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Evaluation of patients diagnosed with spontaneous hemopneumothorax

Spontan hemopnömotorakslı hastaların değerlendirilmesi

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ABSTRACT

Objective: Spontaneous hemopneumothorax (SHP) may threaten life unless timely diagnosed and appropriately treated. The aim of this study was to review our institutional experience in the management of patients with SHP.

Patients and Methods: We retrospectively analyzed age, gender, the affected side, the amount of drainage, clinical findings, and treatment outcomes of 610 patients with diagnosis of spontaneous pneumothorax at emergency department. Later, they were admitted to the Department of Thoracic Surgery, Dicle University Hospital.

Results: Posteroanterior chest radiographs, thoracic computed tomography (CT) scans, biochemistry and coagulation test results of all patients were evaluated. All patients underwent closed chest drainage. Seven (1.14%) of 610 patients were diagnosed with SHP. These patients underwent operation after thoracic drainage. Three of them were operated by video-assisted thoracoscopic surgery (VATS) and the others by thoracotomy. No postoperative complication was observed.

Conclusion: SHP should be considered in patients presenting with sudden chest pain and dyspnea when there is air-fluid level in addition to pneumothorax on radiography. The first treatment approach should be the application of tube thoracostomy. Next step should include close clinical and hemodynamic control and be followed primarily by VATS or urgent thoracotomy in case of continued bleeding. An early diagnosis and appropriate surgical approach can prevent fatal complications.

Keywords: Spontaneous, Hemothorax, Pneumothorax

ÖZ

Amaç: Spontan hemopnömotoraks (SHP), nadir görülen bir hastalıktır. Zamanında tanınmaz ve tedavi edilmezse hayatı tehdit edebilir. Bu çalışmanın amacı SHP' lı hastaların tedavisinde kurumumuzun deneyimlerini paylaşmaktır.

Hastalar ve Yöntemler: Temmuz 2005-Mayıs 2017 yılları arasında 610 adet spontan pnömotoraks hastası kliniğimize başvurdu. Hastaların yaşı, cinsiyeti, etkilenen taraf, drenaj miktarı, klinik bulguları ve tedavi sonuçları retrospektif olarak değerlendirildi.

Bulgular: Tüm hastaların ön-arka akciğer (PA Akc) grafisi, bilgisayarlı toraks tomografisi (BT), tam kan, biyokimya ve koagulasyon testleri değerlendirildi. Tüm hastalara kapalı su altı drenajı uygulandı. Altıyüz on hastadan 7 (%1,14)'sinde SHP tesbit edildi. Toraks drenaj takibi sonrası 7 hasta operasyona alındı. Üç hastaya video yardımlı torakoskopik cerrahi (VYTC), diğer hastalara torakotomi yapıldı. Postoperatif komplikasyon olmadı.

Sonuç: Travma hikâyesi olmadan ani başlayan göğüs ağrısı ve nefes darlığı olan hastalarda, radyografide pnömotoraksla beraber sıvı seviyesi var ise SHP düşünülmelidir. İlk tedavi yaklaşımı tüp torakostomi olmalıdır. Sonrasında, hasta yakın klinik ve hemodinamik kontrol altında tutulmalı ve eğer kanama devam ederse öncelikli olarak VATS veya acil torakotomi uygulanmalıdır. Böylece erken tanı ve uygun cerrahi yaklaşımla gelişebilecek ölümcül komplikasyonlar önlenebilir.

Anahtar kelimeler: Spontan, Hemotoraks, Pnömotoraks

Introduction

Spontaneous hemopneumothorax (SHP) was first described, in an autopsy, by Laennec in 1828 as air and blood accumulation inside pleural cavity without any antecedent trauma or predisposing condition [1]. SHP is an urgent, life-threatening condition with a high mortality rate, which is usually seen due to active bleeding into pleural space as a rare complication (1-12%) of spontaneous pneumothorax, and requires early diagnosis and treatment [2,3].

The most common symptoms are chest pain, dyspnea, anemia, and sometimes a clinical picture of shock due to

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abundant bleeding [4]. Tube thoracostomy that provides expansion of lung and buffers bleeding foci is the initial therapeutic step [5]. However, tube thoracostomy is not always sufficient, and urgent surgical intervention may sometimes be needed. Despite historical mortality rates around 33%, recovery is achieved in most cases owing to recent advances in timely diagnosis and treatment [4, 5].

Ongoing tube drainage and decreasing hemoglobin levels should remind SHP following tube thoracostomy in spontaneous pneumothorax. For this purpose, we discuss and report our results.

Patients and Methods

The data of 610 spontaneous pneumothorax patients admitted to the Department of Thoracic Surgery, School of Medicine, Dicle University between July 2005 and May 2017 were retrospectively evaluated. All of them underwent chest X-ray examination. Some also underwent thoracic computed tomography (CT). Seven patients, as others, underwent tube thoracostomy. Control chest X-rays were taken after drain insertion. Blood pressure, pulse rate and hemoglobin levels were also followed. Bleeding over 1000 cc was accepted as massive hemothorax. Patients directly underwent thoracotomy because of the continued hemorrhagic drainage more than 1000 cc. and video-assisted thoracoscopic surgery (VATS) for less than 1000 cc. Thoracotomy was performed to patients who had massive hemothorax. Hematoma evacuation, removal of bullae, dissection of pleural adhesions, bleeding control, and apical pleurectomy were performed. The patients received blood transfusions during intraoperative and postoperative period owing to low hematocrit levels.

An approval from Dicle University, School of Medicine Research Ethics Committee was obtained for the study.

Statistical Analysis

Statistical analyses were performed using SPSS for Windows Ver. 15.0. Mann Whitney U was used for continuous variables. The study data were expressed as Mean±SD. A *P* value less than 0.05 was considered statistically significant.

Results

Seven (1.14%) of 610 patients with spontaneous pneumothorax were diagnosed with SHP. The age range of these seven patients was 23-57 years. They, as others, underwent tube thoracostomy. A hemorrhagic drainage of more than 1000 cc occurred in three patients. These patients were taken into urgent operation. Two patients had a hemorrhagic drainage of 200 cc in the first hour and 300 cc in the second hour. Expansion failure and patchy opaque appearance that was more prominent at the lateral side were detected on chest X-ray in a patient who developed nausea, cold sweating and tachycardia. This patient also had a drop in hemoglobin levels, and thus an urgent thoracotomy was carried out. Another patient had 1000 cc immediate drainage after drain insertion and he was followed for 6 hours, during when the drainage totaled 1300 cc. Control chest X-ray and serial hemoglobin monitoring sufficed with no need for an intervention. Later, VATS procedure was performed to evacuate hematoma.

Three patients were operated with VATS technique that we have frequently used in recent times, while four patients were approached via a thoracotomy at times when VATS was not popular. In thoracotomy, hematoma was evacuated and the actively bleeding brit was detected at a region corresponding to cupular region in the apex. The bullous structures that were generally in the apical region and had active air leak were ligated with bullae ligation. After eliminating air leak and achieving hemostasis, a drain was placed and the patient was admitted to our clinic's intensive care unit. All patients were evaluated with a chest X-ray (Figure 1) and a thoracic CT when they presented to

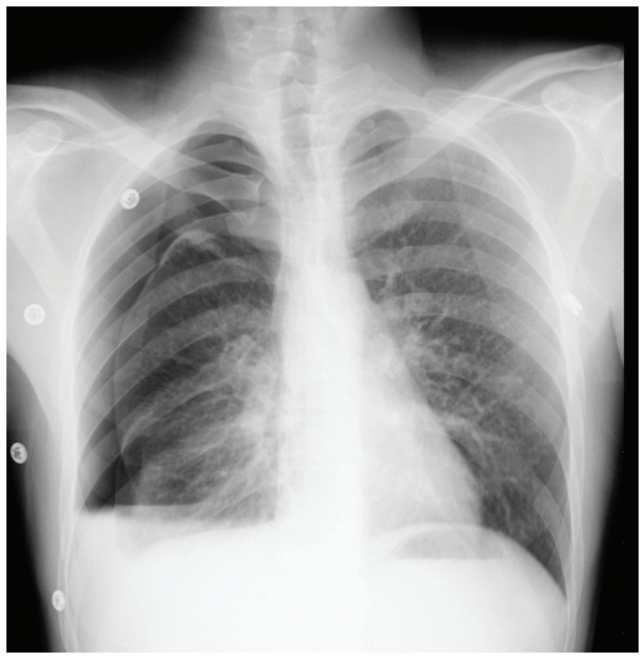

Figure 1. A chest X-ray showing spontaneous hemopneumothorax with air fluid level

the hospital. Computed thorax tomography of all patients confirmed hemopneumothorax seen on chest X-rays. They did not reveal any bullae. Majority of the patients initially experienced a sudden-onset dyspnea and back or chest pain (Table I). Admission and preoperative hemoglobin levels, duration of hospital stay, preoperative vital signs, and the amount of drainage after insertion of drain were presented on Table II. All cases were male and had a history of smoking.

The lesions were on the right side in 4 patients and on the left side in 3 patients. Three patients underwent VATS. After removing the blood clots, the focus of bleeding was localized and then bleeding was controlled with electro-coagulation in one patient and with clips in the others. Then, the ruptured bulla was removed by using an endoscopic stapler. One patient underwent elective VATS procedure to evacuate hematoma; no active bleeding was observed. Other patients underwent thoracotomy and hematoma was evacuated after entry into thoracic cavity. Then, the foci of bleeding were localized and hemostasis was achieved via electro-coagulation. Bullae ligation was performed for bullae in the apical region. Finally, checks were made for foci of bleeding and air leaks and one thoracic drain was inserted to finish the operation. Two units of erythrocyte suspension were given to 5 patients whose hemoglobin levels were lower than 8 gr/dl before surgery. There was no persistent air leak and the mean hospital stay was 7 or 8 days. There was no significant difference in age, side affected, hemoglobin levels, drainage amounts and types of surgery when compared. Length of hospital stay, however, was lower in patients with right sided SPH who had undergone VATS ($P< 0.05$).

Discussion

Spontaneous hemopneumothorax is a surgical emergency that is defined as any hemothorax accompanying primary spontaneous pneumothorax and that is defined as accumulation of more than 400 ml blood in pleural cavity. [1,6]. Bleeding usually occurs because of vascularized adhesions, consisting of aberrant vessels between the parietal and visceral pleura. These adhesions are torn as the lung collapses following pneumothorax [7]. The chest X ray finding of pneumothorax with an ipsilateral air-fluid level is a strong indicator of SHP. In this case, a CT may be considered for differential diagnosis [2, 3]. In our patient series, pneumothorax was first defined by PA chest X-ray after their presentation to emergency department with chest pain and dyspnea. We detected air-fluid level consistent with hemopneumothorax in our 7 patients and they were sent for CT so as to distinguish between other diseases like perforated hydatid cysts, empyema.

Homma et al., reported that they detected hemopneumothorax in 4.6% of 239 cases with spontaneous pneumothorax [1]. Tatebe et al., reported that only 2% of 428 patients with spontaneous pneumothorax had

Table I. Characteristics of the patients with spontaneous hemopneumothorax

N	Age	Gender	Symptoms	Side	Vital Signs
1	24	Male	Pain	Left	Tachycardia, Nausea, Vomiting
2	19	Male	Dyspnea, Pain	Left	Sweating, Hypotension, Nausea, Vomiting, Tachycardia
3	22	Male	Pain, Dyspnea	Right	Hypotension, Tachycardia
4	25	Male	Back Pain, Dyspnea	Right	Hypotension, Bradycardia
5	18	Male	Dyspnea, Pain	Left	Nausea, Vomiting, Hypotension
6	21	Male	Dyspnea, Pain	Right	Hypotension, Nausea, Vomiting
7	36	Male	Pain, Dyspnea	Right	Hypotension, Nausea, Cold sweating

Table II. Hemoglobin levels, drainage amounts and symptoms of the patients

N	Hemoglobin level on admission/ before surgery	Drainage	Surgical Intervention	Duration of hospital stay (days)
1	13.8---8.1	1000cc	VATS	6
2	9.36---7.11	1000cc	VATS	5
3	14.9---6.74	1000cc	VATS	7
4	13.6---9.3	2000cc	Thoracotomy	8
5	11.1---8.3	1500cc	Thoracotomy	11
6	12.4---10.8	3000cc	Thoracotomy	8
7	11.2---8	1000cc	Thoracotomy	8

hemopneumothorax [2]. Tay et al., reported that of 510 patients who underwent surgery for spontaneous pneumothorax, 33 (6.4%) developed spontaneous hemopneumothorax [8]. Haciibrahimoğlu et al., diagnosed hemopneumothorax in 3% of 291 patients with spontaneous pneumothorax [9]. Çoban et al., reported that they detected hemopneumothorax in 8.23% of 97 cases with spontaneous pneumothorax [10]. In our study, we detected SHP in 7 (1.14%) of 610 patients with spontaneous pneumothorax.

Current treatment with tube thoracostomy is sufficient in certain conditions. Emergency surgical approach is favoured when the patient develops shock and/or more than 500 mL/hr in the first hour with 200-300 mL/hr subsequently [5,6]. Two surgical approaches that are known as thoracotomy and VATS are recommended. Thoracotomy should be performed immediately in case of hypovolemic shock, whereas thoracoscopic draining is usually for stable patients [11-13,14]. Haciibrahimoğlu et al., reported that seven patients were treated conservatively (closed underwater drainage) and two required VATS and thoracotomy because of worsening clinical condition [9]. In another study, they treated eight patients. Five of them were treated with tube thoracostomy and three of them underwent VATS [10]. Tay et al., reported that all patients (n:37) underwent operation after thoracic drainage [8]. Nine of them with thoracotomy and twenty-eight of them with VATS were treated.

In a study by Miyazawa et al., the advantages of VATS over conventional thoracotomy include less time required accessing the pleural cavity, a better view, and more fast manipulation during surgery [13]. Calvin et al., reported that VATS, which is associated with potentially fewer post-operative complications and shorter hospital stays when compared with thoracotomy, should be considered in patients with spontaneous hemopneumothorax who are hemodynamically stable [3]. The duration of hospital stay was shorter in VATS-treated patients compared to those operated with thoracotomy.

Conclusion

Fluid level accompanying pneumothorax on chest X-ray should suggest SHP in patients presenting with sudden-onset chest pain and dyspnea in the absence of an antecedent trauma. Early surgical repair must be considered when diagnosis of a SHP is identified. Either thoracotomy or VATS can effectively identify the bleeding source and provide rapid hemostasis. Early diagnosis and treatment of SHP will prevent deterioration of a patient from pneumothorax.

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