

자발성 중격동기종의 임상적 고찰

전순호* · 위장섭** · 이철범* · 김 혁** · 김영학**

Clinical Analysis of Spontaneous Pneumomediastinum

Soon-Ho Chon, M.D.*, Jang Seop Wee, M.D.**, Chul Burm Lee, M.D.
*Hyuck Kim, M.D.**, Young Hak Kim, M.D.**

Background: Spontaneous pneumomediastinum (SPM) is a relatively rare and benign condition that generally occurs in young adults without any precipitating factor or disease. The purpose of this study was to assess whether more uncomfortable diagnostic procedures are necessary and to establish standards in the diagnosis and treatment of spontaneous pneumomediastinum. **Material and Method:** A retrospective study was done on 18 patients from the hospitals of Hanyang University Seoul Hospital and Hanyang University Guri Hospital between February, 1997 and June, 2004. All patients had presence of mediastinal air without a pneumothorax and no evidence of trauma or barotrauma. **Result:** Among the 18 patients, the majority were male patients with only two female patients. Their mean age was 20.95 years old with standard deviation of 14.3 years. The most common complaints were chest pain, dyspnea, and coughing. Evaluation included simple chest roentgenogram in all patients, 10 patients had a chest tomographic scan, 10 patients had an esophagoscopy exam, 6 patients had a bronchofiberscopic exam, and 3 patients had an esophagogram done. The mean hospital stay was 10.9 days. All patients were treated conservatively and in a follow-up of 1~8 years only one recurrence was found. **Conclusion:** SPM is caused by alveolar rupture in the pulmonary interstitium leading to dissection of air towards the hilum and mediastinum. Although SPM is a self-limiting condition, evaluation should include chest roentgenogram and chest tomographic scans to rule out any other secondary condition. More aggressive evaluation seems unnecessary.

(Korean J Thorac Cardiovasc Surg 2006;39:56-59)

Key words: 1. Pneumomediastinum
2. Mediastinal emphysema
3. Emphysema

BACKGROUND

Spontaneous pneumomediastinum (SPM) is a relatively rare and benign condition that generally occurs in the young adult

male without any definite precipitating factor or disease [1,2]. SPM is caused by spontaneous alveolar rupture leading to the presence of mediastinal air without a pneumothorax and excludes those caused by trauma, ventilation, or iatrogenic baro-

*한양대학교 구리병원 흉부외과학교실

Department of Thoracic and Cardiovascular Surgery, Hanyang University Guri Hospital

**한양대학교병원 흉부외과학교실

Department of Thoracic and Cardiovascular Surgery, Hanyang University Hospital

†본 논문은 2003년 한양대학교 교내 연구비 지원으로 연구되었음.

‡본 논문은 제37차 대한흉부외과학회 추계학술대회에서 포스터 발표되었음.

논문접수일 : 2005년 8월 23일, 심사통과일 : 2005년 10월 23일

책임저자 : 이철범, (471-701) 경기도 구리시 교문동 249-1 한양대학교 구리병원 흉부외과

(Tel) 031-560-2300, (Fax) 031-568-9948, E-mail: cblee@hanyang.ac.kr

본 논문의 저작권 및 전자매체의 지적소유권은 대한흉부외과학회에 있다.

trauma[1-3]. The incidence of SPM ranges from one in 800 to one in every 42,000 patients presenting at hospital emergency units[4]. SPM is usually self-limiting and resolves within about 7 days[5].

The purpose of this study was to review our clinical experience with SPM and to establish a reasonable standard of diagnosis and treatment. We report 18 such cases and a review of the literature.

MATERIAL AND METHOD

A retrospective study of a series of eighteen cases of SPM diagnosed and treated at Hanyang University Seoul Hospital and Hanyang University Guri Hospital between February, 1997 and June, 2004 was performed. All patients with coexisting pneumothorax or history of pneumothorax, trauma, and barotrauma were excluded from this study. Patients' charts were reviewed for age, sex, predisposing factors, symptoms and signs at presentation, diagnostic workup performed, length of hospital stay, treatment modalities, complications, and follow up. Precipitating factors included cigarette smoking and pulmonary-related medical history or condition.

RESULTS

Among the eighteen patients, the male to female ratio was 16 : 2, with a mean age of 20.95 years old with standard deviation of 14.3 years (range between 2 months and 62 years). Only three patients were present or past smokers. Six patients had coexisting pneumonia, two patients had a history of asthma, two patients were involved in sports and interstitial lung disease, history of bronchiolitis, history of stomach cancer, and schizophrenia were found in one patient each.

At initial presentation, the most common symptom was acute onset of chest pain with 9 patients (50%). Thereafter, dyspnea (39%), cough (33%), and fever (28%) were relatively common symptoms (Table 1). Subcutaneous emphysema was present in only 4 (22%) patients.

All patients had a simple chest radiograph and 10 patients (56%) had a chest computerized tomographic (CT) scan in their initial diagnostic evaluation. CT scans identified pneumonia in two patients and a hypoplastic lung in one patient. Further diagnostic work up included an esophagoscopy exam

Table 1. Symptoms at initial presentation

Symptom	No. of patients (%)
Chest pain	9 (50)
Dyspnea	7 (39)
Cough	6 (33)
Fever	5 (28)
Subcutaneous emphysema	4 (22)
Palpitation	2 (11)
Dysphagia	1 (6)
Poor feeding	1 (6)

in 10 patients (56%) and an esophagogram in 3 patients (17%) to exclude the possibility of esophageal rupture. More invasive diagnostic procedures such as a bronchofiberoptic exam was performed in 6 patients (33%) to rule out the possibility of tracheobronchial rupture.

Conservative treatment was the standard in all patients and prophylactic antibiotics were given to all eighteen patients for the prevention of the possibility of mediastinitis. All patients with SPM were admitted for evaluation and treatment. Usually, a second or third-generation cephalosporin was given and additional aminoglycoside was added if leukocytosis was present. Oral antibiotics were the mainstay prophylactic treatment in 5 patients (28%). Oxygen therapy via nasal prongs for rapid absorption was given to all but one patient.

The mean hospital stay for the eighteen patients was 10.9 ± 7.5 days, ranging from 3 to 37 days. In the patient who was admitted for 37 days, SPM resolved 24 days after admission. Follow up was done in the form of outpatient visits or by phone inquiries and ranged from 1 to 8 years. There was one natural death, unrelated to SPM, and one recurrence, occurring 2 years later. There were no other SPM related complications.

DISCUSSION

Laennec[6] was the first physician to describe pneumomediastinum in the setting of trauma in 1819. Hamman[1] was the first to report SPM in 1939. He described the characteristic sign, known today as 'Hamman's sign', a "curious loud bubbling, crackling sound synchronized with the heart beat".

The pathophysiology of SPM is well known and most of the cases are caused by leakage of air from the respiratory tract. A detailed description of SPM has been described by Macklin and Macklin[7] in the animal model and has been confirmed in humans[8]. They proposed that pressure gradients between the periphery of the lung and hilum leads to air dissection along the vascular sheet to the hilum. The gas spreads along the bronchovascular trunks or within the lymphatics to the mediastinum. The entity develops as a result of the increase in intrabronchial and intraalveolar pressure with vigorous expiration against a closed glottis (the Valsalva maneuver)[9]. Examples of causes related to the Valsalva maneuver include coughing, straining, vomiting, childbirth, blowing a wind instrument, and athletic competition[10]. Other causes include asthma, diabetic ketoacidosis, drug inhalation, irradiation, and chemotherapy[11-14]. In our study, the Macklin and Macklin effect could be explained in the 10 patients (56%) with lung related conditions and in the 2 patients (11%) who were involved in sports. In the 6 other patients (33%), the mechanism seems unclear.

Clinical diagnosis is based on the symptom triad of chest pain, dyspnea, and subcutaneous emphysema. The most common initial presentation of SPM is chest pain, as was found in our series[15-17]. Other symptoms include cough, dysphagia, rhinolalia, sore throat, nausea and vomiting, tachycardia, fever, and anxiety[9,15,17,18]. A definite diagnosis of SPM includes physical examination, plain chest roentgenogram, and if needed a chest CT scan. Up to 30% of SPMs are not diagnosable on plain chest roentgenograms alone, thus, a chest CT scan may be needed for confirmation or initial diagnosis [19].

A classic history with an identified cause of SPM diagnosed on CXR should not lead to further investigation, as was evidenced in our study. All further investigations of patients with SPM were shown to be nonspecific. If there is a history of vomiting, presence of pleural effusion, or systemic signs, an early esophagogram is warranted[2,20]. More uncomfortable diagnostic procedures, such as esophagoscopy or bronchoscopy, in our study were also shown to be nonspecific and its necessity has been questioned in the literature[9,10,15, 17,21]. Differential diagnosis includes musculoskeletal, pleural, pulmonary, cardiac-related, and esophageal causes [15,21].

The most dreaded differential diagnosis is spontaneous esophageal perforation (Boerhaave's syndrome), which requires emergent surgery.

Hospitalization is recommended to rule out any suspicion of esophageal or airway perforation and patients should be kept under observation for at least 24 hours[9,16]. Treatment consists of conservative measures of 100% oxygen by nonbreathing face mask, bed rest, analgesics, and antibiotics in cases with leukocytosis[10,16,21]. Symptomatic improvement is expected within 1 to 3 days, and resolution occurs within 3 to 7 days[2,19,22]. Recurrences of SPM have been associated with vomiting and diabetic ketoacidosis, but are rare. Our study has presented another case with a recurrence, adding another case to the three cases we have found in the English literature[5,16,23]. In Korea, we have found only 5 cases of spontaneous pneumomediastinum, all of which were treated conservatively[24].

SPM is a relatively rare and benign disorder that is self-limiting and resolves spontaneously with conservative treatment. Aggressive diagnostic procedures seem unnecessary in uncomplicated cases and if viscus perforation is suspected, an esophagogram or CT scan will suffice. Endoscopy may prove to be not only uncomfortable, but can also be dangerous.

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=국문 초록=

배경: 자발성 종격동기종(SPM)은 상대적으로 드문 양성 질환으로 어떤 유발인자나 질병 없이 젊은 성인에게서 일반적으로 나타난다. 본 연구의 목적은 더 불편한 진단절차의 필요여부를 판단하고 자발성 기종격의 진단과 치료의 기준을 확립하는데 있다. **대상 및 방법:** 1997년 1월부터 2004년 6월까지 한양대학교 서울병원과 구리병원에서 18명의 환자를 대상으로 회고적인 연구를 시행했다. 모든 환자들은 기흉이나 외상 또는 압력손상의 증거가 없이 종격동에 공기가 있었다. **결과:** 18명의 환자들 중에서 2명의 여자 환자를 제외한 대부분은 남자 환자였다. 환자들의 평균 연령은 20.95세였으며, 표준편차는 14.3세였다. 가장 흔한 증상은 흉통, 호흡곤란, 기침이었다. 검사로는 모든 환자에게서 단순 흉부 촬영이 행해졌으며, 10명에게는 흉부 단층 촬영이, 6명에게는 기관지내시경이, 3명에게는 식도 조영술이 행해졌다. 평균 재원기간은 10.9일이었다. 모든 환자들은 보전적인 방법으로 치유되었으며, 1~8년간의 추적관찰 도중 단 한차례만 재발하였다. **결론:** 자발성 종격동기종(SPM)은 폐간질에서 폐포의 파열에 의해 발생하는 것으로, 폐문이나 종격동으로 공기의 박리를 유발한다. 비록 자발성 종격동기종(SPM)이 자기 제한적인 질병이지만 다른 이차적인 질병을 감별하기 위해 단순 흉부촬영과 흉부 단층촬영을 포함한 검사는 반드시 행해져야 한다. 보다 적극적인 검사는 필요하지 않을 것으로 생각된다.

- 중심 단어 :** 1. 종격동기종
2. 종격동 공기증
3. 기종