Surgical treatment of spontaneous pneumothorax by wedge resection without pleurodesis or pleurectomy

Abstract  
Objective. Evaluation of wedge resection of the lung without pleurodesis or pleurectomy as a method of surgical treatment for spontaneous pneumothorax in terms of complications, recurrence rate and postoperative complaints.  
Methods. Retrospective study of 132 operations for spontaneous pneumothorax in 120 patients (84 men and 36 women; mean age 34 years, range 14–77) performed between 1974 and 1993. The mean observation time was 84 months (range 6–229) and a 100% follow-up rate of all survivors (97%) was achieved.  
Results. The indications for surgery were recurrent pneumothorax (52%), persistent air leak during first episode (45%), or hemothorax (3%). Perioperative findings were single bullous disease (86%), 2–3 bullae (6%), diffuse bullous disease (5%) and no bullous disease in 3% of the cases. The overall complication rate was 16% (30-day mortality 1%, re-operation for postoperative bleeding 2%, bronchopneumonia 8%, new pneumothorax during hospital stay 5%). The late recurrence rate (operated lung) was 5%. All recurrences were successfully treated by drainage (n=3), exsufflation (n=1) or observation only (n=3). Reoperation was not necessary. Thirty-seven percent of the patients had postoperative complaints which they associated with the operation.  
Conclusion. Lung resection without pleurodesis or pleurectomy is a simple, safe and effective method of the surgical treatment of spontaneous pneumothorax in terms of complications and recurrence rate in patients with limited bullous disease. 

Key words  
Spontaneous pneumothorax - Surgical treatment - Wedge resection - Postoperative complaints

Introduction

Spontaneous pneumothorax is a potentially dangerous condition which often affects young and otherwise healthy people. The primary treatment is usually conservative, but recurrent episodes or prolonged air leak are generally accepted as indications for surgical treatment [5, 6, 8]. The traditional method of surgical treatment has, until recently, been thoracotomy with wedge resection of bullous changes in the lung combined with surgical pleurodesis or pleurectomy in order to increase the generation of adhesions [2, 8, 12]. We are only aware of a few papers reporting results after wedge resection without pleurodesis or pleurectomy [4, 6], which has been the standard method at our hospital. The aim of this study was to evaluate this technique in terms of complications, recurrence rate and subjective complaints after surgery, and to investigate some hospital resources used by the method. Nowadays, video-assisted thoracoscopic technique (VAT) is being increasingly used in the treatment of pneumothorax [9, 10, 13]. The present investigation should be of importance...
when the results after open and thoracoscopic operations are compared.

**Material and methods**

From January 1, 1974 to December 31, 1992, 149 operations for spontaneous pneumothorax were performed in 133 patients. The standard technique was lateral or transaxillary thoracotomy (third or fourth intercostal space), wedge resection of bullous changes by staple machine or hand suture, or a combination of both, followed by chest tube drainage. When present, pleural adhesions were divided in order to allow inspection of the whole lung. Only patients with spontaneous pneumothorax treated by resection of bullous changes in the lung without pleural rubbing or pleurectomy were included in the study.

Limited rubbing and/or electrocoagulation of the parietal pleura was performed in 13 patients (17 operations). In most of these cases, the decision to carry out pleurodesis seems to have been more dependent upon the surgeons earlier experience with – and belief in – pleurodesis, than on the prevailing pathologic condition. These patients were also evaluated (three of them had recurrent pneumothorax), but the results are not included in this study.

Data were collected by reviewing all patient records. Questionnaires were then sent to the patients asking about recurrence of pneumothorax, treatment given and subjective complaints which the patients associated with the operation. In cases of doubt and when patients did not respond to repeated written questionnaires, they were interviewed by telephone. Ultimately, we obtained a 100% response rate from surviving patients (97%). The mean postoperative observation time was 84 ± 57 months (6–229).

Statistical analysis was performed with Stat View Student Statistical Program (Abacus Concepts, Inc., Berkley, CA 1991). The data are presented as mean values ± SD followed by range (in parenthesis). The chi-square test was used for comparing groups with categorical data. A probability value less than 0.05 was considered as statistically significant.

**Results**

Among 120 patients (84 men and 36 women), ten men and one woman were treated for bilateral spontaneous pneumothorax. Synchronous occurrence was present in two men. The mean age was 34 years (range 14–77) (Fig. 1). The male:female ratio was 2.3:1 in the total material, and 2.8:1 in the age group with the highest incidence (18–35 years). Fourteen patients suffered from chronic lung disease. This group of patients was significantly older than the total group (45 versus 34 years, \( P = 0.0001 \)). Five of these patients had diffuse bullous disease.

Surgery was performed on the right lung in 61% of the cases and the left lung in 39%. Smoking habits were known in 79% of the patients. Among these, 79% were smokers/earlier smokers and 21% non-smokers. Six female patients (21%) had a history of catamensal occurrence of their pneumothorax. The indications for operation (Fig. 2) were recurrent pneumothorax (52%), persisting air leak (45%), and hemo-pneumothorax (3%). Two-thirds of the patients had a tube thoracostomy before coming to surgery (38% in the first group; all patients in the last two groups). Thirty-four percent of the operations were performed in patients with their first episode of pneumothorax, while 66% had suffered from recurrent pneumothorax, 2.3 episodes on average (Fig. 3).

The pneumothorax was caused by a single bullous lesion in the upper lobe in 86% of the operations, while two or three bullae were present in 6%. Only seven patients (5%) had diffuse bullous disease of the lung; five of these belonged to the group with chronic lung disease. In four cases (3%), no visible bullous changes could be identified on the pulmonary surface. One patient had fibrotic changes at the apex of the upper lobe, which was resected. Another patient had pleural adhesions at the apex, but nothing to
Wedge resection was performed by hand suture in five patients with recurrent pneumothorax (5% of all manually sutured cases), and by either staple machine or a combination of the two techniques in two patients (5%).

Thirty-seven percent of the patients had subjective complaints which they related to the pneumothorax operation. The most common symptoms were diffuse chest pain, breathlessness and hypoesthesia or hyperaesthesia in the scar region. There were no patients with nerve palsies. Six patients (5%) had severe complaints. Of the patients with transaxillary incision, 40% had complaints compared with 30% with standard thoracotomy, but the difference was not significant (P=0.42). There was no relationship between postoperative observation time and persistence of postoperative complaints.

Discussion

This investigation reports results of a 18-year period of surgical treatment for spontaneous pneumothorax by wedge resection of bullous lesions without surgical pleurodesis or pleurectomy. While most publications concerning this problem deal with techniques using pleural rubbing or pleurectomy [2, 8, 12], we are only aware of a few authors reporting results after operations without pleurodesis [4, 6]. Our complication rate of 16% is comparable to other reports, which vary between 6.5% [12] and 30% [7]. Our rate of reoperations (2%) is low compared to other reports varying from 5% [5] to 13% [7]. We did not experience complications like pleural effusion or bleeding from the pleural surface, which have been associated with pleural rubbing or pleurectomy [6].

The pneumothorax was caused by a single bullous lesion in the upper lobe in 86% of the operations, while two or three apical bullae were present in 6%. This distribution of bullous disease is very similar to that reported by Ferguson et al. [4] from the United Kingdom who found apical bullous disease in 40 of 45 patients (89%) in the surgical group. Other authors, also from the United Kingdom, have reported 52–72% apical bullous disease [1, 11]. In our series, only 5% (seven patients) had diffuse bullous disease of the lung, which is less than the 12% reported by Askew [1].

Seven instances of recurrent pneumothorax (5%) on the operated side occurred during a follow-up period of 7 years on average. Other authors have reported recurrence rates between 0 and 4.2% after operations without pleural rubbing or pleurectomy [4, 6], compared to 0–5% when surgery on the pleura has been undertaken [3, 5]. Based on reported recurrence rates, surgical pleurodesis does not seem to protect the patient from a relapse of pneumothorax. This also conforms with our experience of patients treated with pleurectomy. Although none of our patients with diffuse bullous disease who were treated with only wedge resec-
tion(s) has had a recurrence, we can not generally recommend this method as treatment of pneumothorax in diffuse bullous disease, due to the small number of patients (7) in this group. Probably, pleurectomy might offer better protection against recurrence in many of these patients. Pleurectomy has, however, been associated with postoperative complications necessitating reoperation in 7% [1], while no such complications were reported in another series [11]. Without doubt, pleurectomy makes later lung surgery more difficult. All of our patients with recurrent pneumothorax on the operated side could be treated conservatively without reoperation, which supports our conclusion that pleurectomy or pleurodesis seems unnecessary in ordinary pneumothorax operations caused by localized bullous disease.

The follow-up rate of 100% is an important point in our study. Some publications have only a 66% follow-up rate of their patients [3, 12]. The observation time is also variable (4–19 years) [2, 12]. We achieved complete evaluation of all operated patients and there were clear data in the medical records of those patients who died of other causes. About half of the patients with recurrences did not answer the first or second request for information. It is therefore possible that the real rate of relapses could be higher than reported in other publications where the follow-up rate is lower. About one-third of the patients had subjective complaints associated with thoracotomy (chest pain, a feeling of dyspnea and hypo/hyperesthesia of the scar). We tried to examine if there was any relationship between the time from operation and persistence of postoperative complaints, but we could not find any clear indications for that. It seems that postoperative complaints which are present 3–6 months after operation tend to persist permanently. Other publications report postoperative complaints in 14%–47% of the cases [3, 8]. Transaxillary thoracotomy has been considered to give less pain and disability than standard thoracotomy, but this could not be confirmed in our study. It will be interesting to see if the use of video-assisted thoracoscopic methods reduce the rate of postoperative complaints.

We conclude that transaxillary thoracotomy with lung resection without pleurodesis and/or pleurectomy is an easy, safe and effective method in the surgical treatment of spontaneous pneumothorax in patients with localized bullous disease. The incidence of recurrence is low, but many patients have postoperative pain and discomfort after the thoracotomy. Pneumothorax operations using a VAT technique are reported to give less pain and shorter hospitalization [14], but it is still not yet clear if the recurrence rate will be as low as after thoracotomy.

References