Spontaneous Pneumothorax Recurrence and Surgery

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Abstract Spontaneous pneumothorax that occurs in patients with no underlying lung disease is termed *primary spontaneous pneumothorax* (PSP). Recurrence of pneumothorax is usually seen without surgical procedures at any time. The aim of this study was to determine the recurrence time and rate of PSP after the first episode. A total of 82 PSP patients who had been treated in a thoracic surgery clinic between March 2011 and August 2012 were studied retrospectively. Video-assisted thoracoscopic surgery (VATS) was performed in 14 of 82 patients because of prolonged air leakage. These patients were excluded from the study to determine the recurrence period of PSP in our cases. Simple endotracheal intubation with low-volume high-frequency ventilation and three-port VATS technique were applied. Bullae or blebs were excised using an endoscopic linear stapler. Apical pleurectomy was performed in all of the patients. There were no cases in which VATS was converted to open thoracotomy. Recurrence of PSP was seen in 18 (26.47 %) of 68 patients. We found 26.47 % recurrence at the first 7 months, of which 94.4 % occurred at the first 6 months. About 77.77 % of these recurrences occurred at 3 months after discharge from hospital. Recurrence after the first episode of PSP is a common problem within the first 6 months. The thoracic surgeon should give knowledge about it to all patients. With the greater use of VATS for thoracic pathologies, it could be performed for the first period of pneumothorax in the future.

Keywords Spontaneous pneumothorax · Video-assisted thoracoscopic surgery (VATS) · Recurrence of pneumothorax · Bullous lung · Pleurectomy

Abbreviations

VATS Video-assisted thoracoscopic surgery
PSP Primary spontaneous pneumothorax

Introduction

Spontaneous pneumothorax occurs without any preceding trauma or obvious precipitating causes. Spontaneous pneumothorax that occurs in patients with no underlying lung disease is termed *primary spontaneous pneumothorax* (PSP), while *secondary spontaneous pneumothorax* refers to those that develop in the presence of an underlying lung disease. PSP occurs at a frequency of 7.4–18/100,000 population [1]. PSP typically occurs in young adults (peak age incidence 20–30 years). Risk factors include cigarette smoking, male gender, and tall and thin person. PSP usually presents with sudden chest pain or shortness of breath.

Despite the absence of underlying pulmonary disease in patients with primary pneumothorax, subpleural blebs and bullae are likely to play a role in the pathogenesis. Blebs and bullae are found in up to 80 % of primary pneumothorax cases at thorax tomography and up to 90 % of cases at thoracoscopy or thoracotomy [2]. Recurrence of pneumothorax is usually seen without surgical procedures at any time. In the last 20 years since the introduction of video-assisted thoracoscopic surgery (VATS), practice has changed toward this much less invasive procedure and away from thoracotomy [3].

The aim of this study was to determine the recurrence time and rate of PSP after the first episode.

Materials and Methods

A total of 82 PSP patients who had been treated in a thoracic surgery clinic between March 2011 and August 2012 were

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Fig. 1 Left spontaneous pneumothorax

studied retrospectively. Sudden chest pain was the most common symptom that caused patients to come to the hospital. The pneumothorax was determined with posteroanterior chest X-ray (Fig. 1). Chest tube drainage with 28-Fr chest tube was performed through the anterior-axillary line of the fourth or fifth intercostal space under local anesthesia to all of the patients for the first episode of pneumothorax because of varying of pneumothorax rates from 20 % to total. According to the statistical and perceived risk of recurrence, accepted indications for operative intervention are as follows: second ipsilateral pneumothorax, first contralateral pneumothorax, bilateral spontaneous pneumothorax, persistent air leak (>7 days of tube drainage; air leakage, or failure to completely re-expand), spontaneous hemothorax, and professions at risk (e.g., pilots, divers) [4]. Chest computed tomography (CT) was applied to a patient at expansion period to know the cause of pneumothorax (Fig. 2). Tubes were removed without clamping. After discharge from the hospital, patients were followed with chest X-ray at 10-day intervals for the first month, then monthly.

Fig. 2 Right lung bullous formation

The patients who have recurrent pneumothorax, air leakage, and/or lung collapse for more than 7 days usually undergo surgery. Bullectomy or bleb excisions with apical parietal pleurectomy were performed with VATS. VATS was performed in 14 of 82 patients because of prolonged air leakage. These patients were excluded from the study to determine the recurrence period of PSP in our cases. Finally, 68 (four females, 64 males) of 82 patients were included. Surgery was performed for recurrence. Informed consents were taken from all of the patients. Simple endotracheal intubation with low-volume high-frequency ventilation and three-port VATS technique were applied. Bullae or blebs were excised using an endoscopic linear stapler. Apical pleurectomy was performed in all of the patients. There was no case in which VATS was converted to open thoracotomy.

Results

All of the 68 patients were followed in our hospital after discharge from hospital. Recurrence of PSP was seen in 18 (26.47 %) of 68 patients. Blebs or bullae were diagnosed at tomography and thoracoscopy in the patients who had been operated upon for recurrence. We did not found bullous formation in 50 patients (73.53 %) on tomographic investigation, who have not been recurred up to now. Female patients did not get recurrence in our study. Recurrences were seen at the first episode side in which 66.6 % on the right and 33.3 % on the left side. Recurrences were especially found at the first

Table 1 Recurrence time of patients

Patient	Gender	Age (years)	Side	Recurrence time	Bullous formation
1	Male	15	Right	4 months	Present
2	Male	16	Right	2 months	Present
3	Male	17	Left	1 month	Present
4	Male	17	Right	5 months	Present
5	Male	17	Left	7 months	Present
6	Male	18	Right	15 days	Present
7	Male	18	Right	2 months	Present
8	Male	19	Right	2 months	Present
9	Male	20	Right	1 month	Present
10	Male	20	Right	10 days	Present
11	Male	21	Left	3 months	Present
12	Male	21	Right	6 months	Present
13	Male	22	Left	2 months	Present
14	Male	22	Right	1 month	Present
15	Male	23	Left	2 months	Present
16	Male	23	Left	1 month	Present
17	Male	25	Right	3 months	Present
18	Male	27	Right	2 months	Present

6 months period (Table 1). We found 26.47 % recurrence at the first 7 months, of which 94.4 % occurred at the first 6 months. About 77.77 % of these recurrences occurred at 3 months after being discharged from hospital. We performed three-port VATS technique with low-volume high-frequency ventilation for the second episodes of pneumothorax. There was no any recurrence after bulla resection with apical pleurectomy technique.

Discussion

The presence of subpleural blebs or bullae is thought to be responsible for PSP. As per literature, they are found in up to 80 % of patients on CT scan of the thorax and in up to 90 % at thoracoscopy or thoracotomy [2, 5]. We found bullous formation in only about 26.47 % of patients. Our results were different than the previous studies. When we compared our sample group to that of the other studies, it was specific which included only PSP patients. We excluded from the study the patients who had been operated upon because of prolonged air leakage. The specificity of our sample group is important. We think that new studies should be done with more specific groups and patients.

Although there is no agreement on the optimal treatment of patients with the first episode of PSP, oxygen supplementation, manual aspiration, chest tube drainage, and immediate thoroscopic or even open surgical intervention are the choice of treatment. All of the treatment modalities aim to prevent recurrence [2, 9, 10]. We preferred chest tube drainage for the first episode like most of the thoracic surgeons.

The recurrence rate for the PSP ranges from 7.6 to 52 % and for the SSP from 22.7 to 47 %. Most of them take place between 6 months and 2 years after the first episode [2, 4–8]. Most studies reveal the recurrence rates after conservative treatment, aspiration, or tube thoracostomy. We determined the rate of the recurrences at an early period, which was different from the literature. In our study, we showed the recurrence rate of PSP after tube insertion. In the literature, recurrence after the first episode is generally seen between 6 months and 2 years. The risk of recurrence of primary pneumothorax was given in the British Thoracic Society guidelines at 54 % within the first 4 years [2]. We found 26.47 % recurrence at the first 7 months, of which 94.4 % occurred at the first 6 months. Our results showed that close follow-up of patients is very important at the first 6 months after the first pneumothorax episode. We advise that control of the patients should be done in a 10-day interval for the first month with chest X-ray.

Several authors suggest that VATS offers significant advantages over open thoracotomy, including a shorter postoperative hospital stay, significantly less postoperative pain, better

pulmonary gas exchange, and postoperative period [2]. Although recurrence rates after thoracotomy are lower than those after VATS, there are no statistical differences [8]. We think that VATS may cause lesser adhesive area than open thoracotomy, which can result in recurrence. A previous review of the literature demonstrated a slight advantage of pleurectomy over abrasion: the recurrence rate was 0.4 % after pleurectomy and 2.3 % after abrasion [11]. We advise to perform resection of bullae and apical pleurectomy with VATS. In this way, more adhesions could be formed and recurrences could be prevented.

In conclusion, recurrence after the first episode of PSP is a common problem within the first 6 months. The thoracic surgeon should give knowledge about it to all patients. With greater use of VATS for thoracic pathologies, it could be performed for the first period of pneumothorax in the future.

Conflict of interest There are no financial or potential conflicts of interest for each author.

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