



Role of partial pleurectomy and extended pleurectomy/decortication in mesothelioma: a narrative review

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Background and Objective: The aim of this review is to assess the role of partial pleurectomy in the treatment of malignant pleural mesothelioma (MPM). MPM is an aggressive and rare tumour originating in the pleurae, very often related to occupational asbestos exposure. Surgical procedures for MPM may range from relatively minor operations to obtain a clear histopathologic diagnosis and a complete pathological staging, to more demanding debulking procedures for palliation or with cytoreductive aim.

Methods: This is an unsystematic narrative review of previously published information about partial pleurectomy/decortication (PD) for MPM. Research has been done by accessing the following data bases: Medline; Cochrane database of systematic reviews. Search terms delimiting were: MPM; pleurectomy decortication; palliative pleurectomy; extrapleural pneumonectomy (EPP), indwelling pleural catheters; video assisted thoracoscopic surgery (VATS) talc pleurodesis. Inclusion criteria were: papers written in English about surgical treatment of MPM from the above mentioned data bases [1976–2020].

Key Content and Findings: This review will focus on the palliative role of partial pleurectomy for MPM and highlights its impact on pleural effusion management.

Conclusions: Considering valuable alternatives to partial pleurectomy for controlling pleural effusion, such as VATS talc pleurodesis or indwelling pleural catheters, its indication should be always carefully considered, although its low morbidity and mortality rate is a favourable aspect to take into consideration during the final decisional process.

Keywords: Malignant pleural mesothelioma (MPM); pleurectomy decortication; palliative pleurectomy; extrapleural pneumonectomy (EPP); indwelling pleural catheters; video assisted thoracoscopic surgery talc pleurodesis (VATS talc pleurodesis)

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Introduction

Background

Malignant pleural mesothelioma (MPM) is an aggressive and rare tumour originating in the pleurae (1). The vast majority of MPM diagnoses have been related to well-

known occupational asbestos exposure (2) while less common risk factors unrelated to asbestos are exposure to erionite, ionizing radiation and germline mutations (3,4). There are three main histological groups of MPM: epithelioid, sarcomatoid and biphasic (5); the epithelioid is the most common group and shows the better prognosis;

on the contrary sarcomatoid and biphasic MPM—biphasic being a mixed form of both epithelioid and sarcomatoid forms—are less frequent and associated with the poorest prognosis (6,7).

MPM prognosis is globally very poor, showing a median overall survival (OS) ranging from 8 to 14 months (3); only limited therapeutic options are nowadays available, thus making MPM treatment an emerging field for preclinical experimental approaches (8-10).

Surgical procedures for MPM may range from relatively minor operations to obtain a clear histopathologic diagnosis, to more demanding debulking procedures for palliation or with cytoreductive aim (11).

When the goal of the procedure is to improve OS by cytoreducing pleural disease to a microscopic residual one, extrapleural pneumonectomy (EPP), extended pleurectomy/decortication (EPD) or pleurectomy/decortication (PD) have been advocated—through the years—as the ideal options within a multimodality therapeutic approach (12-15); on the contrary, when the target of the procedure is a palliative control of symptoms like pleural effusions and pain, partial pleurectomy—via open or thoracoscopic approach—and video-assisted talc poudrage (VTP) are presently considered as the best therapeutic options (16,17). While EPP has been clearly described and standardised by many groups (12-15), the definition of PD still remains quite variable with regard both to surgical technique and final goals (18), although EPD definition is currently being standardized by the EORTC 1205 trial, of which results are expected in Q1 2023 (19).

In the recently published ERS/ESTS/EACTS/ESTRO guidelines for the management of MPM, chemotherapy has been shown to have limited efficacy, and only selected patients are described as suitable candidates for radical surgery. New encouraging immunotherapies, as well as targeted therapies have been reviewed. Due to limited data on the ideal combination treatment, ERS/ESTS/EACTS/ESTRO guidelines disclosed that patients potentially candidates for a multimodal treatment, including radical surgery, should be enrolled in clinical trials in MPM-dedicated centres, whenever possible (20).

Intensity modulated pleural radiation therapy has been shown to be safe with an acceptable rate of radiation pneumonitis; together with chemotherapy and PD in has been advocated as a new lung-sparing treatment paradigm for patients with locally advanced MPM, yielding acceptable locoregional control (21,22).

We present the following article in accordance with the

Narrative Review reporting checklist (available at <https://shc.amegroups.com/article/view/10.21037/shc-21-34/rc>).

Objectives

The aim of this unsystematic narrative review is to assess the role of partial pleurectomy in the treatment of MPM.

Methods

This is an unsystematic narrative review of previously published information about partial PD for MPM.

Sources of information

Research has been done by accessing the following data bases: Medline; Cochrane database of systematic reviews.

Search terms delimiting

Malignant pleural mesothelioma; pleurectomy decortication; palliative pleurectomy; extrapleural pneumonectomy, indwelling pleural catheters; VATS talc pleurodesis.

Selection criteria employed

Inclusion criteria: papers written in English about surgical treatment of MPM from the above mentioned data bases [1976–2020] (*Table 1*).

Discussion

PD has been one of therapeutic option for MPM during the last forty years as reported by Martini et coll. which disclosed in 1976 a median OS of 21 months after this operation combined with chemo-radiotherapy (23).

The aim of this procedure is to resect all the visible tumour for the lung, fissures, chest wall, diaphragm and mediastinal structures, usually via postero-lateral or lateral standard thoracotomy.

Not infrequently PD can be effectively accomplished after talc poudrage which does not represent a contraindication and could even make pleural dissection form lung parenchyma easier. Some Authors reported the combination of PD with intraoperative chemotherapy or adjuvant treatments like post operative chemotherapy alone or combined to immunotherapy, although clear benefits in terms of OS are still controversial (16,24).

Table 1 The search strategy summary

Items	Specification
Date of search (specified to date, month and year)	Last update: February, 16 th 2022
Databases and other sources searched	Medline; Cochrane database of systematic reviews
Search terms used	Malignant pleural mesothelioma; pleurectomy decortication; palliative pleurectomy; extrapleural pneumonectomy, indwelling pleural catheters; VATS talc pleurodesis
Timeframe	1976–2020
Inclusion and exclusion criteria (study type, language restrictions etc.)	Papers written in English about surgical treatment of malignant pleural mesothelioma
Selection process (who conducted the selection, whether it was conducted independently, how consensus was obtained, etc.)	Two senior researchers, independently

VATS, video assisted thoracoscopic surgery.

Although some concerns still exist about the role of adjuvant high-dose radiotherapy following PD because of the presence of the lung that is still in-situ and could suffer from severe radiation pneumonitis (25), the introduction of pleural intensity-modulated radiation therapy (IMRT) allowed a safer although technically challenging delivering radiation (26).

It has been reported an acceptable operative mortality rate of 4% with 2-year survival rate of 26% and 5-year survival rate of 9% (27). In the light of its relatively low morbidity and mortality rate, PD and EPD have been recently advocated as a potential alternative to EPP: several groups, in fact, disclosed same survivals after EPP and PD with a definitely lower mortality rate and higher post operative quality of life of PD (28–33). In particular, pulmonary function shows a faster and better improvement in patients submitted PD rather than EPP with a better postoperative global performance status allowing the completion of multimodality treatment with adjuvant therapies (34).

Video assisted thoracoscopic surgery (VATS) is the gold standard approach for obtaining a reliable histologic diagnosis in patients which might further benefit from additional surgery with radical intent; on the other hand, medical thoracoscopy is a valuable option for patients not amenable of radical surgery because of poor performance status or significant comorbidities, although the main reason for not being amenable for surgery is advanced disease (35,36). Patients presenting trapped lung—with no chance of re-ventilation—can not benefit from talc pleurodesis but could be considered for pleurectomy or long-term chest drainage placement (indwelling pleural catheters or pleurocaths). VATS pleurectomy in patients with MPM and

trapped lung could provide complete or partial pulmonary re-expansion, ameliorating respiratory performances and overall quality of life (37–40).

In 2014 the MesoVATS trial's results have been published; it was an open-label, parallel-group, randomised, controlled trial randomizing patients aged 18 years or older with any subtype of confirmed or suspected mesothelioma with pleural effusion, to either VATS pleurectomy or talc pleurodesis and no survival benefit has been showed in the VATS pleurectomy group. For this reason VATS pleurectomy was not recommended to ameliorate OS of MPM patient and VATS talc poudrage was suggested because of its lower complication rate and shorter hospital stay as well. On the other hand, patients submitted to VATS pleurectomy—rather than talc poudrage—showed a significantly better quality of life both at 6 and 12 months after the procedure (41). Nevertheless, it should be always taken into consideration that PD—although definitely less invasive than EPP—is not without any complications, in particular when performed in older patients or with significant comorbidities (38); haemorrhagic complications as well as prolonged air leaks may frequently occurred after PD and so the expected advantages of the procedure should always be carefully evaluated according to the global performance status of the patient.

There are several limits on this multicentric study which required nearly 10 years to complete its accrual: during this period, daily clinical practices worldwide evolved from those reported in this study. Positron-emission tomography (PET) and/or magnetic resonance imaging (MRI) were more frequently used for preoperative staging and VTP was chosen over talc slurry via chest drainage. These

modifications—together with some patients' exclusion from the trial—significantly affected some conclusions of the study. In fact, many results of this study are based only on subsets of enrolled patients, and so they should be carefully considered when applied to clinical practice (42).

Indwelling pleural catheters represent another palliative option for treating pleural effusion in MPM patients: they do not require hospitalization as they can be easily implanted in the outpatient setting and caregivers or patients themselves can safely manage at home to treat recurrent pleural effusion not amenable of effective talc pleurodesis (43,44). Some studies show even better results of indwelling pleural catheters when compared with talc pleurodesis (43,44), in our personal experience, two different types of indwelling pleural catheters were able to effectively palliate symptoms in case of trapped lung (45).

With regard to long-term results, in our personal experience, we observed similar long-term outcomes results of EPD and standard PD; on the other hand, they both disclosed a clear survival advantage over partial pleurectomy (46). Moreover, no difference in terms of postoperative mortality rate was observed between the three types of PD (extended, standard and partial), while a significantly higher postoperative morbidity rate was observed in extended and standard pleurectomy when compared to partial pleurectomy (46).

The unsatisfactory results provided by partial pleurectomy—with regard to long term survival—raise the question of the appropriateness of this procedure; in addition, the palliative role of partial pleurectomy—that could be emphasized by its low postoperative morbidity rate—is still debated and some doubts remain about its real impact on quality of life improvement, pain control, pleural effusion recurrence prevention as well as chest wall and soft tissue invasion (46,47).

In a recent systematic review about the role of pleurectomy in the treatment of MPM by Cao *et al.*, partial pleurectomy showed a perioperative mortality rate ranging from 0% to 7.8% and overall perioperative morbidity rate ranging from 14% to 20% with a mean total length of in-hospital stay ranging from 6 to 11 days (48). As reported in previous studies, both disease-free and median OS outcomes were shown to be longer in patients receiving extended PD compared to standard PD and partial pleurectomy; this might be probably due to the increased chance to obtain complete macroscopic disease resection by removing the pericardium and the diaphragm whenever these surfaces are involved by the tumour. Interestingly, these better results

are balanced by higher morbidity and a longer in-hospital stay (48).

The histological subtype is relevant when surgery is considered for MPM, and most guidelines recommend excluding sarcomatoid mesothelioma; this histologic type, in fact, as the biphasic type, does not benefit from surgery because of its biological behaviour and only symptoms control should be the target of surgeons in this setting.

Summary

In conclusion, partial pleurectomy and decortication for MPM plays a role in the palliative approach to the disease, in particular to control recurrent pleural effusion; its impact on disease free and OS is very limited. Considering valuable alternatives to partial pleurectomy for controlling pleural effusion, such as VATS talc pleurodesis or indwelling pleural catheters, its indication should be carefully considered in fit patients with a longer life-expectancy, although its low morbidity and mortality rate is a favourable aspect to take into consideration during the final decisional process.

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