidotomy may be a reasonable alternative, the evidence suggests that a scalpel cricothyroidotomy is both faster and more reliable [6,9,16]. Despite the role of emergency percutaneous tracheostomy is not well established, a failed emerging cricothyroidotomy may be an indication to perform it [17].

On the first case, the wide bore cannula cricothyroidotomy failed, requiring the establishment of an alternative invasive airway. Since the patient was being oxygenated and experienced surgeons were readily available, it was decided a surgical tracheostomy, which took ten minutes.

In the second case, the first choice for an invasive airway was a surgical cricothyroidotomy. In this case the patient could not be oxygenated due to a CICO situation, but the surgical airway was successfully completed in 45 seconds preventing the occurrence of critical hypoxia.

In 2015, the Difficult Airway Society proposed a flowchart of four plans, which consist of: A, face mask ventilation and tracheal intubation; B, maintaining oxygenation: SAD insertion; C, facemask ventilation; D, Emergency front of neck access [9]. In the present two cases, the authors followed these plans, except the insertion of a SAD for the reasons previously mentioned.

In conclusion, emergency cricothyroidotomy is a lifesaving intervention and constitutes the final pathway of any airway algorithm management. Data published in the literature suggest that surgical cricothyroidotomy has a greater likelihood of success than cannula cricothyroidotomy due to its simplicity and speed. The anesthesiologist must be prepared to establish an effective surgical airway in a timely fashion. However, its incidence is too low to ensure adequate training and expertise [18].

Airway management is primarily a psychomotor skill. Therefore, simulation training is a very suitable way to teach such skills [19]. It has been shown that high fidelity cricothyroidotomy simulation improves the compliance with difficult airway management algorithms and the technical skills of cricothyroidotomy [20,21]. However, skill retention in the technique of cricothyroidotomy has been shown to deteriorate six to nine months following initial training [22]. All anaesthetists must keep their skills up to date.

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