Case Report

Unanticipated difficult nasotracheal extubation following oral surgery

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A B S T R A C T

Difficult tracheal extubation is a rare but potentially dangerous problem that can be life threatening especially when it is unexpected and there is a lack of preparation. Most of these cases are associated with orofacial surgery. We herein present two patients with oral cavity cancer who experienced unexpected postoperative difficult nasotracheal extubation by a Kirschner pin penetrating the endotracheal tube and fixing the tube at the maxillary bone following tumor resection. The pins were found by fiberoptic bronchoscopy. Both patients were returned to the operating theater immediately for removal of the penetrating pins as well as the endotracheal tubes. The common causes of difficult tracheal extubation and strategies of managing these situations are discussed in the article.

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1. Introduction

All anesthetists will face certain problems during airway management. There are numerous guidelines and protocols that address problems associated with tracheal intubation. By contrast, problems associated with tracheal extubation have always been overlooked and are less well documented. The occurrence of difficult extubation is rare but can be dangerous1–3 and even life threatening.4 Hence it is truly important to manage these situations with vigilance. The majority of cases of difficult extubations have been reported in association with orofacial surgery.5–8 Here we present two patients with oral cavity cancer who experienced postoperative difficult nasotracheal extubation following tumor resection.

2. Case reports

2.1. Case 1

An 82-year-old male (body height 163 cm, body weight 55 kg) with squamous cell carcinoma over his right hard palate was scheduled for wide tumor excision with partial maxillectomy and island flap repair. After induction of general anesthesia, a 6.5 mm inner diameter, cuffed endotracheal (ET) tube (CURITY Tracheal Tube, Kendall, Tyco healthcare, USA), was inserted smoothly via his right nasal passage and advanced into the subglottic region using a flexible fiberoptic bronchoscope. After auscultation of bilateral lungs, the tracheal tube was fixed at 27 cm at his nostril. The courses of anesthesia and surgery were smooth and uneventful. After excising his palatal tumor, an obturator prosthesis was used to cover the residual palatal defect. The obturator was temporarily fixed in place with two Kirschner pins. After the procedures were completed, he was sent to the postanesthetic care unit for emergence and extubation (Fig. 1A).

However, resistance was found while attempting to withdraw the tracheal tube. In order to test the patency of the ET tube, a 14F suction catheter was inserted but could only be passed a short distance into the ET tube. In fear of something occluding or impinging the ET tube, we use a flexible fiberoptic bronchoscope to survey its patency. The examination revealed a Kirschner pin penetrating the ET tube (Fig. 1B and C) and fixing the tube at the maxillary bone. The patient was immediately returned to the operating room to remove the penetrating pin (Fig. 1D). The ET tube was then successfully withdrawn without complication.

2.2. Case 2

Two months after the operation described in Case 1, a 69-year-old male patient of buccal cancer with local invasion of his right upper gingiva and palate, received wide excision of an oral tumor combined with radical neck dissection. After anesthetic induction, a 6.5 mm inner diameter, cuffed ET tube (Curity Tracheal Tube, Kendall), was inserted smoothly by a flexible fiberoptic bronchoscope.
Fig. 1. (A) Case 1 in the postanesthetic care unit. He was still nasotracheally intubated. (B) The picture of the obturator prosthesis fixed with a Kirschner pin (white arrow) at the patient's maxillary bone. (C) The penetrating Kirschner pin in the endotracheal tube. (D) The removed penetrating Kirschner pin.

Fig. 2. (A) Case 2 still intubated in the postanesthetic care unit. (B) The Kirschner pin (black arrow) used to fix the obturator also caused the endotracheal (ET) tube fixation. (C) The penetrating Kirschner pin in the ET tube. (D) The removed Kirschner pin that pierced and fixed the patient's ET tube.
via his right nostril and was fixed at 28 cm at the nostril. Both courses of anesthesia and surgery were smooth. After the tumor was excised, obturator fabrication had been done for the surgical defect. Finally, we sent him to the postanesthetic care unit for further care (Fig. 2A).

Before trying to withdraw the ET tube after meeting the criteria of extubation, resistance was sensed while passing a suction catheter into the ET tube for pre-extubation suction. Thanks to the experience of managing the previous case whose ET tube was fixed intraoperatively by a Kirschner pin, we checked the patency of the tube by the fiberoptic bronchoscope immediately this time. This also revealed a penetrating Kirschner pin (Fig. 2B and C) in the ET tube. Consequently, the surgeon was called to remove this pin (Fig. 2D), and the patient was smoothly extubated without any problems.

3. Discussion

According to the literature, ET tubes have been difficult to remove because of permanently inflated cuffs,\(^{7,8}\) tracheal tube laceration forming barbs,\(^2\) and fixation with Kirschner wires,\(^{9,10}\) sutures,\(^{11,12}\) and screws.\(^{13}\) Most of these cases have been reported in relation to head and neck surgical procedures, as with our cases. In addition, difficult removal of double lumen tubes due to sutures,\(^{14}\) mucosal adherence, and laryngeal edema\(^{15}\) has been occasionally mentioned during chest surgery. Hence, we should have extra caution in managing patients undergoing these kinds of procedures.

Here we present two cases of oral cavity cancer whose ET tubes were fixed intraoperatively by the Kirschner pins after palatal tumor excision. Because of the surgical resection of the palatal tumor involving partial maxillectomy, a prosthesis is needed to close the surgical defect.\(^{14}\) The prosthesis used here is referred to as an obturator (Fig. 3). The aim of the obturator prosthesis is to restore masticatory function and improve speech, deglutition, and cosmetic appearance after partial maxillectomy.\(^{14}\) Both the temporary obturators used in our cases were fixed with Kirschner pins. Because the obturator is used in the proximity of the nasal cavity, its fixation with Kirschner pins carries a high risk of injury or penetration of the nearby nasotracheal tubes (Fig. 3). This explains the likelihood of occurrence of exactly the same event in two similar surgical procedures of our cases.

Tracheal tube perforation by a foreign body could result in an airway leak with concomitant lightening of anesthesia, hypoxia, hypercarbia, or deflation of the cuff with possible aspiration.\(^{16}\) Besides, fixation of the tracheal tube can result in immediate and delayed mechanical obstruction or trauma with vigorous attempts at extubation.\(^{17}\) Hence early recognition of a fixed tracheal tube is of the foremost consequence to prevent further complications. For cases like this, Lee et al.\(^8\) recommended routine testing of tracheal tube mobility at the end of all orthognathic surgery. Bhaskar et al.\(^9\) suggested routine facial X-ray and passing a suction tube through the tracheal tube in all orthognathic surgery if blindly directed Kirschner wires are used. Lang et al.\(^11\) have proposed routine intraoperative testing for tracheal tube movement and routine flexible fiberoptic bronchoscopy through the tracheal tube when blind surgical procedures occur in the vicinity of the tube.

If we do not adopt any the suggestions listed above because of overlooking the surgical procedures, accidental intraoperative fixation of the ET tube is likely to occur again, as was seen when the same event was encountered in Case 2 within a short time period, which could only be identified and managed postoperatively. Plus, according to the suggestion from the National Institute of Health for extubation procedure, pre-extubation suctioning of the ET tube should be done to help clear the patient’s secretions prior to extubation. In fact, this maneuver might serve another purpose, seldom considered in our daily practice: to test the patency of the ET tube prior to extubation. If we had rigidly followed this rule by simply passing a suction catheter into the ET tube of Case 1 first, we could have found the situation of fixation even earlier. The maneuver could have helped us avoid the attempt to withdraw his ET tube, the same approach as used for Case 2, because any forceful attempt to withdraw a pre-fixed ET tube might cause injuries to the patient.

In conclusion, although difficult tracheal extubation is a complication seldom encountered in our daily clinical practice, it should always be kept in mind when resistance is noted during ET tube removal. Methods with passing a suction catheter, facial X-ray, tracheal tube mobility test, or flexible fiberoptic bronchoscopy can be used for early recognition during the operation or when difficult tracheal extubation is suspected postoperatively. Forced endotracheal extubation should always be forbidden in this situation.

References