

# Adoption of pleurectomy and decortication for malignant mesothelioma leads to similar survival as extrapleural pneumonectomy

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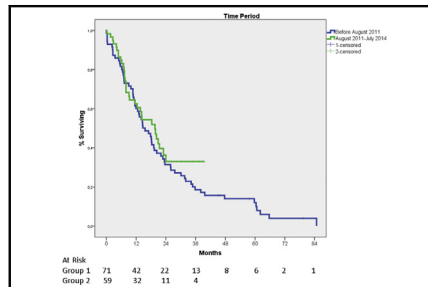
## ABSTRACT

**Objective:** We changed our surgical approach to malignant pleural mesothelioma (MPM) in August 2011 and adopted pleurectomy and decortication (PD) instead of extrapleural pneumonectomy (EPP). In this study, we analyzed our perioperative and survival results during the 2 periods.

**Methods:** All patients who underwent surgical intervention for MPM during 2003-2014 were included. Data were retrospectively analyzed from a prospective database. Before August 2011, patients underwent evaluation for EPP and adjuvant chemoradiation (group 1). After August 2011, patients were evaluated for PD and adjuvant chemotherapy and/or radiation (group 2). Demographic characteristics, surgical technique, histology, side, completeness of resection, and types of treatments were recorded. Statistics was performed using Student *t* test,  $\chi^2$  tests, uni- and multivariate regression, and Kaplan-Meier survival analysis.

**Results:** The same surgical team operated on 130 patients. Median age was 55.7 years (range, 26-80 years) and 76 were men. EPP and extended PD was performed in 72 patients. Ninety-day mortality was 10%. Median survival was 17.8 months with a 5-year survival rate of 14%. Uni- and multivariate analyses showed that epithelioid histology, stage N0, and trimodality treatment were associated with better survival ( $P = .039$ ,  $P = .012$ , and  $P < .001$ , respectively). Demographic variables and overall survival (15.6 vs 19.6 months, respectively) were similar between the groups, whereas nonepithelioid histology, use of preoperative chemotherapy, and incomplete resections were more frequent in group 2 ( $P < .001$ ,  $P < .001$ , and  $P = .006$ , respectively). Follow-up was shorter in group 2 ( $22.5 \pm 20.6$  vs  $16.4 \pm 10.9$  months;  $P < .001$ ).

**Conclusions:** Adoption of PD as the main surgical approach is not associated with survival disadvantage in the surgical treatment of MPM. (J Thorac Cardiovasc Surg 2016;151:478-84)



Extrapleural pneumonectomy and pleurectomy and decortication result in the same survival rate in patients with malignant pleural mesothelioma.

### Central Message

Adoption of pleurectomy and decortication as the main surgical approach does not cause survival disadvantage in the treatment of malignant pleural mesothelioma.

### Perspective

Preference of EPP or PD as the main surgical approach does not make a difference in terms of overall survival in patients with MPM. With the growing body of evidence showing relatively similar survival rates with any of the surgical strategies adopted, randomized studies are needed to compare surgical procedures (VATS PD vs EPD and partial PD vs EPD) in the treatment of MPM.

See Editorial Commentary page 485.

See Editorials page 307 and 310.

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Malignant pleural mesothelioma (MPM) is a disease with poor prognosis, mainly due to the rapid progression of the tumor and frequent locoregional failure of treatment strategies.

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Abbreviations and Acronyms	
CT	= computed tomography
EPD	= extended pleurectomy and decortication
EPP	= extrapleural pneumonectomy
MARS	= Mesothelioma and Radical Surgery
MCR	= macroscopic complete resection
MPM	= malignant pleural mesothelioma
PD	= pleurectomy and decortication

Several perioperative techniques and strategies were adopted to improve survival in patients with MPM. Multimodality approaches, including surgery, chemotherapy, and radiotherapy in various orders, are shown to improve survival with most series reporting median survivals between 17 and 35 months and 5-year survival of 15% to 20%.<sup>1-5</sup> In 2 recent studies that include more than 500 patients, median survival following extrapleural pneumonectomy (EPP) was 18 months with 15% 5-year survival rates.<sup>1,5</sup>

Debate about the technique of MPM surgery has lasted for more than 2 decades, with proponents of lung-sacrificing surgery—namely EPP, which includes removal of the ipsilateral lung, diaphragm, and occasionally pericardium and the lung-sparing option of pleurectomy-decortication (PD), which includes removal of ipsilateral pleura. Although this debate is ongoing, following the publication of several retrospective comparative series and a consensus statement about surgical principles, macroscopic tumor resection regardless of the surgical technique has become the widely accepted approach.<sup>7</sup>

We have been proponents of EPP as the main surgical technique in the treatment of MPM for about a decade and decided to adopt a lung-sparing approach following a growing body of evidence showing similar survival rates with a lung-sparing surgical technique.<sup>3,8</sup> The Mesothelioma and Radical Surgery (MARS) trial, which was an underpowered feasibility study with strong anti-EPP conclusions, attracted considerable interest from many clinicians around the world and changed legal consequences in some countries.<sup>8</sup>

We analyzed our single-institution experience in the surgical and multimodality treatment of patients with MPM, comparing periods before and after changing our surgical technique.

**METHODS**

One hundred thirty patients were evaluated for multi- or trimodality treatment with histologically proven MPM and underwent surgery in Marmara University Hospital during 2003-2014. The study was approved by the Ethical Council of Marmara University Faculty of Medicine.

All patients with radiologically resectable MPM and no bulky mediastinal or extrapleural lymph node metastasis were evaluated for trimodality treatment. Patients underwent thoracoabdominal computed tomography (CT) scan, positron emission tomography (PET)-CT, laboratory and pulmonary function tests, and cardiac evaluation.

**TABLE 1. Demographic, perioperative, and survival data for the cohort (n = 130)**

Data	Result
Median age, y	55.7 (26-80)
Sex	
Female	54
Male	76
Comorbidities	
Present	52 (40)
Cardiopulmonary	33
Diabetes	6
Others	13
None	78 (60)
Types of surgical procedures	
Extrapleural pneumonectomy	42 (32)
All pleurectomies*	66 (51)
Others†	22 (17)
Histology	
Epithelioid	97 (75)
Mixed	26 (20)
Sacromatoid or desmoplastic	7 (5)
Forced expiratory volume in 1 s, L	2.05 ± 0.5
Postoperative major morbidity	17 (13)
Mortality	
30-d	6 (4.6)
90-d	13 (10)
Length of hospital stay, d	7.6 ± 4.1
Resection status	
1	70 (54)
2	60 (46)
Surgical T status	
T1 and T2	62 (48)
T3 and T4	68 (52)
Pathologic N status	
0	65 (50)
1	1 (1)
2	22 (17)
X‡	42 (32)
Mean follow-up, mo	19.1 ± 16.8
Sites of recurrence	
Locoregional	69 (53)
Distant	9 (7)
Locoregional and distant	19 (15)
Median overall survival, n	17.8
Survival rates, %	
2-y	32
5-y	14

Data are presented as n (%), median (range), or mean ± standard deviation unless otherwise noted. \*Pleurectomy decortication with macroscopic complete resection (n = 30) and partial pleurectomy decortication (n = 36). †Explorative video-assisted thoracoscopic surgery and diagnostic procedures. ‡Mediastinal lymph nodes not surgically evaluated.

Mediastinal staging was based on CT findings until 2005 and afterward on fluorine-18-fluorodeoxyglucose PET-CT. If there was any suspicion of mediastinal lymph node involvement, cervical mediastinoscopy was performed. Magnetic resonance imaging was also frequently used in case of suspicion of involvement beyond the pleural envelope.

The treatment strategy before August 2011 was to perform EPP (with ipsilateral diaphragm and/or pericardial resection), adjuvant high-dose

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