ABSTRACT

Tracheostomised patients are at risk of several complications. The complications of tracheostomy include bleeding, stenosis, pneumothorax, tracheo-arterial fistulas and malacia. In article described the case of severe complication of tracheostomy. We report a patient who suffered life-threatening hemorrhage from an innominate artery laceration following an elective surgical tracheostomy procedure.

Keywords: Tracheostomy; complication; hemorrhage.

1. INTRODUCTION

Surgical procedures performed to secure the patency of airways include percutaneous cricothyrotomy and surgical tracheostomy. Surgical cricothyrotomy is indicated in conditions precluding oral intubation such as maxillofacial trauma, laryngotracheal trauma, and airway obstruction, as well as in situations where intubation is infeasible.
On the other hand, as compared to surgical cricothyrotomy, percutaneous dilatational cricothyrotomy represents a more practical, rapid, and less time consuming method that is being increasingly preferred by the surgeons.

Emergency tracheostomy may be a challenging intervention that may lead to development of severe complications. The arterial bleeding from tracheal stoma and pneumothorax are the perioperative early complications. Late complications of tracheostomy include stenosis, fistulas and paralysis of vocal cords [1,2].

In this presentation, we aimed to review late complications of tracheostomy on the basis of our experience with a patient who had significant bleeding late after tracheostomy.

2. CASE PRESENTATION

A 61 year old female patient had presented to the emergency room with respiratory difficulty 4 months ago after a visit to a thermal spring area. She was intubated in the emergency room and then was transferred to the intensive care unit, where she was treated and followed up with the diagnoses of pneumonia and ARDS. At that time, she was also receiving treatment with methotrexate due to rheumatoid arthritis and a possible drug induced pulmonary toxicity could not be excluded. She had a FiO2 of 90 to 95%, and SpO2 of 80 to 85 during her stay in the intensive care unit. She was referred to our intensive care unit for further diagnostic work up and therapy, while she was still intubated and under sedation. On Days 2 and 3 after she was admitted to our intensive care unit, she was weaned on and off the mechanical ventilation and her FiO2 was reduced to 45%. She was totally extubated on day 6 after her admission. During her follow up under non-invasive respiratory support, she required re-intubation due to worsening respiratory functions. The patient was re-intubated the same day. A decision was made to perform tracheostomy. In the patient, percutaneous tracheostomy in the bed was planned. Since innominate artery could be palpated at the incision line made for percutaneous tracheostomy, a surgical tracheostomy was performed by an otorhinolaryngologist in the surgery room and a length-adjusted cannula was placed due to deep-seated trachea. In the patient, for tracheostomy, an incision was made between the 2nd and 3rd tracheal rings, 1 cm below the cricoid cartilage. The risk of bleeding is high in the process under 4th and 5th tracheal rings. No bleeding during surgery and in the early postoperative period occurred. The patient could not be weaned from the mechanical ventilation and was followed in the intensive care unit for 10 days with the use of home mechanical ventilator after which she was transferred to chest disease ward. She was discharged after 3 days.

She received home mechanical ventilation through tracheostomy for nearly one month and presented to the emergency unit due to the presence of fresh blood leakage at tracheostomy site. A pulsatile bleeding was noted near the tracheostomy cannula. A jet of blood flow was observed after removal of the tracheostomy cannula, requiring re-institution of the tracheostomy cannula and inflation of the cuff to reduce the bleeding. An emergency surgery was planned and blood products were prepared for possible need during surgery.

The patient had a disposition for sleepiness with a pale skin and was taken to the operation room where cardiovascular and ENT surgery teams were ready for surgery. She was being transfused one unit of RBC while being transferred from the emergency room. She was being continuously monitored and vascular access routes were established using 14 G and 16 G cannula and infusion with colloid and crystalloid fluids was initiated. Blood pressure was also monitored. The heart rate was 100 bpm, blood pressure was 120/69 mmHg, and oxygen saturation (SpO2) was 96%. Blood gas analysis showed respiratory and metabolic acidosis, and hemoglobin was 7.4 g/dl.

She was given 100% oxygen through the tracheostomy and anesthesia was induced by fentanyl 0.1 mg, pentothal 300 mg, and esmeron 30 mg. For endotracheal intubation, after a No 7 endotracheal tube was advanced through the vocal cords, the cuff was inflated, and a sudden onset of abundant bleeding occurred as soon as the tracheostomy cannula was removed by the surgery team. Therefore, there was no massive blood in the trachea. The trachea and airway were aspirated for control. The minimal blood within the airways was removed via the entubation tube and ventilation with 100%
oxygen was provided. It was not possible to identify the site of bleeding due to the presence of intensive hemorrhage. Hypoxia has not been seen. A sudden decrease in her blood pressure was noted, and CPR was initiated due to the development of bradycardia and asystole. Sinus rhythm was re-established within one to two minutes, during which blood, plasma, and fluid infusions were continued.

At the same time, the site of the bleeding could be identified which proved to originating from the ascending aorta. A temporary clamp was placed in the aorta to stop the bleeding, and a 4-cm tear extending from the brachiocephalic trunk to the aortic arch was identified. The potential explanation proposed by the ENT surgery team suggested that the anterior tracheal wall was destructed by the tracheostomy cannula over time, leading to this clinical presentation.

A total of 7 units of RBC, one unit of platelets, 5 units of TDP, 3000 ml of crystalloid solution, and 1500 ml of colloidal solution were administered. After completion of the surgery, which lasted 2.5 hours, she was transferred to the CVS intensive care unit while she was still intubated and under sedation and was receiving noradrenaline support. At that time, she had normal blood pressure and hemoglobin of 8.0 g/dl.

A computed tomography imaging performed at 5 days after admission to the CVS intensive care unit, she had cerebral edema, and she died on postoperative day 10.

3. DISCUSSION

Bleeding rarely occurs after tracheotomy and may originate from the isthmus of the thyroid gland or anterior jugular vein depending on the type of surgical intervention. Whether percutaneous or surgical, large arterial injury should always be suspected in hemorrhage involving the site of tracheostomy. Low tracheotomies may also be associated with a risk of erosion in the innominate artery. In such cases, an initial consideration should be given to potential causes of hemorrhage such as hypertension or coagulopathies, and these should be corrected. If bleeding continues beyond 48 hours, is pulsatile at the margins of the incision, and is abundant, then injury to the innominate artery should be suspected and the cuff of the cannula should be inflated to reduce the bleeding as an initial step. A preparation for blood and plasma transfusions and for surgical interventions should be undertaken in the operation room and the tracheostomy should be checked and the cannula should be removed [1,2].

In a previous case report by Barranco et al. [3] forceps dilatation was performed during tracheostomy, and aortic rupture occurred upon the entry of the forceps into the mediastinum, leading to death after massive hemorrhage.

As a result of the anatomical variations of the innominate artery, massive hemorrhage or obstructive apnea due to tracheal compression may be seen [4]. Also, in a patient with acute massive hemoptysis, innominate artery located immediately adjacent to trachea, and bleeding resulting from tracheo-innominate artery fistula have been reported [5]. This latter condition represents a surgical emergency with high mortality and an incidence of 0.1 to 1% [4,6,7]. The risk of bleeding due to tracheo-innominate artery fistula is higher within the first 3 days after tracheostomy and after 6 weeks. It presents with abundant acute bleeding at the tracheostomy site [5,6,8,9].

Hsu et al. [10] examined a total of 100 patients undergoing tracheostomy prospectively and 14% of the cases had complications, the most frequent one being the minor bleeding (4%), followed by major bleeding (3%).

Late complications of tracheostomy include stenosis, paralysis of the vocal cords, and tracheo-esophageal, tracheo-innominate artery, and tracheo-cutaneous fistula [9,10]. Several studies and meta-analyses comparing percutaneous tracheostomy with surgical tracheostomy found that life-threatening major bleeding may occur in both techniques [10-14]. Percutaneous tracheostomy has recently gained widespread attention as an alternative to surgical tracheostomy. However, it is associated with high complication rate when performed bedside or in emergency conditions [15]. Our patient underwent surgical tracheostomy.

Nearly 4 to 65% of patients undergoing tracheostomy have been reported to endure complications. Of these, tracheo-innominate
artery fistula occurs in less than 1% as a late complication. Cannula related chronic erosions at the tracheal wall and cartilage tissues may lead to complications in the adjacency of the innominate artery [16].

4. CONCLUSIONS

In conclusions, tracheo-arterial fistula represents a rare but serious complication that is associated with a high risk of mortality. The clinicians examining tracheostomised patients must be more vigilant for serious complications. In patients with a suspicion of such complications, surgical treatment is indicated. After adequate preparation for severe and difficult-to-control bleeding, surgery should be undertaken.

CONSENT

As per international standard or university standard, patient’s written consent has been collected and preserved by the author’s.

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES
