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Pnömotorakslı Olguda Torakotomisiz Kollabe Akciğerin Pozitif Basınçla Ventilasyonu

Ventilation of collapsed lung by positive pressure avoiding thoracotomy in a case with pneumothorax

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Özet

Primer spontan pnömotoraks genç, zayıf, önikoid ve sigara kullanan bireylerde sık görülür. Patolojisinde sıklıkla akciğer apeksine yerleşen subplevral bleblerin rüptüre olması suçlanmaktadır. En sık semptomları göğüs ağrısı, nefes darlığı ve öksürüktür. Tanıda BT altın standarttır. En yaygın tedavi şekli tüp torakostomidir. Cevap alınamayan vakalarda torakotomi yapılmaktadır. Bu sunuda pozitif basınçlı ventilasyon sonrası akciğer ekspanse oldu. Torakotomiden vazgeçilen vakayla ilgili tecrübemizi literatür eşliğinde paylaşmayı istedik.

Anahtar Kelimeler: Primer spontan pnömotoraks, torakostomi, pozitif basınçlı ventilasyon

Abstract

Primary spontaneous pneumothorax is common in young, skinny, önikoid, and smoker person. Pathology is often blamed to have ruptured move the subplevral settled in lung apex. The most common symptoms are chest pain, shortness of breath and cough. BT is the gold standard in diagnosis. The tube thoracostomy is most common treatment. Thoracotomy is treatment of failed to respond. İn this presentation, lung was exspanse after positive pressure ventilation. We wanted to our experience accompanied by literatür about abandoned case thoracostomy.

Keywords: Primary spontaneous pneumothorax, thoracostomy, positive pressure ventilation

INTRODUCTION

Pneumothorax is a pathological condition in which free air penetrating between visceral and parietal pleura causes collapsed lungs. This condition can occur spontaneously or iatrogenically or due to trauma (1). Primary spontaneous pneumothorax mostly occurs in young adults and individuals who have no underlying lung disease. The most common mode of treatment is tube thoracostomy, however, thoracotomy is performed in individuals who do not respond to tube thoracostomy or have serious air leak (2).

This case study aims to present a patient who did not respond to thoracostomy, who had prolonged air leak and was planned thoracotomy after bronchoscopy in light of literature data. Thoracotomy was cancelled for this patient as the collapsed lung was expanded by positive pressure ventilation before the surgery.

CASE

Twenty one year old male patient who was admitted to thoracic surgery clinic was urgently taken to surgery due to acute respiratory problem and shortness of breath. Patient history showed that the patient was admitted to the emergency service due to chest pain one week before. He was treated and followed-up in the service with the diagnosis of right spontaneous pneumothorax and was inserted a chest tube. Follow-up of the patient showed increased air leak and nearly total collapse of the right lung. Fiber optic bronchoscopy (FOB) was

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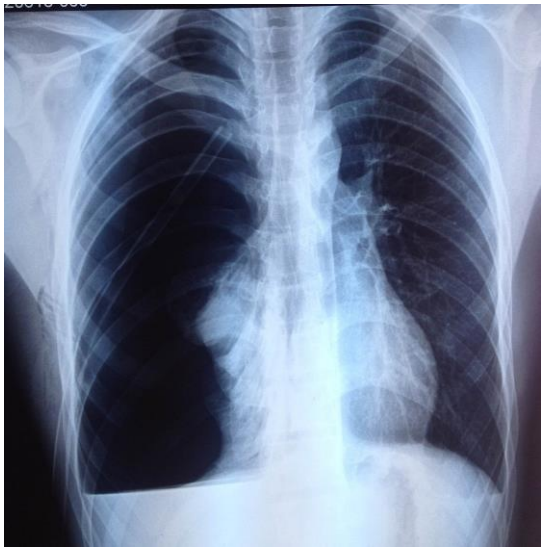
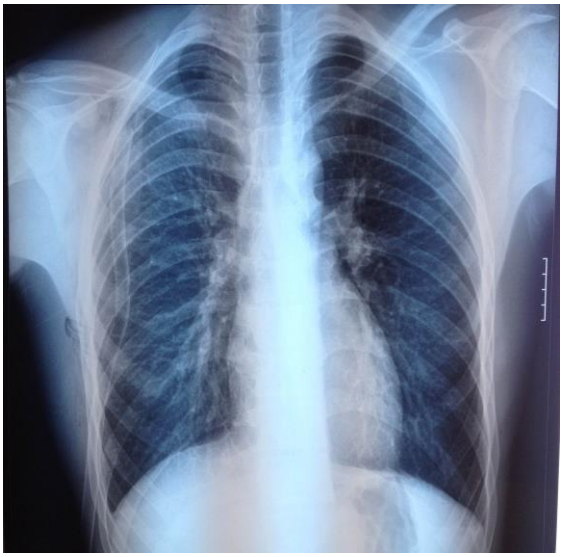
planned to evaluate bronchial tree in terms of continuity and mucus plug (Image 1).



The patient was tachycardic, sweating cold and short of breath. No breath sound was heard from the right lung. The patient was conscious and was learnt to have adequate fasting time and have no other health problems. Following anesthetic induction using 1 mg midazolam, 1,5 µg /kg fentanyl, 2mg/kg propofol and later 0.5 mg/kg rocuronium, the patient was conveniently intubated in 3 minutes at the first attempt using a cuffed tube with an internal diameter of 7.5 mm. Anesthesia was maintained by 50% N2O/ O2 and 1-2% sevofluran. Tracheal and bronchial structures were evaluated by inserting FOB through the endotracheal tube. As the integrity of bronchial structure was entirely evaluated and no occlusive structure was observed, thoracotomy was planned. However, as a last chance, positive pressure was planned by moving the tube into the right bronchus. The tube was moved to the right lung with fiber-optic guidance. APL valve was set to 40. It was ventilated manually for one minute adjusting peak pressure to 40-50cm H_2O creating 500-550 mL tidal volume. Oxygen saturation level of the patient did not fall below 90% during this procedure. Chest movements were seen; breath sounds were heard from the right lung. Portable lung graph showed that the collapsed lung was expanded (Image 2).



Endotracheal tube was withdrawn and bilateral lung ventilation was started. It was observed that chest movements were equal. Thoracotomy was cancelled for the patient. The patient was decurarized with neostigmine and atropine after spontaneous respiratory activity was observed. The patient was extubated after reaching sufficient respiratory depth and was taken to intensive care unit for close follow-up. After a problem-free intensive care follow-up, the patient was discharged from the hospital with improvement.

DISCUSSION

Primary spontaneous pneumothorax (PSP) is common at the age of twenties (3). The condition occurs more commonly in males and smoking increases the risk of PSP in both genders (2). Topdağ et al. reported that the prevalence of PSP was 85% in males and that majority of these were smokers (2). The literature also contains studies reporting familial predisposition (4). Our patient was a young, thin and a tall male and was a smoker.

Rupture of sub pleural blebs in lung apex are frequently are blamed for the pathophysiology of PSP (2). On the other hand, it is believed that bleb formation is

caused by alveolar damage occurred due to the circulatory disturbance and increase of negative pressure in apical region. Furthermore, the fact that pressure difference between lung basal and apex cause bleb and bullae formation explains its high prevalence in tall and thin individuals.

In the clinic, patients describe sudden onset of pleuritic chest pain. Symptoms may also include shortness of breath and coughing. Findings of physical examination include tachycardia, sweating, decreased or no breath sounds in auscultation (2). Anamnesis and physical examination findings are important for the diagnosis. Postero-anterior lung graphs taken in standing position are valuable. Image of visceral pleural line that is separated from the chest wall is a diagnostic finding. However, computerized tomography (CT) is the gold standard. CT makes it possible to evaluate parenchyma more clearly (5). Our patient was admitted to the hospital due to sudden onset of chest pain, which was followed by respiratory problem, tachypnea and tachycardia.

The primary aim of the treatment should be to improve the clinic of the patient. To this end, air in pleural voids should be removed, the lung should be sufficiently expanded and recurrence should be prevented (2). Conservative treatment is adequate for the patients with a good general condition who have a pneumothorax that is smaller than 15-20%. Oxygen therapy applied during this period has been reported to contribute to healing (6). Although needle aspiration and percutaneous drainage are other treatment methods, tube thoracostomy is an effective treatment method in medium and large pneumothorax (2). Surgical methods such as VATS (video aided thoracoscopic surgery) or thoracotomy are used in case of an air leak that continues for more than seven days, previous history of pneumothorax in the other lung, bilateral and recurrent pneumothorax (2, 7). Bullae and blebs on the apex are followed by the surgery. Pleurodesis is an effective method to prevent recurrence. This procedure, in which pleural leaves are bonded, is performed chemically or by pleural ablation using partial or total pleurectomy (8). Our patient received tube thoracostomy treatment for one week. As he did not respond to tube thoracostomy and experienced considerable respiratory problems, bronchoscopy was planned for the patient. Thoracotomy was planned according to the result of the bronchoscopy.

Independent lung ventilation is one of the rarely used modes of mechanical ventilation. It is used when it is necessary to apply different pressure on both lungs and in case of ventilation perfusion disorders. Furthermore, it has also been used to improve or prevent the development of atelectasis (9). Koyuncu et al. used this method in a patient who developed unilateral extensive atelectasis and concluded that the method was highly beneficial to open unilateral extensive atelectasis (9). A review of the literature did not find applying positive pressure ventilation towards collapsed lung in pneumothorax treatment. No pathology was seen in terms of the continuity of bronchial tree or mucus plug after fiber optic bronchoscopy. We moved our tube towards the collapsed lung as a last change for the patient who was planned to undergo thoracotomy. We have ventilated manually for almost one minute with positive pressure and high tidal volume based on the principle of opening the atelectasic area. It was observed that the collapsed lung was expanded, water-seal chest drainage system continued to work. PA chest graphs confirmed that the lung was adequately ventilated.

Mechanical ventilation with long term high pressure and tidal volume is known to cause barotrauma and parenchyma damage. We have taken into account that positive pressure ventilation we have applied might have caused damage. We have observed no pathology after the procedure we applied as a last chance. Double lumen tube provides surgical comfort and safe ventilation in pulmonary patients who are planned to undergo thoracotomy (10). We have considered intubation using a double lumen tube in our patient. However, we have intubated the patient with single lumen tube as the patient was operated at emergency conditions and thoracotomy decision would be taken following bronchoscopy.

In conclusion, ventilation of collapsed lung with positive pressure may be beneficial as a last chance before thoracotomy for almost totally collapsed lungs with prolonged air leak despite the thoracostomy which give no pathological condition in bronchoscopy. However, it should be considered that insistent and long-term attitude can harm the patient and lead to increased complications.

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