Self-inflicted oral penetration injury: An intravenous drip pole advanced from the mouth to the retroperitoneum

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A B S T R A C T

INTRODUCTION: Patients with oral penetration injuries require a systematic physical examination. These patients should be managed by a multidisciplinary medical team. Airway management, operative procedures, and transfusion needs of the patient with an oral penetration injury should be discussed before surgery.

PRESENTATION OF CASE: A 63-year-old man with a history of recurrent hepatic duct cancer attempted suicide by advancing an intravenous pole through his mouth, neck, and thorax, ultimately penetrating into the right retroperitoneal space. A multidisciplinary team assembled by code blue emergently treated the patient, initially with fiberoptic intubation. The injured right lower lung was resected under one lung ventilation via a double lumen tube after tracheostomy. Fortunately, the pole did not injure any other organs or major vessels. Despite successful removal of the pole after lung resection, the patient died 14 days postoperatively due to his primary hepatic duct cancer.

DISCUSSION: We highlight the need for a multidisciplinary approach to this patient’s management and discuss particular aspects of airway and transfusion management.

CONCLUSION: A systematic and multidisciplinary approach allowed successful removal of the drip pole and stabilization of the patient’s respiratory and hemodynamic status.

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1. Introduction

The treatment of multiple trauma is difficult and requires proper airway management and a multidisciplinary approach for multiple organ dysfunction and potentially massive hemorrhage. Furthermore, oral penetration injuries present with more difficult airway management due to difficulty with intubation, ventilation, and tracheostomy. We present this unusual case to highlight some of the difficulties encountered in airway management and therapy in patients with an oral penetration traumatic injury.

2. Presentation of case

A 63-year-old man with a history of recurrent hepatic duct cancer after pancreatoduodenectomy two years previously, cholangitis, and carcinomatous pleural effusion was admitted with a complaint of epigastric cramps. The patient had refractory ascites thought to be due to hepatic dysfunction and carcinoma. The treatment options were under consideration by the patient and his physicians. However, before additional treatment was instituted the patient was found face-down in his hospital room with an intravenous (IV) drip pole protruding from his bleeding mouth. The patient was immediately transferred to the emergency room for an initial evaluation. Hemodynamic respiratory conditions were stable, and Glasgow Coma Score was E3V1M6. Airway patency was maintained; there was no stridor due to airway obstruction despite continued bleeding from the upper respiratory tract. Written informed consent was obtained from the patient for publication of this case report.

2.1. Investigations

Focused Assessment with Sonography for Trauma (FAST) was implemented and showed no abnormalities; there was no sign of pneumothorax. Airway patency was confirmed by the symmetrical rise and fall of the chest and by auscultation of the neck and chest. Even though the airway was maintained, intubation was mandatory due to the potential for a penetrating wound of the neck to distort the patient’s airway anatomy.

Examination of the laryngopharyngeal space with an Airway Scope AWS-S100 (Pentax, Tokyo, Japan) and McGrath® MAC video laryngoscope (Covidien, USA) was attempted, but the pole prevented insertion of either device. Therefore, a fiberoptic bronchoscope was inserted nasally, and the vocal cords and laryngeal

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space were visualized. A 7-mm diameter spiral endotracheal tube was inserted through the nasal cavity with fiberoptic bronchoscopy guidance. Subsequently, propofol and neuromuscular blockade (rocuronium bromide) were administered for sedation after confirmation of appropriate tube placement (Fig. 1a and b).

Chest radiography showed the pole inserted into the mouth and extending below the diaphragm, with a slight right pneumothorax and a deep sulcus sign. The radiograph also showed opacity in the right lung due to lung contusion, but no rib fractures were noted, and the mediastinum was not deviated (Fig. 2a). Abdominal radiography showed the tip of the pole located near the iliac bone (Fig. 2b).

2.2. Treatment

After completion of the radiography studies, the patient’s hemodynamic status deteriorated and he was immediately transferred to the operating room for removal of the pole without completing the computerized tomography (CT) scan. The operation was performed by a multidisciplinary team of surgeons. Initially, exploratory laparotomy was performed by the gastrointestinal surgeons, and no abdominal injury was detected. The pole had been advanced along a course dorsal to the diaphragm and liver; the tip of the pole was in the retroperitoneal space. Next, the femoral artery and vein were cannulated by the cardiac surgeons in preparation for percutaneous circulatory pulmonary support (PCPS). Tracheostomy was performed by an otolaryngologist and a double lumen tube (DLT) was inserted into the left main bronchus through the tracheostomy. The major vessels of the neck and esophagus were fortunately not damaged. After median sternotomy was performed, the right thoracic cavity was opened with discharge of retained blood from inside the right thoracic cavity. The pericardium was opened and revealed no evidence of major vessel damage since the pole had passed dorsally to the major vessels. There was no apparent damage of the right main stem bronchus. One lung ventilation was maintained for exploratory lung resection. The pole was carefully removed from the mouth, and the punctured lower lobe of the right lung was resected (Fig. 3).
During surgery, the patient received 122 units of plasma, 70 units of platelets, 6172 mL of operative blood salvaged with the Cell Saver (Haemonetics, Braintree, MA, USA), 11,200 mL of red blood cells, 500 mL of 5% albumin, and 10,800 mL of crystalloid. In contrast, the urine output during surgery was 415 mL and total blood loss was 26,987 mL. Therefore, the patient had a total net positive fluid balance of 17,325 mL during surgery. In the ICU, the patient’s hemodynamic and respiratory conditions were managed by an intensivist. However, systemic edema, pleural effusion, and ascites persisted due to the patient’s hepatic dysfunction. On the nineth postoperative day, the patient developed bleeding from the median groove of the tongue. This laceration was not related to the pole injury, and we suspected the patient had bit his tongue in another suicide attempt. The tongue bled again on the thirteenth postoperative day and required ligation of a branch of the lingual artery originating from the external carotid artery.

2.3. Outcome

After the second episode of hemorrhage from the tongue, the family of the patient refused further invasive procedures in view of the patient’s poor prognosis because of his recurrent hepatic duct cancer. The patient died due to hepatic dysfunction on the fourteenth postoperative day.

3. Discussion

On initial evaluation, it was clear that this patient’s airway management and intubation would be difficult, and the physicians choose to perform awake intubation in accordance with the difficult airway algorithm [1]. Furthermore, tracheostomy would have been difficult because the thyroid cartilage was deviated by the inserted IV pole. Fortunately, we were able to insert the endotracheal tube via the nasal route. Emergency cricothyroidotomy with deviation of the trachea would be difficult, and an otolaryngologist was available on standby in case an emergency tracheostomy was required. When fiberoptic bronchoscopic intubation fails due to bleeding and edema of the glottic space, airway patency may quickly deteriorate and compromise ventilation. Multiple attempts at direct laryngoscopy may also lead to supraglottic edema and hemorrhage, deterioration of ventilation, and hypoxemia with potential morbidity [2,3]. Therefore, we immediately abandoned laryngoscopy and adopted the fiberoptic approach.

Physical examination alone has a 20% false negative rate and a 42% false positive rate in the diagnosis of lower neck injury [4]. Therefore, after the airway was stabilized in our patient, further examination of the injury was planned with CT. However, CT would have been limited by artifact due to the metal pole, which probably would have caused halation and obscured the structures around the pole [5]. In this patient, only radiography and ultrasound were performed for evaluation of the injury site because the patient required emergent surgical intervention, resulting in an inadequate preoperative assessment.

Tension pneumothorax is a life-threatening injury that may occur after chest trauma. Tachycardia, absent breath sounds, and hypotension are the most reliable and easiest to appreciate signs of tension pneumothorax. In the initial evaluation, with the patient spontaneously breathing without positive pressure ventilation, the physical examination and ultrasound did not suggest pneumothorax. Even in retrospect, we are unable to differentiate whether tension pneumothorax or massive hemorrhage was responsible for the patient’s hemodynamic collapse. Currently, ultrasound is reported as a useful procedure for the detection of pneumothorax without radiography and CT [6]. Ideally, we should have repeated the ultrasound assessment for pneumothorax after the initiation of positive pressure ventilation.

In this case, the intermediate and upper lobes of the right lung were intact without vascular damage. Therefore, the thoracic surgeon performed a resection of only the lower lobe of the right lung. However, selective resection of one lung required the use of a double lumen tube (DLT) or tracheal blocker. To secure our patient’s airway, a 7.0-mm spiral tube was inserted via the nasal route, and tracheostomy was performed for insertion of the DLT before exploration of the lung. Several researchers have previously reported that completion pneumonectomy has a 20–23% perioperative mortality [7,8], and patients undergoing completion pneumonectomy due to benign conditions had a higher comorbidity and mortality than those with malignancy [9]. Fortunately, pneumonectomy was avoided in our patient, but it is important to consider this strategy when the patient has life threatening hemodynamic and respiratory problems.

The patient’s massive hemorrhage and persistent bleeding during surgery were probably related to the patient’s low platelet count and disseminated intravascular coagulation secondary to hepatic disease. The management of massive hemorrhage has been widely researched. Trauma-induced coagulopathy has been reported to occur in 24–56% of patients within 30 min of the trauma, despite the use of blood transfusions and fluid resuscitation [10–12]. Currently, when a patient requires massive transfusion, the early use of platelet transfusions and fresh frozen plasma infusions with each unit of red blood cells transfused in a 1:1:1 ratio may improve patient mortality and outcome [13]. Even though explicit guidelines for the management of massive transfusion in severe trauma patients have not been established, sufficient blood products should be prepared for the potential need for massive transfusion.

4. Conclusion

The treatment of an oral penetration injury and multiple organ trauma requires a multidisciplinary approach and repeated evaluation of potentially injured organs. Furthermore, the various potential surgical approaches and transfusion management should be discussed before the operation.

Conflict of interest

None.
Funding

None.

Ethical approval

None.

Consent

Informed consent for academic usage about this case has been obtained from patient.

Author contribution

Shunsuke Takaki contributed study concept and writing paper. Osamu Yamaguchi contributed interpretation of management of patient care in ICU and support for writing paper.
Naoto Morimura contributed in the management of initial treatment and writing paper.
Takahisa Goto contributed interpretation and management of manuscript.

Guarantor

Dr Shunsuke Takaki have full responsibility for this work.

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