Resection of Pulmonary Blebs and Pleurodesis for Spontaneous Pneumothorax*

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Over a 20-year period, 83 patients underwent operative pleurodesis with resection of pulmonary blebs for spontaneous pneumothorax. Follow-up for all patients was between 5 and 25 years, with a mean of 9.1 years. There were five early (5.6 percent) and three late recurrences (3.6 percent). There were no deaths or need for blood transfusion in our series. There was a low incidence of postoperative fever (n = 8), minor wound infection (n = 6), air leak (n = 6), or pneumonia (n = 2). The low morbidity and recurrence rates compare favorably with published series of alternative treatment options for spontaneous pneumothorax.

(Chest 1993; 104:1767-69)

Spontaneous pneumothorax is an uncommon problem, but there is still controversy regarding its treatment. It occurs in two groups of patients: young people with apical blebs, and older patients with chronic obstructive pulmonary disease (COPD) who may have large bullae. The formation of these blebs in younger patients is attributed to air dissecting from a ruptured alveolus through interstitial tissues. The air collects beneath the visceral pleura. In patients with COPD, progressive destruction of alveolar septal walls leads to formation of bullae. Rupture of the bleb or bullae results in air leaking into the pleural space. The goal of therapy is to obliterate the ruptured bleb or bullae, and create adhesions between the two pleural surfaces thus preventing collapse of the lung. Chemical pleurodesis or pleurectomy has been favored by some, but we prefer simple pleural abrasion and bleb resection because of its safety, lack of complications, and reliability.

METHODS

Between 1965 and 1985, 83 patients underwent pleurodesis for spontaneous pneumothorax. This group of patients provided us with a minimum of 5-year follow-up. The hospital records of these patients were reviewed, and follow-up was obtained by either telephone interview or mail-in questionnaire.

The initial treatment of these patients was either bed rest, aspiration, or tube thoracostomy depending on the clinical state of the patient and size of the pneumothorax.

Technique

Patients are positioned in the lateral decubitus position with the involved side elevated 90°. There were many incisions used in this series, but the most common was a muscle sparing-one used in 46 patients. A small lateral incision is made beginning one finger breadth below the tip of the scapula extending to the anterior axillary line. Small subcutaneous flaps are raised to expose the latissimus dorsi. This muscle is preserved by dissecting it from the chest wall staying close to the muscle to avoid the neurovascular bundle of the serratus muscle. The serratus anterior muscle is then divided in line with its fibers over the fourth or fifth rib, stopping 1 to 2 cm from the neurovascular bundle. The fourth or fifth interspace is used to enter the pleural space. A small portion of rib may be removed subperiosteally if additional access is needed.

The lung is then thoroughly inspected for blebs or bullae. These are removed with either a stapler (TA-30) using 3.5-mm staples, or excised and oversewn with 2-0 chronic catgut. The parietal pleura is abraded with a dry gauze sponge until the surface becomes slightly erythematous. The visceral pleura is either gently abraded or tetracycline (1 g in 100 ml saline solution) is applied to its surface. One or two chest tubes are inserted through separate incisions and placed on 20 cm of water suction. The tubes are removed after 2 days, provided there is no air leak.

RESULTS

Prior Treatment

Seventy-six patients (91.6 percent) had a history of pneumothorax. These patients were treated with tube thoracostomy (54.7 percent), bed rest (29.9 percent), contralateral pleurodesis (5.7 percent), needle aspiration (5 percent), thoracotomy with resection of blebs (2.5 percent), chest tube sclerosis (1.2 percent), or contralateral pleurectomy (0.6 percent).

Indications for Surgery

The indications for pleurodesis included recurrent pneumothorax (80 percent), prior contralateral pneumothorax (10 percent), persistent air leak (6.7 percent), bilateral synchronous pneumothorax (2.2 percent), and occupational hazard (1.1 percent).

Patient Demographics

There were 90 pleurodeses with resection of pulmonary blebs performed on 83 patients. There were 65 male and 18 female patients. A right-sided pneumothorax was more common (59.4 percent). Bilateral pneumothorax was present in 5 percent, and 11 percent had tension pneumothorax. The ages ranged from 13 to 67 years, with a mean age of 28 years. The patients fell into two groups, with 24 patients (age range, 28 to 67 years; mean, 47.6 years) showing

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pathologic evidence of COPD. Fifty-nine patients (age range, 13 to 44 years; mean, 26.5 years) had no evidence of COPD. Sixty-seven percent of all patients were smokers. Prior to surgical management, the recurrence rate after the first pneumothorax was 50 percent, and it increased to 80 percent following the third episode.

Pathology

Pulmonary blebs or bullae were found in all but five cases (94 percent), and were located in the upper lobe in 90 percent of patients.

Morbidity and Mortality

Morbidity following pleurodesis included fever (10 percent), minor wound infection (6.7 percent), air leak greater than 5 days (6.7 percent), and pneumonia (2.4 percent). There were no deaths in the group. There were no neurologic complications or blood transfusions. The only long-term complication was persistent incisional pain in two patients.

Recurrence

Recurrence following pleurodesis was uncommon. There was a 5.6 percent early recurrence following removal of the chest tubes. These five patients were all successfully treated with either aspiration or chest tube reinsertion. Late recurrence has occurred in three patients (3.6 percent). These patients were successfully treated with either bed rest (n = 2) or chest tube (n = 1). Follow-up has been from 5 to 25 years, with a mean of 9.1 years.

Discussion

Lockwood suggested surgical intervention for recurrent spontaneous pneumothorax in 1928. Tyson and Crandall in 1941 excised a 5-cm pulmonary bleb for treatment of spontaneous pneumothorax. The treatment options since that time have largely been chemical pleurodesis, resection of blebs with abrasive pleurodesis, and pleurectomy.

Our series demonstrates that resection of blebs with abrasion of the pleura is an effective, well-tolerated procedure. There were no deaths, no need for blood transfusion, and low rates of fever, minor wound infection, or prolonged air leak. There was no documented injury to the sympathetic chain, vagus, or phrenic nerves.

While some advocate chemical pleurodesis for spontaneous pneumothorax as a conservative option, current anesthetic techniques combined with new modalities for pain control make limited thoracotomy a well-tolerated procedure. An examination of 119 patients treated with either chemical or operative pleurodesis showed no difference in mortality. While the preprocedure length of hospital stay was longer in the operative group, there was no difference in the postprocedure length of stay. A prospective, multicenter, randomized trial showed a 25 percent recurrence rate in 113 patients treated with chemical pleurodesis.

The addition of thoracoscopy to chemical pleurodesis is reported to be of no value in predicting recurrence. If chemical pleurodesis fails, operation may be more difficult because of adhesions. This could possibly increase the risk of complications, requiring a larger thoracotomy with increased discomfort and prolonged recovery. We would therefore reserve chemical pleurodesis for those patients who refuse surgery or those with minimal pulmonary reserve.

Pleurectomy is also an effective mode of therapy, with recurrence rates quoted at 1 percent or less. This operation carries with it a higher risk. The major complication rate in some studies is 3.7 to 6.2 percent. This includes hemorrhage requiring reoperation or transfusion, nerve damage, empyema, respiratory distress, and death. Pleurectomy in the population of younger patients would also make future thoracotomies very difficult.

Video-assisted thoracoscopy may be yet another way of managing spontaneous pneumothorax. Staplers can be inserted through small incisions to resect blebs. Pleural abrasion can be accomplished with sponges through the same small incisions. Chemical sclerosis could also be used in this instance. Results of video-assisted thoracoscopy for management of pneumothorax will be forthcoming. It remains to be seen if it will compare favorably with operative pleurodesis.

Until series with video thoracoscopy become available, we advocate operative pleurodesis and resection of blebs for spontaneous pneumothorax. It can be done safely with low morbidity. Small, muscle-sparing incisions allow the operation to be done with few long-term problems. The low incidence of late recurrence (3.6 percent) in our series of patients followed up a minimum of 5 years (mean, 9.1 years) attests to the effectiveness of this procedure. We believe chemical pleurodesis is associated with an excessive recurrence rate and may complicate further management of recurrence by the adhesions that are formed. Pleurectomy is an effective method of treating pneumothorax, but for most patients, it is associated with too many complications and makes future surgery very difficult.

References