

Post Anesthetic Extubation Pulmonary Edema-Hemorrhage: A study of three Cases

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Article information	Abstract
<p>Article history: Received: 22 Jan 2012 Accepted: 15 Mar 2012 Available online: 5 Nov 2012 ZJRMS 2013; 15(4): 78-81</p> <p>Keywords: General anesthesia Pulmonary edema Pulmonary hemorrhage</p> <p>*Corresponding author at: Department of Internal Medicine, Birjand University of Medical Sciences, Birjand, Iran. E-mail: gmortazavi@yahoo.com</p>	<p>Background: Post extubation pulmonary edema and hemorrhage is an uncommon condition. In order to have good insight to the condition it will review the clinical course of 3 cases.</p> <p>Cases presentation: Undergoing surgery on one healthy middle age woman with lumbar disc herniation, and two young men (one with renal stone and one with varicocele) complicated by postextubation pulmonary edema and hemorrhage. Dyspnea and agitation were the main symptoms. Thacypnea, cyanosis, and hemoptesis were the main signs. Onset was rapid and all patients were managed conservatively by rest, supplemental O₂, and hydrocortisone. Initial chest X-ray showed patchy, acinar infiltration in all three cases. All patients were improved rapidly within 24 to 48 hours and CXRs were fully cleared without any consequences.</p> <p>Conclusion: Considering the pulmonary edema and hemorrhage as a consequence of postextubation laryngospasm, so anesthesiologist have to place in the good insight to preventing the condition and watch all patients in post operative period at least for 2 to 6 hours.</p> <p>Copyright © 2013 Zahedan University of Medical Sciences. All rights reserved.</p>

Introduction

Hemoptesis represents a fear condition facing patient and physician. Diffuse alveolar injury has been among the worse condition resulting in hemoptesis. Vasculitis, poisoning, mechanical stress on alveolar membranes are among the common causes of diffuse alveolar injury and hemoptesis [1]. Pulmonary edema and hemorrhage due to negative intrathoracic pressure following post anesthetic extubation laryngospasm is one example of the mechanical stress on alveolar membranes but is relatively rare phenomenon [2-5]. Despite of the negative pressure pulmonary edema and hemorrhage (NPPE) due to upper airway obstruction is a well recognized problem and has been described in the literatures [6, 7], reporting the new cases leads to better understanding and preventing the condition. Here is report of NPPE following postanesthetic extubation laryngospasm in three patients with light surgical procedure. Such cases description after light surgical procedure especially in those with physically good health can help physician to prevent similar incidences.

Case presentation:

Patient No 1: A 22-year-old young soldiers and athletes man referred to a surgeon and admitted in hospital due to varicocele. He has no history of any previous illness. Consultation with the anesthesiologist determined that the risks of surgery and anesthesia are low. So surgery was performed under general anesthesia and there were no complications during surgery. Considering the favorable hemodynamic conditions after anesthesia, endotracheal

tube is removed. Following extubation, temporary cyanosis occurred and then rapidly improved. But, after a few minutes, oxygen saturation decreases again and is accompanied by a cough with foamy bloody sputum, respiratory distress, cyanosis and agitation. The patient's chest radiograph is taken. The chest X-ray showed patchy alveolar pattern involvement of both lungs (Fig. 1A), so pulmonologist consultation was requested. The patient was transferred to the pulmonary ward and placed under close observation and O₂ saturation surveillance. With a few hours of conservative care all symptoms including cyanosis and O₂ saturation improved and pulmonary hemorrhage stopped. Chest X-ray was performed on the next day and showed significant radiographic improvement (Fig. 1B). Laboratory evaluations, including platelet count and coagulation tests, blood urea nitrogen and urine analysis and also diagnostic tests of vasculitic diseases including ANA, ANCA, RF, and anti GBM were performed with no any abnormalities in all of them. As with good condition on the forth days of admission, the patient was discharged and followed one month later. He is in well condition and without consequence sequels now.

Patient No 2: A 55-year-old woman referred to a surgeon and was admitted in hospital for surgery of lumbar disc herniation. Consultation with the anesthesiologist before surgery was performed. Obesity was the only risk factor for anesthesia. Patient was transferred to the operating room and placed under general anesthesia for surgery and surgical procedure was

completed without complication. After surgery the patient was transferred to the recovery room. When the patient's level of consciousness improved, endotracheal tube was removed. A few minutes after extraction of the endotracheal tube, respiratory distress, restlessness, cyanosis and also bloody productive cough was developed. Oxygen saturation is reduced and therefore the chest radiograph is performed to evaluate the patient. Chest radiograph showed a normal heart size, but patchy infiltration with alveolar pattern was observed on both lung field (Fig. 2A).

Pulmonologist consultation is done and the patient transferred into pulmonary ward for more evaluation and care. With several hours of conservative care, significant improvement occurs and everything including CXR and O₂ saturation come back to normal on the next day (Fig. 2B). As regards of the symptoms were completely resolved the patient was discharged after a few days. Because there was previous experience of similar condition, further diagnostic investigations were not considered and the patient was discharged with good condition and subsequent follow-up showed that the patient has no problems of the respiratory system.

Patient No 3: A 30-year-old man who was admitted to the hospital for his kidney stone operation. He has no history of respiratory or systemic disease and therefore no risk of anesthesia is considered. Patient was transferred to the operating room and the surgery is performed under general anesthesia. There was no problem during the operation. The patient was transferred to the recovery room after ending of the operation. When the level of consciousness was improved and respiratory and hemodynamic status stabilized, endotracheal tube is removed. Respiratory distress, cyanosis, restlessness, cough and foamy and bloody sputum appear after a brief time of tube extraction. Oxygen saturation drops and CXR shows bilateral patchy alveolar infiltration (Fig. 3A). Significant clinical improvement occurred after several hours of conservative care. The patient was discharged two days later with well status. Subsequent follow-up showed that the patient suffers from mild asthma but with normal CXR. The patient is currently being on treatment with a low dose of inhaled corticosteroids and bronchodilators with good control of asthma symptoms.

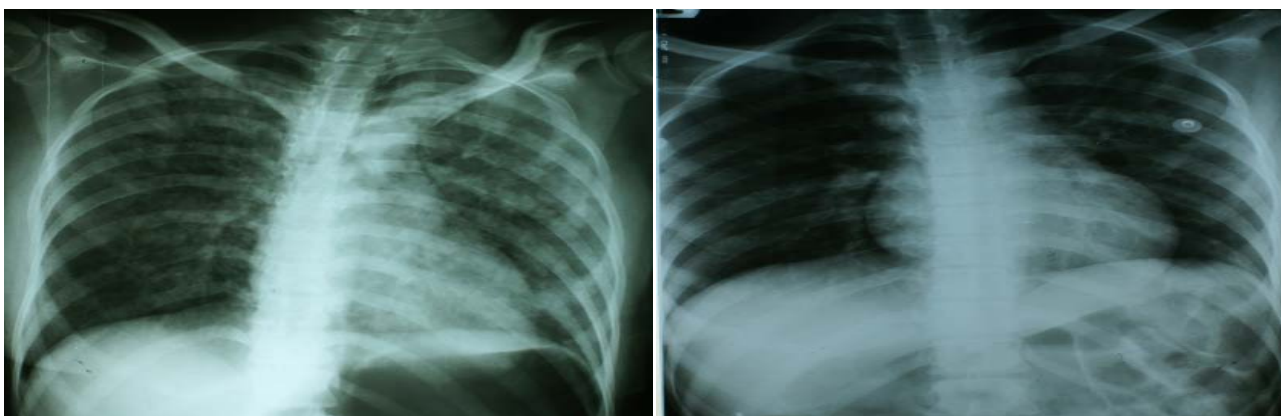


Figure 1 (A). Initial CXR showed patchy, acinar infiltration **(B).** 24 h later CXRs were cleared

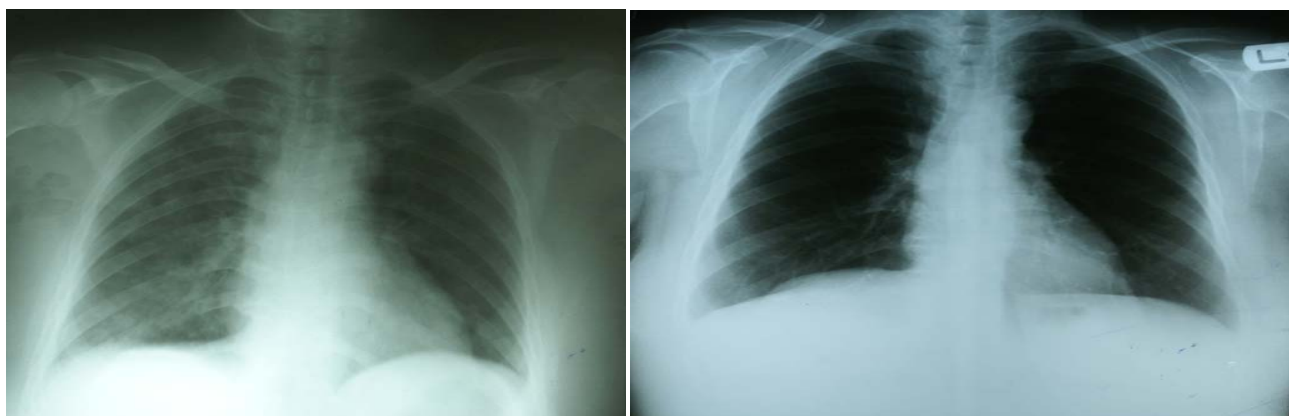


Figure 2 (A). Initial CXR showed patchy, acinar infiltration **(B).** 24 h later CXRs were cleared

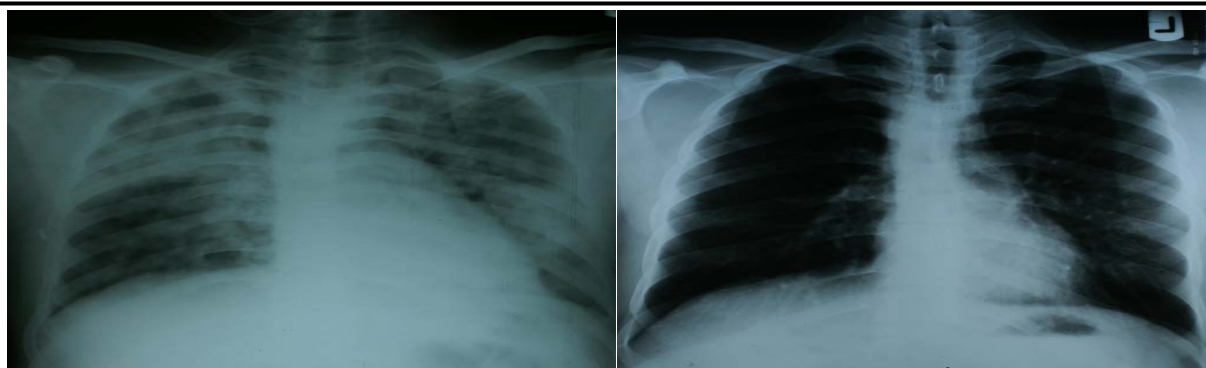


Figure 3 (A). Initial CXR showed patchy, acinar infiltration **(B).** 24 h later CXRs were cleared

Discussion

All three patients presented with acute respiratory failure and bloody sputum in the recovery room. Although the patients had severe symptoms at first, but all three patients were quickly improved. Such a phenomenon should be directly related to a physical injury of tracheobronchial or alveolar wall and is unlikely to result from systemic reactions such as inflammation or coagulopathy. It seems that forced inspiration against postextubation laryngospasm result in mechanical stress on the alveolar wall and pulmonary edema, hemorrhage and hemoptysis. This condition is known as negative pressure pulmonary edema and hemorrhage (NPPE) [5].

None of them had a history of respiratory problems and risks of anesthesia and surgery was low in all of them. Furthermore, in all three cases the operation was performed under general anesthesia, but surgical procedures were light and short.

The diagnostic investigation was conducted for the first case which revealed no evidence of systemic disease. The second and third patients had similar conditions, so there wasn't need for further diagnostic workup.

There are several reports about negative pressure pulmonary edema [6, 7], but it is rarely followed by diffuse alveolar or tracheobronchial bleeding [8, 9]. In general, in all such situations, pulmonary edema, with or without tracheobronchial and alveolar hemorrhage occurs when a strong respiratory maneuver (Mueller maneuver) is associated with upper airway obstruction [10]. In strong individual, negative intrathoracic pressure may decrease to -100 H₂O during the Mueller maneuver [10]. This high negative pressure is transmitted to interstitial lung tissue and also to alveolar wall. When such strong maneuver is performed against laryngospasm can cause serious damage to tracheobronchial tree and alveolar memberan. The effect of this pressure results in mechanical damage to capillary network of alveolar or tracheobronchial wall, and bleeding into alveolar and tracheobronchial space. This damage is called stress failure. Bleeding after extubation can be also derived from wall of tracheobronchial tree [11]. But in such cases the source of bleeding is from the tracheobronchial artery. Bronchoscope is used to determine the source of bleeding [12]. Bronchoscope was not performed for the present patients and did not seem to help the patient management.

In such cases it is often sufficient to perform a CXR and or lung HRCT. Type of involvement is alveolar and in contrast to cardiogenic pulmonary edema more central. Lung HRCT scan is more accurate than CXR in determining the distribution of pulmonary edema [10].

Creation of respiratory distress, cyanosis and restlessness occurred shortly after extubation and was followed by pulmonary edema and hemoptysis. Faced with such symptoms to the doctor and the patient are very uncomfortable and aggressive treatment may considered. However the present cases improved only with conservative management. Aggressive treatment is rarely necessary in acute phase in most case reported. However, the use of PEEP and mechanical ventilation may be necessary in some patients [4].

A major long standing complication occurred in one of the patients was mild asthma during follow up after discharge. Subsequent morbidity and mortality has not been reported and there have been no reports of subsequent asthma in patients with NPPE until now. So it can not be a direct correlation between postoperative pulmonary edema and subsequent bronchospasm, but studies in animals suggest that lung injury may release cytokines that is able to be effective in creating long lasting complication [13].

Prevalence of pulmonary edema and hemorrhage after extubation appears to be much higher than available reports and its prevalence is likely to be at least 1% [14]. One point is the more common of the condition in young and athlete's people. Its prevalence is similar in men and women [15]. Its prevalence is probably lower in the surgery of the abdomen and chest [3]. By reviewing the related literatures in English there were no reports of this complication in surgeries on chest.

Conclusion: Due to possibility of such complication as a consequence of postextubation laryngospasm after surgery, it is necessary to consider the related risk factors including young and athletic patients undergoing surgery. So the anesthesiologist have to place in the good insight to preventing the condition and watch all patients in post operative period at least for 2 to 6 hours.

Authors' Contributions

All authors had equal role in design, work, statistical analysis and manuscript writing.

Conflict of Interest

No conflict.

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