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Tracheo-Innominate Artery Fistula after Tracheostomy requiring Median Sternotomy

J.Y. Tsai*; A. Zavala; S. Vachhani; T. Moon; U. Williams; P. Owusu-Agyemang

***January Tsai**
Department of Anesthesiology and Perioperative Medicine, The University of Texas MD Anderson Cancer Center, USA. Email: JTsai@mdanderson.org

Abstract

A 26 year-old female presented with accidental decannulation of her tracheostomy with multiple unsuccessful attempts at re-cannulating. This resulted in massive bleeding and hemoptysis leading to an emergency re-exploration of her previous surgical site that illustrated a tracheo-innominate fistula. This was surgically corrected with evidence of a middle cerebral artery infarct postoperatively.

Keywords

Tracheo-innominate fistula; Tracheostomy; Hemoptysis

Introduction

Tracheo-innominate artery fistula (TIF) is a rare post-operative complication that usually happens after a tracheostomy. The incidence has been reported by Scalise et al. to be 0.6 to 0.7% in patients with short term tracheostomy tubes (1). Typically occurring 7-14 days after surgery, it is life threatening with a high incidence of morbidity and mortality (2, 3). We present the case of a 26 year-old woman who developed a TIF 5 days post-operative from a neck dissection with planned tracheostomy. In this case, the TIF required emergent vascular repair with approach via partial median sternotomy.

Case Report

A 26 year-old woman with a history of papillary thyroid cancer presented for a total thyroidectomy and redo central and left neck dissection. On postoperative day one the patient became stridorous with respiratory insufficiency on the floor. She was taken to the operating room for an awake fiberoptic intubation. On postoperative day two she was taken to the operating room for a trial of extubation. After 30 minutes of extubation, she was having difficulty breathing and becoming more anxious. The patient also was noted to have increased airway edema on direct laryngoscopy and a supraglottic airway was placed. The decision was made to perform a controlled tracheotomy. On post-operative day five of the tracheostomy the patient passed a swallow study and was preparing for discharge home when she coughed and potentially dislodged the tracheostomy tube. Upon examination by the nurse, the 6.0 shiley tracheostomy was dislodged. Multiple attempts were made by the nursing staff to reposition the tracheostomy. These attempts consisted of blind passes of the tracheostomy through the open neck wound at different angles until the tracheostomy was seated at a depth consistent with normal placement. End-tidal capnography was not performed through the tracheostomy because

the patient was able to spontaneously ventilate through her patent oropharynx, and the cuff of the tracheostomy tube remained deflated. It was thought to be successful until 12 hours later, when the patient complained of difficulty breathing through the tracheostomy and at this time also had hemoptysis. The surgical team was immediately called to evaluate the patient and tracheostomy. While at the patient's bedside, the surgeons attempted to reposition the tracheostomy, but during manipulation bright red pulsatile blood was noted at the stoma. The first attempt at tamponading the bleed was to overinflate the tracheal cuff, which proved to be unsuccessful. It was noted at that time that one liter of blood was suctioned at the bedside, and the anesthesiologist on call was consulted emergently for airway assistance. The anesthesiologist arrived and assessed the situation, and an emergent awake nasal fiberoptic intubation was performed at bedside. The patient's mental status was rapidly declining due to hypoxia and acute blood loss, therefore, no sedation was administered or necessary. After topical benzocaine was sprayed in the right nare, a lubricated wire reinforced 7.0 endotracheal tube (ETT) was advanced over a portable fiberoptic bronchoscope until posterior pharyngeal structures were seen. Anatomic structures were difficult to identify with the surrounding blood in the oropharynx, but the bronchoscope was advanced toward air bubbles that seemed to appear with patient respiratory efforts. Edematous vocal cords were seen and passed, and subsequent coughing that produced air and blood in the ETT seemed to help suggest proper tube placement. The ETT was advanced approximately 5 centimeters until resistance was felt at the tracheostomy, which was kept in situ, and the cuff of the endotracheal tube was inflated with marked reduction of the bleeding. The patient was then brought emergently to the operating room for neck exploration and possible vascular repair. The surgical incisions were reopened to identify the source of bleeding. After evaluating the surgical field, the source of bleeding was presumed to be the innominate artery. Digital pressure was applied to maintain hemodynamic stability while venous access was obtained and the patient was resuscitated. Vascular surgery was called for assistance and partial median sternotomy was performed. The innominate artery was confirmed to be the source, and was compressed against the sternum. Direct repair of a 1 centimeter anterior and posterior innominate artery laceration was performed. Five units of blood were transfused. The estimated blood loss was two liters. After the patient was hemodynamically stable in the operating room, she was taken to the intensive care unit where she regained consciousness the following day. At that time, it she was noted to have left facial weakness and left upper extremity weakness. Imaging was obtained to investigate the new neurological deficit, which showed a right middle cerebral artery distribution infarct. This injury resulted in subsequent need for physical therapy and rehabilitation. The tracheostomy tube was removed two weeks later, the patient was discharged home, and she has now returned to work with complex regional pain syndrome of the left upper extremity and face for which she is being treated with a spinal cord stimulator by the chronic pain service.

Discussion

TIF is a life-threatening complication that requires immediate airway management and vascular repair. Risk factors for TIF include neck radiation, prolonged intubation, low surgical incision, excessive movement of the tracheostomy, steroids, malnutrition, infection, high cuff pressures, diabetes mellitus and frequent hypotension (4). This patient's only risk factor was repeated manipulation of her tracheostomy with subsequent pressure necrosis. Knowledge of this possible complication with prompt airway access allowed for definitive surgical repair and survival. To possibly prevent traumatic causes of

TIF, a prudent approach may include fiberoptic examination of dislodged tracheostomies placed within the last 30 days. Otherwise, capnography with an inflated tracheostomy cuff could be used to confirm endotracheal placement. However, this would not preclude partial endotracheal placement with tracheostomy displacement into surrounding soft tissue. In the nonemergent setting, radiographic examination could also be used to confirm tracheostomy placement.

Any hemorrhage after a tracheostomy should be evaluated for TIF, and a high index of suspicion must be maintained. Immediate management with overinflation of the tracheostomy cuff, translaryngeal airway access with overinflation of the endotracheal tube cuff, digital compression of the innominate artery, and definitive operative repair increase the likelihood of survival.

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Authors Information: J.Y. Tsai*; A. Zavala; S. Vachhani; T. Moon; U. Williams; P. Owusu-Agyemang
Department of Anesthesiology and Perioperative Medicine, The University of Texas MD Anderson Cancer Center, USA.

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