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Difficult Airway due to Retropharyngeal Hematoma after Stabbing to the Neck

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Abstract

Reports of retropharyngeal hematoma have been scarce in the anesthesiology literature. We report a patient whose trachea was difficult to intubate due to retropharyngeal hematoma after stabbing to the neck. A woman with a knife injury to the common carotid artery required emergency carotid arterioplasty. When tracheal intubation was attempted, marked swelling of the posterior pharyngeal wall made the vocal cords impossible to visualize. Preoperative computed tomography showed a retropharyngeal hematoma. The patient required mechanical ventilation for 2 days.

Keywords Difficult airway; Retropharyngeal hematoma; Stabbing; Carotid artery

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Introduction

Any space occupying lesion in the retropharyngeal space, including a collection of blood, can obstruct the upper airway [1]. Retropharyngeal hematoma (RPH) is rare; however, it can obstruct the airway rapidly [2-5], and can be fatal [5-7]. When dyspnea or stridor occurs in RPH, tracheal intubation is mandatory to secure the airway [8]. However, tracheal intubation is technically difficult in some patients with RPH [5,8,9]. Retropharyngeal hematoma caused by stabbing to the neck has not previously been reported.

We report difficult tracheal intubation in a patient who had RPH due to common carotid artery injury after stabbing to the neck.

Case report

A 31 year old woman was stabbed with a knife in the left side of the neck, left chest and upper abdomen. The time of injury was unclear; however, the emergency medical services had been called 2 hours and 40 minutes before the patient was brought to the operating room, having taken 10 minutes to arrive at the scene. At the scene, her blood pressure had been 143/84 mmHg, heart rate 148 beats/min, and respiratory rate 30 breaths/min. Manual compression had been applied to the neck and the patient was transported to our hospital.

On arrival in the emergency department, her blood pressure had fallen to 82/32 mmHg, and her heart rate and respiratory rate had risen to 150 beats/min and 36 breaths/min, respectively. Peripheral blood oxygen saturation (SpO_2) was 100% with oxygen supplied at 10 L/min by face mask. Manual compression of the wound was released as there was no active bleeding from the neck wound.

Intravenous fluid resuscitation was undertaken, using 2,500 mL crystalloid fluid, 1,000 mL 5% albumin, and 10 units of packed red blood cells. The blood pressure rose to 125/65 mmHg, and the heart rate fell to 105 beats/min. Laboratory investigations performed 1 hour after arrival showed a blood hemoglobin concentration of 11.5 g/dL, and a hematocrit of 33.4%. As blood pressure rose, pulsatile bleeding was observed from the left neck, so manual compression was resumed. Auscultation of the chest was unremarkable. Computed tomography (CT) of the neck revealed a hematoma and traumatic emphysema around the left carotid artery, and deviation of the trachea to the right. A lateral X-ray of the neck was not taken. The chest and abdominal CT revealed intra-abdominal hemorrhage. Emergency arterioplasty of the left carotid artery and abdominal surgery for hemostasis was planned.

She was transferred to the operating room with her neck wound under manual compression. Heart rate, electrocardiogram, SpO_2, and invasive blood pressure were monitored. There was no stridor and she was able to communicate, speaking without hoarseness. At the time of entering the operating room, the blood pressure was 130/70 mmHg, heart rate 110 beats/min, respiratory rate 20 breaths/min and SpO_2 100% with oxygen provided at 10 L/min by face mask.

Anesthesia was induced with intravenous propofol 50 mg after 100% oxygen had been administered for 5 minutes by face mask. Manual ventilation was straightforward. Neuromuscular block was achieved with intravenous rocuronium 50 mg. When a second-year grade anesthesiologist tried to intubate the trachea with a Macintosh laryngoscope, the tip of the epiglottis could be visualized, but not the vocal cords, which were obscured by a swelling of the posterior wall of the pharynx that was compressing the epiglottis. Blind tracheal intubation with a stylet was attempted, resulting in esophageal intubation. Additional intravenous propofol 50 mg was administered and a Pentax-Airway Scope® videolaryngoscope (Pentax Co., Tokyo, Japan) was prepared. Meanwhile, an attending anesthesiologist tried tracheal intubation using the stylet. He could also identify the tip of the epiglottis, and although the vocal cords could still not be visualized, he was able to blindly intubate the trachea using the stylet. Expiratory carbon dioxide was detected. Fiberoptic bronchoscopy confirmed that the tube was in the tracheal lumen above the carina. It took 5 minutes to intubate the trachea from induction of anesthesia: SpO_2 had remained 100% throughout. Thereafter, anesthesia was maintained with sevoflurane and fentanyl. After the airway was secure, we reviewed the preoperative CT of the neck (Figure 1). The CT showed that the distance from the ventral line of the cervical spine to the posterior wall of the pharynx was 16 mm at C_2, 18 mm at C_3, and 19 mm at C_4, and that the distance from the ventral line of the cervical spine to the posterior wall of the trachea was 21 mm at C_5, and 19 mm at C_6. The vocal cords were situated at the level of C_5.

Left carotid arterioplasty, and repairs of the diaphragm and gastric serosa were performed. Surgery lasted 4 hours 45 minutes. The patient was mechanically ventilated postoperatively. On postoperative day 1, repeat CT of the neck showed tracheal deviation to the right. There was no swelling of the tracheal mucosa. She was extubated 2 days after surgery. Immediately after extubation, the respiratory pattern was normal, the respiratory rate was 20 breaths/min, and SpO_2 was 100% with oxygen 6 L/min by mask. She experienced transient hoarseness, but there was no inspiratory stridor. Supplemental oxygen was no longer required by the fourth postoperative day. SpO_2 ranged between 98 and 99%. She started oral intake on postoperative day 5 and her recovery was rapid and uneventful. Institutional Review Board of the Fukuoka University Hospital permission to publish this report has been obtained (No. 13-3-21).

Discussion

Retropharyngeal hematoma can cause life-threatening airway obstruction [5-7]. Fatalities due to RPH have been reported [7]. Reports of RPH have been scarce in the anesthesiology literature, although it may be associated with a variety of conditions, such as cervical spine fracture [10,11], trauma to the head or neck [12,13], foreign body ingestion [14], violent cough or sneeze [15,16], carotid sinus massage [3], coagulopathy [17], anticoagulation therapy [4,18], mycotic aneurysm of the external carotid artery [19], thyroid cyst [1], and stellate ganglion block [8].

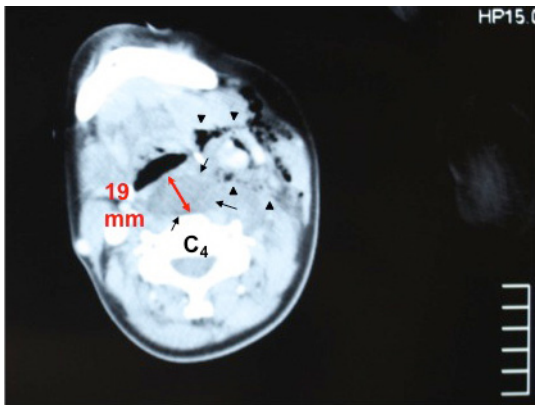

Figure 1. Contrast-enhanced computed tomography of the neck. Horizontal view. The patient was supine with her head turned to the right. This slice was taken at the upper level of the vocal cords. Red arrow indicates the distance from the ventral line of the cervical spine to the posterior wall of the pharynx. The black arrows indicate the extent of the retropharyngeal hematoma. Arrow heads indicate the hematoma and emphysema around the wound.

Retropharyngeal hematoma develops in the retropharyngeal space, which is bounded by the buccopharyngeal fascia ventrally, the prevertebral fascia dorsally and the carotid sheaths laterally. It extends caudally from the base of the skull to the posterior mediastinum at the level of T_2 to T_6 [20]. The retropharyngeal space is continuous with the parapharyngeal space [1], and normally contains loose connective tissue, lymph nodes, and fat [11,21]. The parapharyngeal space lies laterally to the pharynx and contains muscles, the carotid sheath, the vagus nerve, loose connective tissue, and fat [1]. In our patient, blood hemorrhaging from the carotid artery appears to have entered the retropharyngeal space, causing RPH.

Lateral cervical spine X-rays and CT images can provide valuable diagnostic and clinical information in the presence of RPH [12]. The maximum normal distance from the ventral line of the cervical vertebral bodies to the posterior wall of the trachea on the lateral cervical spine X-ray is 8-11 mm at C_1, 6 mm at C_2, 7 mm at C_3, 8 mm at C_4, 22 mm at C_5, 19-20 mm at C_6, and 20-21 mm at C_7 [11]. Increases in these distances indicate swelling of the retropharyngeal space. Computed tomography of the neck assists with further diagnosis, as it can help identify the nature of the swelling (including the presence of blood), and quantify lateral swelling, tracheal shift [5], and swelling of the tracheal mucosa [22]. Retropharyngeal hematoma distorts the normal anatomy of the larynx, making tracheal intubation difficult. In our patient, the CT of the neck revealed RPH from C_2 to C_4. When tracheal intubation was attempted, we could not see the vocal cords because of ventral swelling of the posterior pharyngeal wall. We could have predicted a difficult intubation from the CT images.

Symptoms and signs of RPH include sore throat, neck pain, neck swelling, dyspnea, hoarseness, and stridor. Ecchymosis can appear on the neck or anterior chest wall in some cases [8,12]. Airway obstruction in RPH is thought to be caused by swelling of the pharyngolarynx due to venous and lymphatic congestion [23,24]. The airway should be secured immediately if inspiratory stridor occurs in patients with RPH [8]. This was absent in our patient.

Massive swelling of the pharyngolarynx distorts the normal anatomy of the larynx and makes direct visualization of the vocal cords difficult. Tracheal intubation may be extremely difficult or impossible in some patients with RPH, even for experienced anesthesiologists [5,23]. Although the attendant anesthesiologist was able to intubate the trachea blindly using a stylet in our patient, the vocal cords could not be identified due to the massive protrusion of the posterior pharyngeal wall. When tracheal intubation with a laryngoscope is not possible in patients with RPH, alternative airway management techniques should be adopted. These include fiberoptic endotracheal intubation [10,12,13], the Pentax- Airway Scope® [25], percutaneous transtracheal jet ventilation [26], cricothyroidotomy [6,9], and tracheostomy [5,6,13,27]. Percutaneous transtracheal jet ventilation through the cricothyroid membrane can provide immediate oxygenation in a 'can't ventilate, can't intubate' scenario, with the additional benefit that the high intra-tracheal pressure from the jet ventilation may open the collapsed vocal cords and airway.

Here we report the case of a patient with RPH whose trachea was difficult to intubate. It is important to suspect RPH in patients with carotid arterial injury and hemorrhage. A range of alternative airway devices with which to intubate the trachea should be at hand before induction of anesthesia for patients with RPH.

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