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Life-threatening primary simultaneous bilateral spontaneous tension pneumothorax, successfully managed with single-stage bilateral video-assisted thoracoscopic surgery

Tek aşamada iki taraflı video yardımlı torakoskopik cerrahi ile başarıyla tedavi edilen yaşamı tehdit edici primer simultane iki taraflı spontan tansiyon pnömotoraks

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ABSTRACT

Primary spontaneous pneumothorax is a common disease in clinical practice and occurs most often in slender young males. Clinical presentation of primary spontaneous pneumothorax can be variable, there may be no symptoms, or mild chest pain, dyspnea or tension pneumothorax may be present. Primary spontaneous pneumothorax is rarely life-threatening; however, if this condition develops as the bilateral tension type, the patient may deteriorate abruptly, significant respiratory distress may develop, and this condition may become life-threatening. In this article, we report a 16-year-old male patient with simultaneous bilateral spontaneous tension pneumothorax and with no definite underlying lung disease. Patient presented with loss of consciousness, cyanosis, and hemodynamically unstable state, and was successfully treated with immediate closed thoracostomy drainage along with simultaneous single-stage bilateral video-assisted thoracoscopic surgery.

Keywords: Bilateral pneumothorax; pneumothorax; tension pneumothorax; video-assisted thoracoscopic surgery.

ÖZ

Primer spontan pnömotoraks klinik uygulamada yaygın bir hastalıktır ve çoğunlukla zayıf genç erkeklerde görülür. Primer spontan pnömotoraksın klinik görünümü değişken olabilir; semptom olmayabilir veya hafif göğüs ağrısı, dispne ve tansiyon pnömotoraks olabilir. Primer spontan pnömotoraks nadiren yaşamı tehdit edicidir; diğer yandan, bu durum iki taraflı tansiyon tipinde gelişirse hasta aniden kötüleşebilir, anlamlı solunum stresi gelişebilir ve bu durum yaşamı tehdit edici bir hale gelebilir. Bu yazıda, simultane iki taraflı spontan tansiyon pnömotoraksı olup altta yatan kesin bir akciğer hastalığı olmayan 16 yaşında bir erkek hasta bildirildi. Hasta bilinç kaybı, siyanoz ve hemodinamik bakımdan istikrarsız bir durum ile başvurdu ve simultane tek aşamada iki taraflı göğüs tüpü yerleştirme ve video yardımlı torakoskopik cerrahi eşliğinde tedavi edildi.

Anahtar sözcükler: İki taraflı pnömotoraks; pnömotoraks; tansiyon pnömotoraks; video yardımlı torakoskopik cerrahi.

Primary spontaneous pneumothorax (PSP) is a common clinical condition and rarely life-threatening; however, bilaterally developed PSP is a very rare life-threatening condition that requires prompt diagnosis and treatment. Furthermore, aggressive surgical approaches to overcome this critical situation and prevent recurrence are mandatory.

CASE REPORT

A 16-year-old male patient presented at our Emergency Department with loss of consciousness, cyanosis, and hemodynamically unstable state. Patient was a high school student. He suddenly collapsed during a lesson in school and was brought to our hospital by ambulance. During the ambulance ride, the emergency

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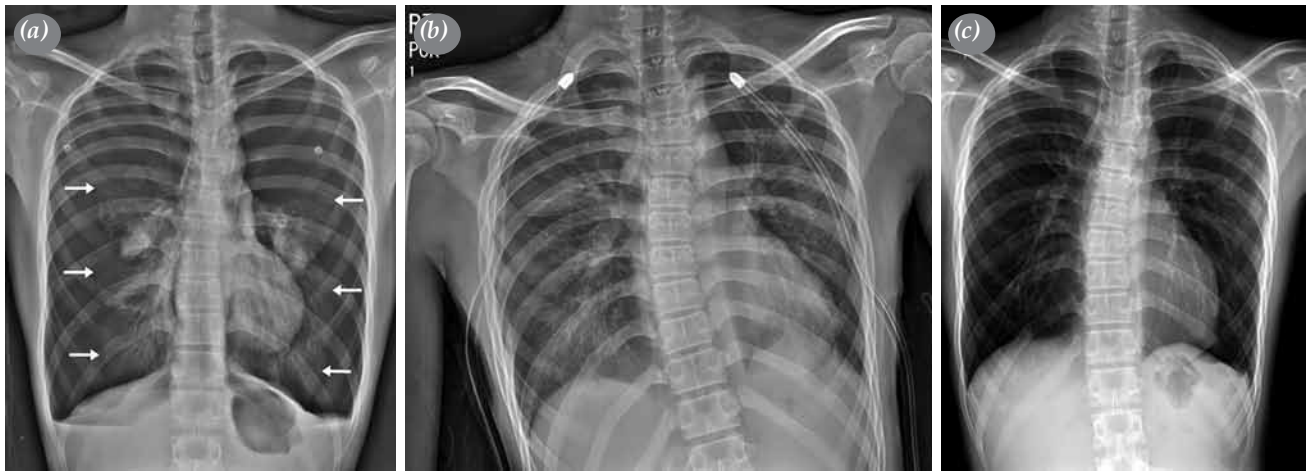

Figure 1. Chest anteroposterior and posteroanterior view. **(a)** At admission to Emergency Department. Note both totally collapsed lungs and downward deviation of bilateral diaphragms. White arrow indicates visceral pleural line. **(b)** After closed bilateral thoracostomy drainage using 24-Fr chest tube in Emergency Department. Note both fully expanded lungs. **(c)** Improved condition five days after video-assisted thoracoscopic surgery.

medical technicians made great efforts to maintain airway and respiration with an artificial respiration unit and supplemental oxygen due to slow respiration, low peripheral capillary oxygen saturation (SpO_2), and cyanosis. According to the school teacher in charge, he was a very healthy non-smoker who did not have specific diseases or any history of operation. His mental state was drowsy to stuporous at presentation. His blood pressure was 70/40 mmHg, pulse rate 128 beats/minute, respiratory rate 36/minute, body temperature 36.8 °C, and Glasgow coma score 12 points. Detailed physical examination revealed that he was very slender and that bilateral lung sounds were faint but equivocal. At initial presentation, laboratory tests revealed white blood count to be 9,800/uL and hemoglobin to be 13.6 g/dL. Peripheral oxygen saturation was 78% despite high oxygen supply, and arterial blood gas analysis (ABGA) results were as follows: pH: 7.16; arterial oxygen partial pressure (PaO_2): 42 mmHg; arterial carbon dioxide partial pressure ($PaCO_2$): 72 mmHg; and SpO_2: 78%. The initial anteroposterior view of plain chest radiographs revealed bilateral tension pneumothorax (Figure 1). Written informed consent was obtained from the patient.

After closed bilateral thoracostomy, mental state improved dramatically to the alert level. Furthermore, follow-up ABGA results were: pH: 7.41; PaO_2: 157 mmHg; $PaCO_2$: 44 mmHg; and SpO_2: 99%. Persistent air leak through both chest tubes were noted and high-resolution lung computed tomography showed multiple bullae in both upper lung fields (Figure 2). On the fourth admission day, bilateral wedge resections were successfully performed using bilateral video-assisted thoracoscopic surgery (VATS) via the standard three-port technique. The postoperative course was

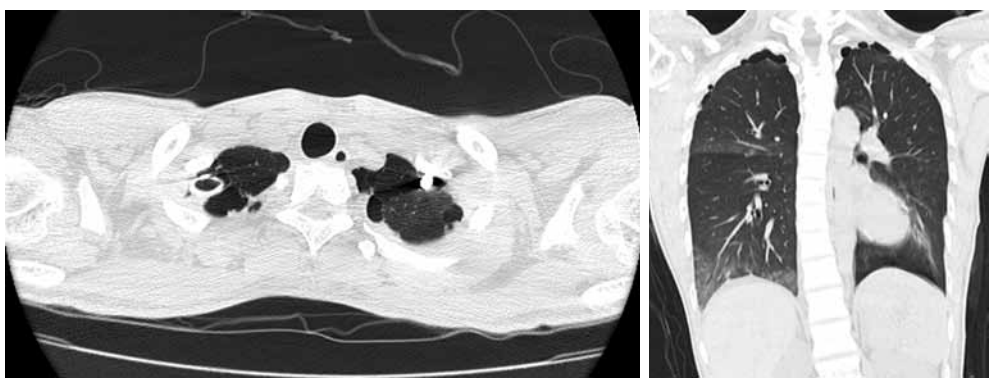

Figure 2. High-resolution computed tomography view shows multiple bullae in both upper lung fields.

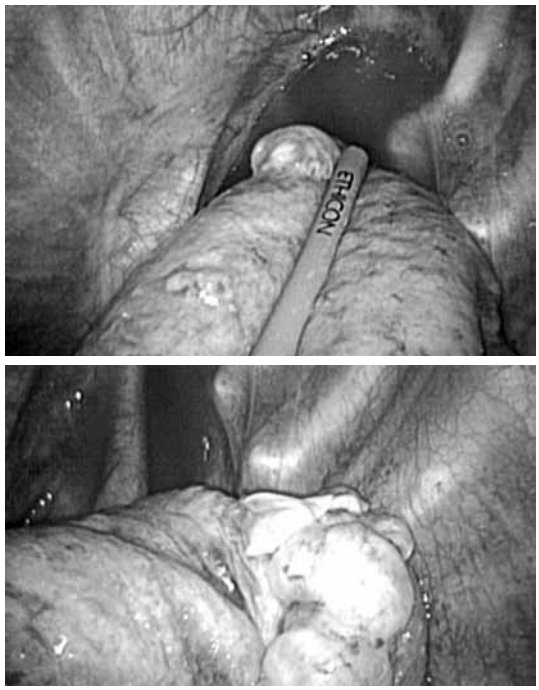

Figure 3. Intraoperative view with video-assisted thoracoscopic surgery. Note a large ruptured bulla and multiple bullae in upper lung field.

uneventful, and the chest tubes were removed on the sixth day. The patient improved without any sequelae and was discharged from the hospital on the seventh postoperative day. There was no evidence of recurrence of pneumothorax on either side during the six-month follow-up (Figure 3).

DISCUSSION

Pneumothorax is defined as the presence of air in the pleural space, causing the loss of the negative subatmospheric intrapleural pressure and partial or total lung collapse.[1] Simultaneous bilateral pneumothorax (SBP) is relatively rare. It can be categorized according to etiology as spontaneous (primary or secondary), traumatic, or iatrogenic; although most of the SBP cases occur as traumatic, iatrogenic, or secondary, but not primary. Other causes of SBP have been reported in the literature, which include tumor, catamenial pneumothorax, sarcoidosis, pregnancy, and radiation.[2] Primary SBP, either non-simultaneous (i.e., contralateral recurrence) or simultaneous, has a reported prevalence of 7.8% to 20% in patients who have pneumothorax.[1,3] Simultaneous bilateral primary spontaneous pneumothorax (SBPSP) is extremely rare, and most of the reported cases are in case studies or more general reports of conditions associated with SBP. Lee et al.[4] reported that among the 616 patients with 807 episodes of PSP, only 13 had SBPSP (1.6%) at first presentation and that all the SBPSP patients were male (mean age, 20.9±4.7 years; range, 16 to 25 years). They also stated that only one patient with SBPSP presented with tension pneumothorax as in our case and that SBPSP can result in a severely deteriorated condition, usually requiring intubation or resuscitation. Patients with bilateral pneumothorax may deteriorate rapidly, so early diagnosis and emergency drainage are recommended when SBP occurs.[2] Our patient was first presented to the Emergency Department with severe dyspnea and respiratory distress of unknown origin, so we performed a detailed and thorough physical examination. Furthermore, he experienced critically life-threatening events, such as loss of consciousness, cyanosis, and impending respiratory arrest. The first clinical impression was tension pneumothorax; however, breath sounds were faint or equivocal in the entire lung field, which made it difficult to establish a correct diagnosis. During initial management, we immediately obtained the portable chest anteroposterior view, which showed that PSP progressed to bilateral tension pneumothorax. Early diagnosis and emergency drainage are always recommended when SBP occurs.[2] Patients with PSP who have a lower body mass index and bilateral blebs/bullae are at higher risk of developing SBPSP. For the treatment of SBPSP, the surgical approach is considered essential and mandatory, because this condition has a high risk of recurrence and might lead to respiratory failure. It is considered that standard surgical approaches to the management of SBPSP include open thoracotomy, median sternotomy, and VATS, which may be undertaken simultaneously as a single-stage operation or as staged procedures. In many recent reports, surgical bullectomy and pleural abrasion of the lung apex through the VATS technique have been effective in reducing the risk of recurrence of PSP. Single-stage bilateral VATS offers several advantages in treating SBPSP. First, a smaller incision is required as compared to classical transaxillary minithoracotomy (TAMT), which generally results in less pain. Second, the cosmetic effect is superior to that of TAMT. Third, the VATS technique can involve all procedures, including wedge resection, mechanical pleurodesis, and chemical pleurodesis. Finally, with the development and improvement of surgical devices, surgeon's skill, and anesthetic care, the simultaneous bilateral operation is recommended for the treatment SBPSP using the VATS technique, not staged technique.[2,5] A successful simultaneous VATS approach in the supine position has been

reported; however, there is argument as to which position (lateral versus supine) is better.[6]

This case highlights the potential difficulty in diagnosing simultaneous bilateral primary spontaneous pneumothorax and the necessity for prompt chest radiography when managing such presentations in the acute setting. Furthermore, bilateral simultaneous video-assisted thoracoscopic surgery is a safe and effective procedure for simultaneous bilateral primary spontaneous pneumothorax which needs urgent assessment and management.

Declaration of conflicting interests

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