Bilateral Tension Pneumothorax in a Child during Laser-Assisted Supraglottic Laryngectomy: A Case Report

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Abstract

We describe a case of intraoperative bilateral tension pneumothorax and diffuse subcutaneous emphysema in a child during supraglottic laser surgery. The case described was a 6-year old boy scheduled for supraglottic laser surgery due to burning-related tracheal stenosis. The patient was scheduled for operation with previous tracheostomy that ultimately led to rapidly progressive O2 de-saturation and bradycardia. The palpation of the chest wall revealed diffuse subcutaneous massive emphysema. Decreasing of breath sounds was also detected and the chest was bulged immobile bilaterally suggesting tension pneumothorax that was successfully managed by decompression by intercostal needling and medications for hemodynamic stability. Tension pneumothorax due to iatrogenic interventions even laser-based repairing operations is expectable, but can be successfully managed by early compensating managements.

Introduction

Tension pneumothorax is an infrequent and life-threatening clinical condition. The overall incidence of this event remains understood, however about 1 to 3 percent of patients hospitalized especially in intensive care units or undergoing iatrogenic traumas suffer from this phenomenon [1,2]. The main causal mechanism for occurring tension pneumothorax is creating a one-way communication between the pleural cavity and lung parenchyma that result in air entrapment in the pleural cavity [3]. The major concern related to tension pneumothorax is its definitive diagnosis only based on clinical manifestations as well as early managerial approach for its removing by urgent thoracic decompression [4]. Moreover, it has been demonstrated that its inappropriate treatment may lead to devastating and irreversible consequences [5,6]. The appearance of tension pneumothorax among children may be due to different conditions such as lung parenchyma vulnerability because of using mechanical ventilation or post-end-expiratory pressure, congenital diaphragmatic hernia predisposing neonate to diaphragmatic defects followed by barotrauma and pneumothorax or iatrogenic causes following invasive or even minimal invasive therapeutic procedures [7]. Therefore, the occurrence of tension pneumothorax is not uncommon event following trauma associated with surgical interventions, however occurrence during laser surgeries is very rare especially when these interventions are not related to thoracic surgery. Herein, we describe a case of intraoperative bilateral tension pneumothorax and diffuse subcutaneous emphysema in a child during supraglottic laser surgery.

Case Report

The case described was a 6-year old boy weighing 30 Kg with previous tracheostomy and tracheal stenosis due to swallow burning substances that scheduled for supraglottic laser surgery. According to the parents’ expression, he had swallowed burning substances at the age of two leading grade III esophageal stenosis with impossibility of dilatation. Due to development of respiratory distress and cyanosis, tracheostomy was indicated for the patient and 5 months later, he underwent gastric pull up surgery. During the pointed time, he was assessed regularly by laryngoscope that in the last assessment, subglottic stenosis and adhesion of base of tongue on the right side and just the gastric anastomosis orifice was discernible and on the left side it was indiscernible remains of larynx. The TVC and glottic structure were normal in retrograde fiberoptic assessment.

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Figure 1: A lateral view of glottic structure and tracheostomy inserted.

Figure 2: Bilateral immobile bulging chest suspecting tension pneumothorax

Discussion

Tension pneumothorax is a mortal phenomenon which characterized by progressive hemodynamic instability such as tachycardia, hypotension, and respiratory distress. If progress or remains untreated timely, it may result in sudden cardiopulmonary collapse and sudden death, unless immediate decompression is scheduled. The main fundamental of occurring tension pneumothorax is imbalance and incompatibility in air spaces in which When a one-way valve is created between the lung and the pleura, air accumulates in the pleural cavity during the respiratory cycle and the consequent increase in intrapleural pressure interferes with the effective expansion of the lung on the side of pneumothorax. Eventually, the pressure in the pleural cavity increases aggravating to lung collapse along with compensatory deviating the heart and mediastinum to other side, compressing vena cava and disturbing venous pattern and reducing cardiac output followed by mismatching ventilation-perfusion balance and therefore occurring acidosis, hypoxemia, shock and even cardiac arrest [7]. The overall incidence of tension pneumothorax is rare, but widely varies because of its wide etiological basis. According to the literature, the incidence of this event ranged widely from 0.5%–35.9% [8-10]. However, early diagnosis and immediate treatment will help the patient survive. There is not enough information about the occurrence of this incident following various types of surgery, especially laser surgery; however, to the best of our knowledge, the present report is the first described occurring tension pneumothorax following supraglottic laser surgery for tracheal stenosis due to swallow burning substances in a child. However, some cases of tension pneumothorax due to iatrogenic causes have been previously presented. In a case described by Ashaal et al. [11], tension pneumothorax occurred following an endoscopic retrograde cholangiopancreatography leading duodenal perforation that was successfully managed by inserting chest tube followed by laparotomy.
Conclusion
Finally, it can be concluded that tension pneumothorax following surgical procedures can be fatal due to progressive compression of cardiopulmonary system unless rapid decompression of the system and sustain the patient’s hemodynamics.

Author Contributions
Sehat Kashani S., Farahmand Rad R., Mohseni M., Derakhsh P and Amniati S. contributed to the design and implementation of the research, to the analysis of the results and to the writing of the manuscript. Ahmadi A., designed the approach of surgery. Saidi H selected the patient and analyzed the clinical data. Khosravian G and Milanifar M analyzed the laboratory data and and drafting of the manuscript. Hassani V., critical revision of the manuscript for important intellectual content.

Conflicts of Interest
The authors report no conflicts of interest.

References