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Pleurectomy/decortication for palliation in malignant pleural mesothelioma: results of surgery

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Abstract

Objective: Surgery can only offer palliation in an attempt to slow the progression of malignant pleural mesothelioma (MPM). We want to assess the effectiveness and safety of pleurectomy/decortication in establishing a tissue diagnosis, and controlling pleural fluid accumulation and symptoms in patients with MPM. *Methods:* We reviewed our pleurectomy results in 100 patients with MPM over a 19 year period. Major symptoms were chest pain, cough and dyspnea, and radiographic findings included pleural mass, pleural fluid and constriction of involved hemithorax. *Results:* Approximately two thirds of the patients underwent surgery prior to tissue diagnosis. Eighty-nine patients had stage I and stage II disease, 8 and 81%, respectively. The patients underwent subtotal (44%) or total pleurectomy (56%). The surgical mortality rate was 1% (1/100) and the morbidity rate was 22%. Morbidity included prolonged air leak ($n = 12$), empyema ($n = 6$), reaccumulation of pleural fluid ($n = 2$) and wound infection ($n = 2$). Palliative results included dyspnea and cough relief in all patients, chest pain relief in 60 (85%) and pleural fluid control in 52 (96%) patients. Median survival was 17 months in MPM patients. *Conclusions:* We conclude that pleurectomy/decortication safely provides both tissue diagnosis and effective control of pleural effusion and symptoms and therefore excellent palliation in patients with MPM. © 1997 Elsevier Science B.V.

Keywords: Malignant pleural mesothelioma; Pleurectomy; Decortication

1. Introduction

Environmental and occupational exposure to asbestos is frequently the main cause of malignant pleural mesothelioma (MPM). As a result of the many asbestos and erionite areas found in Turkey, MPM is one of the major health problems in the country. Although it is an uncommon disease, it possesses a serious problem because there is no curative treatment for this usually fatal tumor. There is no uniform agreement on the most appropriate therapeutic management of this tumor. Surgery has three roles in malignant mesothelioma: diagnosis, palliation and radical resection [21]. But therapeutic efficiency of surgery is still controversial. Here we assess the effectiveness and safety of pleurectomy/decortication in establishing tissue diagnosis, controlling pleural fluid accumulation and effecting palliation of symptoms such as dyspnea, cough and chest pain.

2. Material and methods

A hundred patients with MPM who underwent surgery in Atatürk Chest Diseases and Thoracic Surgery Center between 1974 and 1992 were reviewed. Of these, cases of 46 patients seen prior to 1986 were reported previously [9], however, eight of these patients

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underwent pleural pneumonectomy and were consequently excluded from this study. The female:male ratio was 1:5 and the average age was 41 (range 12–70 years). Symptoms and radiological signs of the patients are shown in Table 1. Laboratory data evaluated before the operation included haemoglobin, haematocrit, white blood cell count, sedimentation rate, renal and liver function tests, urinalysis and pleural fluid examinations. Two dimensional chest roentgenogram was performed in every case. Although a CT scan of the chest is the most useful test in the diagnosis of MPM, it was obtained in only 23 patients. In 22 of these cases, possible diagnosis of mesothelioma was made by means of a CT scan of the chest due to the pathognomonic appearance of mesothelioma on the CT scan. The tissue diagnosis was obtained by cervical lymph node biopsy, percutaneous pleural needle biopsy, thoracoscopic biopsy or thoracotomy. Selection criteria for thoracotomy included pleural thickening, pleural mass and chronic empyema. We also proceeded with thoracotomy for pleural thickening in patients whom the diagnosis was known.

Since the patients have pleural mass or extensive pleural thickening which causes trapped lung, we then proceeded with thoracotomy for diagnosis, and performed pleurectomy to have the lung reexpanded and the thoracic cavity fully filled with the lung. A pleurectomy/decortication was performed via a wide posterolateral thoracotomy through the fifth or sixth intercostal space. The costal pleura was separated from the endothoracic fascia by blunt dissection extrapleurally, very hot compresses were then placed between the chest wall and the parietal pleura, for haemostasis. Ultimately, the edge of the parietal pleura was reached. Dissection was discontinued in cases where the cleavage plane was difficult to find. The parietal pleura was incised carefully, to gain entry into the pleural space and the visceral pleura, with a small scalpel. Visceral pleurectomy was then performed with extensive care taken to ensure no damage to the lung parenchyma. Residual tumor was left on the lung when impossible to resect completely without tearing the lung.

Table 1
Symptoms and radiological signs of malignant pleural mesothelioma in 100 patients

Symptom or radiological sign	Patients (%)
Chest pain	71
Pleural mass or thickening	70
Pleural fluid	54
Cough	40
Dyspnea	37
Constriction of hemithorax	30

Patients were evaluated for symptom relief such as dyspnea, cough and chest pain, and for recurrence of pleural effusion at two monthly intervals after discharge, by means of palliation. Survival data was obtained by corresponding with patients or their families by mail as well as from the charts of the patients. The results of palliative treatment were evaluated with the improvement of clinical findings and symptoms.

3. Results

Since 89% of patients were in class I or II, we were able to perform pleurectomy/decortication in 56 patients and subtotal pleurectomy in 44 patients. Although the tissue diagnosis was obtained before thoracotomy in 32 patients (one with cervical lymph node biopsy, 10 with closed needle biopsy and 21 with thoracoscopy), we also performed thoracotomy to carry out pleurectomy/decortication in these patients. The remaining 68 patients were diagnosed after thoracotomy.

Postoperative bleeding was 400 ml mean (range 100–1700 ml). No patient needed revision for postoperative haemorrhage. There was no surgical complications such as phrenic nerve palsy and hoarseness.

The mortality rate was 1% with only one patient whose postoperative course was complicated with empyema, sepsis and ARDS. The overall morbidity rate was 22%. Twelve patients had prolonged air leak. Empyema developed in six patients and was treated with tube thoracostomy and under water seal drainage without any extra difficulty. Only two patients developed reaccumulation of pleural fluid and were hence treated with tetracycline chemical pleurodesis. Two patients had wound infection and were healed with wound care.

Cell types of MPM were epithelial in 60 patients (60%), sarcomatous in 11 patients (11%) and mixed in 29 patients (29%). No chemical pleurodesis of any kind was used pre or intraoperatively, pleurodesis was accomplished by means of visceral pleurectomy (surgical pleurodesis) as described above.

By means of palliation only two patients were discovered to have reaccumulation of pleural fluid (2/100, 2%). The other palliative results are summarized in Table 2 and these results remained stable after 6 months. Thirty-one patients received radiation therapy , 24 received chemotherapy and 20 received both, postoperatively.

Tumor recurrence relating to the thoracotomy site or chest tube tracks was observed in two patients. Each of these patients presented with a painful lump. They were palliated by radiation therapy. The median survival of the patients analysed on a long term basis was 17 months (range 3–63 months).

Table 2
Symptom relief or improvement of signs in 100 patients with malignant pleural mesothelioma after pleurectomy/decortication

Symptom relief or improvement in sign	No. of patients	Patients (%)
Chest pain	60	85
Pleural mass or thickening	38	55
Pleural fluid	52	96
Cough	40	100
Dyspnea	37	100
Constriction of hemithorax	12	40

4. Discussion

MPM is a rare disease which has no standard treatment protocol. It is often presented with pleural fluid accumulation and constriction of the chest wall, the diaphragm and the lung resulting in dyspnea and chest pain [23]. Pleural fluid may also be infected sometimes, resulting in empyema due to repeated thoracentesises. Symptomatic pleural effusions occur in 30–90% of patients with MPM [2,3,16]. Therefore, these patients always need palliation.

The correct diagnosis is yet difficult to make. Biochemical and cytological analysis of the pleural fluid rarely give definitive results. Cytology based diagnosis was obtained in only 10% of patients [1], although malignant cells were discovered in pleural fluid of many more patients with MPM. Specimens from closed needle pleural biopsy are not sufficient in size and depth to allow a definitive diagnosis. Needle biopsy was positive in only 9% of our patients. Thoracoscopy has the advantage of direct vision of pleura for biopsy, but permits inspection of approximately 75% of the pleural space [17]. Thoracoscopy is a very useful method for both diagnosis and staging of MPM. But there are some difficulties in diagnosis of MPM also with thoracoscopy because of the thick adhesions and fibrous bands often found in this disease. In this series, 21 patients were diagnosed thoracoscopically. Thoracotomy and pleurectomy could be carried out instead of open pleural biopsy if the patient has no contraindication for thoracotomy.

In this series, 74% of patients had history of asbestos exposure or had been living in asbestos or erionite areas of Turkey. There are many asbestos deposits in some rural parts of Central and Eastern Anatolia [21]. The villagers use asbestos contaminated soil (called white soil) in whitewashing, so the most important route of asbestos exposure is dust originating from the walls of houses. This situation can explain the lower ages of our patients (average 41). It may be due to the early onset of nonoccupational exposure to either mineral. One of our patients was 12 years old.

Surgical mortality of pleural pneumonectomy varies between 6 and 30% [6,8,10,20]. The mortality rate of pleurectomy/decortication is considerably less than that of pleural pneumonectomy and is 1.8% [16] which shows pleurectomy is safer than pleural pneumonectomy. As for any operation, the operative mortality and morbidity of pleural pneumonectomy and pleurectomy/decortication are linked to the patient selection criteria, technical expertise and experience of the surgeon. So pleural pneumonectomy should not be performed by every surgeon. Because pleurectomy does not involve the removal of the lung, it is an option for many of the mesothelioma patients with significantly impaired lung function [20].

Since the knowledge about the survival results of surgical therapy of MPM has intensified, it has become apparent that there is no survival advantage from doing pneumonectomy [7,15]. Surgery was only used for palliation, every effort was made to preserve the lung and pneumonectomy was not carried out after 1986. A subtotal or total pleurectomy was performed in 100 patients. Visceral and parietal pleuras were completely removed in 56 patients, but in 44 patients some gross residual tumor could not be removed because of the invasion to the mediastinal structures and bulky tumor. Even so, we were able to resect some parts of the visceral pleura to allow the lung to expand and fill the thoracic cage in some such cases. It was found that pleurectomy is feasible in 15 (80%) patients operated on for MPM. In this series we were able to perform a complete pleurectomy/decortication in 56% of patients but we removed the pleura as much as we could in the remaining patients from the standpoint of palliation. It was reported from several centers that there was no significant difference between survival rates of the patients with supportive care alone and those who underwent any kind of treatment [11,12,19]. Pleural pneumonectomy patients had a significantly better disease free survival in the experience of the 'lung cancer study group' [18], but there was no difference between overall survival.

Pleurectomy is the procedure chosen for surgical palliation of malignant mesothelioma [13]. If it is carried out completely or almost completely it can improve the mechanics of respiration. Adequate pulmonary reexpansion and effective pleurodesis can be achieved after decortication [4,14]. By means of parietal pleurectomy, diaphragmatic and chest wall compliance may be improved and patients can expand the thoracic cage more than they could prior to treatment. Because of this, dyspnea, cough and chest pain were controlled in our patients by 100, 100 and 85%, respectively. Besides, pleurectomy/decortication may allow the removal of all gross tumor and serve as a good debulking surgery in patients with early stage disease.

Parietal pleurectomy and decortication have been reported as an effective means of controlling malignant pleural effusions [4,14]. In palliation of pleural fluid in MPM, pleurectomy is reported with a 2% surgical mortality and a 2% reaccumulation of pleural fluid [5].

The question of whether this procedure prolongs survival cannot be determined in the absence of a controlled study, however the median survival of followed pleurectomy/decortication patients was 17 months. The survival of patients receiving radiation therapy and/or chemotherapy was higher, 22 months. All of those patients receiving radiation therapy and/or chemotherapy were followed up. The treatment of MPM is generally unsatisfactory. No type of treatment is sufficient to control the disease. Problems associated with the surgical approach including local recurrence in the incision and a possible shortened life span relating to the morbidity and mortality of the operation can be solved by prophylactic radiotherapy of the incision site [5,21] and by choosing the operations with lower morbidity and mortality (pleurectomy/decortication). The adequate pleural fluid control achieved by pleurectomy significantly improves the quality of life of the patients. All of our patients except one returned to their daily life after discharge.

Localized nature, potential accessibility and rarity of distant metastases make MPM an attractive candidate for gene therapy. Effective gene transfer was accomplished within tumor implants of human mesothelioma growing within the peritoneal cavity of mice after the intraperitoneal administration of the virus [22].

In conclusion, we recommend pleurectomy/decortication in MPM for palliation of pleural fluid accumulation, chest pain and dyspnea and possibly, curative resection in patients with minimal disease. Also, thoracotomy and pleurectomy is the most conclusive way of obtaining tissue diagnosis in MPM. Even in patients with advanced stages, if the patient is a surgical candidate, thoracotomy and pleurectomy can be tried for pleurodesis.

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