Difficult Airway Management in Field Conditions: Somalia Experience

Ahmet Selim Özkan¹, Serdar Nazif Nasır²

¹Department of Anaesthesiology and Reanimation, İnönü University Faculty of Medicine, Malatya, Turkey

²Department of Plastic Reconstructive and Aesthetical Surgery, Hacettepe University Faculty of Medicine, Ankara, Turkey

Difficult airway is defined as having the patient's mask ventilation or difficult tracheal intubation of an experienced anaesthesiologist. A number of reasons, such as congenital or acquired anatomical anomalies, can cause difficult intubation and difficult ventilation. Keeping all equipment ready for airway management of patients will reduce mortality and complications. In this case, it is intended that the submission of difficult airway management who encountered in mandibular reconstruction for mandible bone defect repairing with reconstruction plates before at the field conditions in Somalia.

Keywords: General anaesthesia, difficult airway, field conditions, Somalia

Introduction

Endotracheal intubation (ETI) is a standard technique used for airway control under general anaesthesia (1). Difficult airway is defined as a case in which an anaesthetist has difficulty in ventilation with a mask and/or ETI (2). During ETI, difficult airway can develop at a rate of 1.5–20%, and 2–3% of these cases can be serious (3). Difficult airway is the most common cause of mortality and morbidity associated with anaesthesia. Many anatomical factors, inherited or acquired, can lead to difficult airway. The availability of all necessary equipment for the airway management of these patients will decrease the rate of mortality and number of complications. Although airway difficulty can be predicted with a good history taking, physical examination and some tests during pre-anaesthesia evaluation (Mallampati scoring, sternomental and thyromental distance, extension degree of the head, radiological examination, etc.), an unexpected difficult airway can sometimes be encountered. In cases where intubation cannot be provided with a direct laryngoscope, different intubation techniques can also be tried. When intubation is unsuccessful despite all techniques, airway management can be provided through tracheostomy. In this case report, the airway management of a patient who previously underwent a repair surgery with a reconstruction plaque in Somali, which had field conditions, due to a bone defect in the mandible was presented.

Case Presentation

A 45-year-old male patient applied to a hospital of a non governmental organisation in Somali due to mandibular destruction. It was learned from the anamnesis of the patient that he was a smoker for 10 years, that he underwent the insertion of a mandibular reconstruction plaque 2 years previously because of a mandibular fracture after a firearm injury but that destruction had developed in the mandibula due to infection and that he did not have difficult airway in his previous surgery. No clinical feature was observed in his familial history. In his physical examination, the Mallampati score was 3. There was a fingerbreadth mouth opening, and the neck mobility was lower than 15–20° (Figure 1). His thyromental distance was 5 cm and sternomental distance was 11 cm (Figure 2, 3). The maxillary incisor teeth were overbite and long. His mandibula was completely destructed, and there was only the plaque that had been previously placed in this region. Stretched scar tissue was observed in his mandibula and neck skin. No pathology was found in laboratory examinations. The patient, who planned to undergo bone reconstruction with a fibula flap due to the bone defect in the mandibula, was taken to the operating room after fasting for 6 h. Electrocardiography (ECG), heart rate (HR), non-invasive arterial blood pressure (NIBP) and peripheral oxygen saturation (SpO₂) were monitored. According to the results of the monitoring, HR was 80 beat min⁻¹, NIBP was 110/80 mmHg and SpO₂ was 97%. Because difficult ventilation and difficult intubation, and accordingly, the

Figure 1. Overbite and long maxillary incisor teeth; a finger-readth mouth opening

Figure 2. Short sternomental and thyromental distance

Figure 3. Stretched scar tissue in the mandibula and neck skin; neck mobility lower than 15-20°

possible need for emergency tracheostomy were predicted for the patient who was not administered any premedication, a preparation was made to perform tracheostomy. The patient was preoxygenated with 100% oxygen for 5 min. For spontaneous respiration to return back as soon as possible, anaesthesia induction was applied with propofol (2.5 mg kg^{-1}) and succinylcholine (1 mg kg^{-1}), which is a short-acting muscle relaxant. The patient's Cormack–Lehane score was found to be 4 with direct laryngoscopy performed after providing mask ventilation. ETI was attempted three times, but all attempts failed. Because of the lack of supraglottic airway devices, a

video laryngoscope or flexible fibre-optic bronchoscope, which could be used in the difficult airway algorithm, a 7.0-mm spiral tube was placed on a fine-bore rigid endoscope, which is used in urological procedures as an alternative application, and entry into the trachea was tried. Because the fine-bore endoscope tip was broken during manipulations performed for entry into the trachea, the same tube was placed on a thicker rigid endoscope, and it was tried again (Figure 4). When vocal cords were seen during the second attempt, the tip of the endoscope was advanced into the trachea, and the patient was intubated by moving the 7.0-mm spiral endotracheal tube over the endoscope. After the placement of the tube in the trachea was confirmed with chest movements and hearing lung sounds, the tube was fixed. During these processes, the patient could comfortably breathe with a facial mask, and no desaturation was observed. The maintenance of anaesthesia was provided with 1–2% sevoflurane in the mixture of 50% oxygen and 50% nitrous oxide and when necessary, with 0.15 mg kg^{-1} rocuronium. During 9-h intervention, no complication occurred, and vital signs and SpO_2 were stable. For being able to do postoperative respiration follow-up and the possibility of aspiration, the tracheostomy was opened at the end of the operation. After adequate consciousness and ventilation were reached, the patient was transferred to the clinic.

Figure 4. Placement of spiral tube on the thick rigid endoscope

Discussion

The implementation of ETI is often needed for enabling an efficient and safe airway in general anaesthesia administrations. However, difficult ventilation and difficult intubation can be encountered in patients, which is sometimes predicted and other times unexpected. During airway application, difficult intubation can develop at a rate of 1.5–20%, and serious difficulties can be experienced in 2–3% of these cases (3). In the evaluation of the airway before anaesthesia, Mallampati scoring, Wilson risk score, sternomental distance, assessment of the frontal mandibular region anatomy, extension degree of the head, radiological examination, and computed imaging techniques can be used for determining intubation difficulty (3). In the meta-analysis by Shiga et al. (4), it was reported that using these tests together increased the diagnostic value and that the most appropriate bedside test was the combined use of Mallampati scoring and thyromental distance measurement. Ali et al. (5) reported that the upper lip bite test could be a good alternative in addition to Mallampati scoring for the detection of patients with difficult airway. In the preoperative evaluation of the case, it was found that he had a fingerbreadth mouth opening and overbite and long maxillary incisor teeth. Because his Mallampati score was 3, neck mobility was 15–20°, thyromental distance was 5 cm, and sternomental distance was 11 cm, he was considered to have difficult airway.

Mandibular reconstruction operation was planned for our patient who previously underwent a surgical repair with a reconstruction plaque due to bone defects in the mandibula in a non governmental organisation hospital in Somali. In the hospital where there was only one anaesthetist due to field conditions, a variety of difficult airway devices was not available. Because ETI could not be provided with a direct laryngoscope in the patient with difficult airway, an alternative airway technique was tried. Similar to the intubation principle with a flexible fibre-optic endoscopy, a rigid endoscope, which is often used in urological interventions, was decided to be used for this aim. Considering that emergency tracheostomy could be needed for the patient, necessary preparations were made, but it was decided to attempt ETI under general anaesthesia. In cases where the airway is required to be provided with tracheostomy at the end of operation, primarily opening the tracheostomy under local anaesthesia can be a safer technique. For patients who are predicted to have

airway difficulty in induction, necessary conditions must be provided, and preparation must be made for tracheostomy (6). In our case, tracheostomy had to be applied at the end of the surgery because of the operation length and the feature of the surgical region. In similar situations, tracheostomy is recommended to be primarily opened under local anaesthesia in cooperation with the surgical team (1).

Before the anaesthesia induction of patients who are suspected of having difficult airway, preoxygenation should be performed by breathing 100% oxygen for 5 min, and a muscle relaxant must be administered after assuring ventilation with a mask (7). In our case, preoxygenation with 100% oxygen was performed for 5 min, and then, a hypnotic agent was administered. After providing adequate and comfortable ventilation, succinylcholine, a short and rapid-acting muscle relaxant, was administered.

In a study conducted by Kheterpal et al. (8), it was reported that there was difficulty in mask ventilation in 77 of 53000 patients, that difficult intubation was faced in 19 patients, and that in 12 of these patients, alternative difficult airway techniques were implemented. Retrograde orotracheal intubation was also recommended as a low-cost, minimally invasive, safe and practical method in cases for which fibre-optic intubation could not be applied (9). If it could not be used, awake fibre-optic intubation could be a good alternative.

Young et al. (10) stated in their study that intubating a laryngeal mask airway (LMA), which can be applied as blind intubation, could be safely used for airway control in injuries happening in rural areas. As an alternative to fibre-optic intubation in patients with difficult airway, intubation with Proseal LMA and Glidescope video laryngoscope are recommended (11). These methods can be used as alternatives in patients with difficult intubation.

For patients suspected of having difficult airway, preparations must be made according to the difficult airway algorithm. Endotracheal tubes of various sizes, different types of supraglottic airway devices, a video laryngoscope, flexible fibre-optic bronchoscope, and tracheostomy set must be kept ready in settings where anaesthesia will be administered. However, in the presence of technical incompetence and field conditions, many of these equipments can be unavailable. Intervention must be done by experienced anaesthetists for these patients, and an assistant anaesthetist must accompany an experienced anaesthetist during the intervention.

Conclusion

Detailed airway examination must definitely be performed for patients who are predicted to have difficult airway. When necessary, a contingency plan must be formed by an experienced team. By pushing limits in field conditions, an important anaesthesia problem had been successfully solved. Therefore, necessary conditions and preparations for possible

difficult intubation and ventilation should be provided in accordance with the difficult airway algorithm before intervention.

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