Management of Malignant Pleural Effusions

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Overview of current guidelines and practices in the management of malignant pleural effusion

Keywords: malignant pleural effusion

1. Background

Malignant pleural effusion (MPE) is the second most common cause of pleural exudate and affects 15% of all patients with cancer [1]. MPE accounts for greater than 125,000 admissions per year in the United States, with costs of around $5 billion for inpatient charges alone. It usually indicates an advanced stage or metastatic disease and hence portends a poor prognosis. The average life expectancy of patients presenting with MPE is 3–12 months depending on the underlying tumor type and patient comorbidities [2]. Lung cancer, breast cancer, and lymphoma contribute to the majority of these effusions, followed by gynecological malignancies and malignant mesothelioma [3]. Patients frequently experience debilitating dyspnea and other symptoms which severely compromise their quality of life. Various therapies are currently available for the management of these effusions. The management of MPE is challenging and is mainly focused on the relief of symptoms and the improvement of the patients' quality of life. The therapy needs to be tailored to individual patients taking into account their preferences, life expectancy, affordability, presence of trapped lungs, resources available, and the experience of the treatment team.

2. Management of Malignant Pleural Effusion

A small percentage of patients with MPE remain asymptomatic and hence can be managed by observation alone [1]. The main goal for the management of symptomatic MPE is the alleviation of dyspnea and improving their quality of life by the least invasive and minimal number of procedures.

Thoracentesis is the first step in the management of symptomatic MPE. For patients with malignancies responsive to cancer-directed treatment, definitive intervention beyond this may not be necessary. Thoracentesis can be safely done in an outpatient setting as well as in the hospital. The service is offered by a wide range of specialists—pulmonologists, thoracic surgeons, interventional radiologists, emergency medicine physicians, etc. Local institutional practices and patient presentations determine which service performs the procedure. Large volume thoracentesis can be done guided by pleural manometry and with USG guidance for assessing the patient's response to the removal of fluid. Although manometry though can be useful, is not widely used as it can be cumbersome and not readily available at all institutions. Studies have failed to establish standardized guidelines with regard to the use of manometry.

Thoracentesis also helps to identify patients with trapped lung, which can help determine further definitive interventions. Trapped lung refers to the phenomenon of the unexpandable lung, where there is an impediment to the normal apposition between the parietal and visceral pleura. The main mechanism is due to the formation of a fibrous layer along the visceral pleural surface due to local pleural pathology, which prevents lung expansion [4]. This can be assessed post procedurally after the drainage of the pleural fluid either by manometry or diagnostic imaging such as a chest X-ray/USG.

For patients with recurrent MPE who experienced relief of dyspnea following thoracentesis, a variety of interventions are available—repeated thoracentesis, pleural space drainage with pleurodesis, insertion of an indwelling pleural catheter (IPC), and surgery. We have included a table extrapolating the current ATS guidelines on management of MPE [**Table 1**] as well as the practice algorithm at our institution (**Figure 1**). The choice of therapy should be made on a case-by-case basis taking into account the patients' preference, affordability, quality of life, expected life expectancy, underlying tumor type, presence or absence of trapped lung, and local practices. Some tools have been validated to assess the risk of mortality, such as the LENT score (scoring based on pleural fluid LDH, ECOG performance scale, Neutrophil/lymphocyte ratio and tumor type), and can be helpful in deciding the therapy [5].

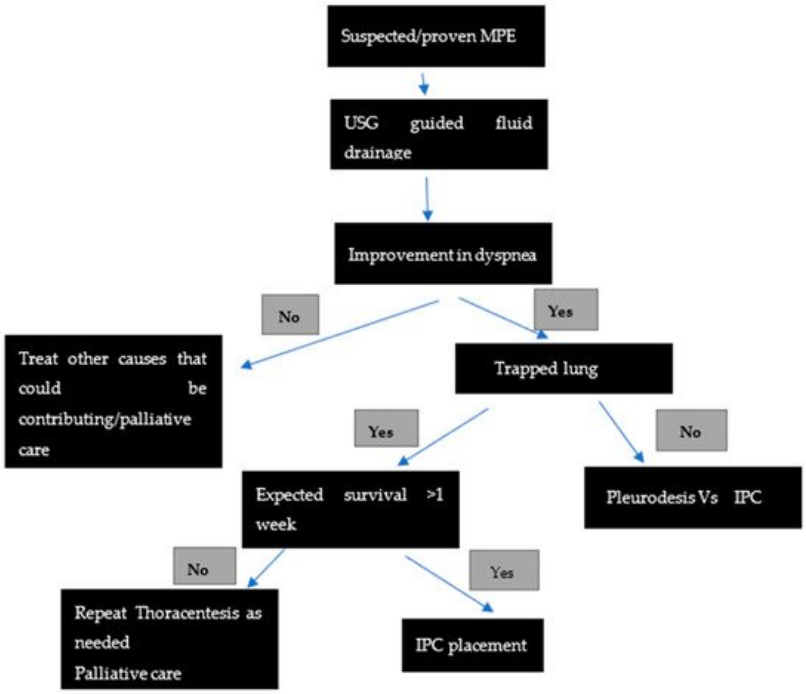

Figure 1. Algorithm suggested for the management of suspected/proven recurrent malignant pleural effusion.

Table 1. Summary of Current recommendations of ATS/STS/STR [6].

PICO [1]	RECOMMENDATIONS
1. In patients with known or suspected MPE should thoracic USG be used to guide pleural interventions?	**Yes**
2. In patients with known or suspected MPE, who are asymptomatic, should pleural drainage be performed?	**No**
3. Should the management of symptomatic known or suspected MPE guided by large volume thoracentesis and pleural manometry?	**Yes. Manometry if pleurodesis is contemplated to assess for lung re-expansion**
4. In patients with known or suspected symptomatic MPE, with expandable lung and no prior definitive treatment, should IPC or chemical pleurodesis be used as first line intervention?	**Yes**
5. In patients with known or suspected MPE, undergoing talc pleurodesis, should talc slurry or talc poudrage be used?	**Yes, there is no difference in the efficacy between the two**
6. In patients with symptomatic MPE with non-expandable lung, failed pleurodesis or loculated effusion, should IPC or chemical pleurodesis be used?	**IPC is the preferred method of choice over chemical pleurodesis**
7. In IPC associated infection, is catheter removal required?	**Not unless infection does not improve**

[1] PICO-population, intervention, comparator outcomes format.

2.1. Thoracic Drainage and Pleurodesis

For patients with symptomatic, recurrent MPE demonstrating expandable lung, placement of chest tube for drainage, and instillation of sclerosing agents in the pleural space are recommended as the preferred definitive management. Small-bore chest tubes (10–14 French) are equally effective for this purpose compared to large-bore catheters and are recommended

by British Thoracic Society Guidelines [7]. Pleurodesis involves the instillation of sclerosing agents in the pleural space to promote adhesions between the visceral and parietal pleura, thereby obliterating the space and preventing further accumulation of the pleural fluid. Various agents have been used for this purpose-talc, tetracyclines, bleomycin, Corynebacterium parvum, mitomycin, iodopovidine, etc. Talc is the most widely used and has proved to be the most efficacious [8]. Talc slurry instilled via a chest tube is equally effective as thoracoscopic talc poudrage [9]. However, highly effective talc as a sclerosant can cause significant pain in patients due to acute pleurisy. Other complications associated with talc pleurodesis include fever, acute pneumonitis, acute respiratory distress syndrome, and empyema. Studies have revealed that serious complications such as ARDS occur when small particle/non-graded talc (<15 microns) is used, likely due to high systemic absorption of talc [10].

Though highly effective in palliation of symptoms, pleurodesis involves inpatient admission of the patients and can be expensive, time-consuming, and inconvenient to the patients. This method also cannot be applied in patients with trapped lung physiology.

2.2. A Thoracoscopy with Pleurodesis

Thoracoscopy is a procedure that allows the visualization of the pleural surfaces and serves both as a diagnostic tool as well as definite management therapy of MPE. Thoracoscopy has high diagnostic yield (95%) in determining the etiology of exudative pleural effusions when compared to other modalities. By allowing the direct visualization of the pleural space, it allows for targeted biopsies of the parietal pleura. Additionally, it allows lysis of pleural adhesions, placement of chest tubes and pleurodesis by talc poudrage/mechanical abrasion of the parietal pleura [11]. Two different approaches are available for thoracoscopy—medical thoracoscopy (MT), completed by a pulmonologist, and surgical thoracoscopy (ST), completed by thoracic surgeons. Each has its own risks and benefits, and the choice of approach varies based on local practices, expertise, resources available, patient factors (ability to tolerate single lung ventilation/GA for ST), etc.

Medical thoracoscopy involves the placement of one or two trocars inserted through small ports along the midaxillary line. The procedure is then completed by either rigid thoracoscope or semi-rigid/flexible thoracoscope based on operator preference and expertise. MT is generally well tolerated and done under light/moderate sedation and local anesthesia and has a good safety profile. It can be completed on an outpatient basis without requiring the hospital admission of patients. Surgical thoracoscopy, usually carried out with video assistance (VATS), routinely involves three or more larger sized ports and is completed under general anesthesia. VATS normally require single-lung ventilation, which might limit patient selection for this approach. Though considered more expensive than MT, VATS carries the advantage of being able to offer the debridement of the fibrinous pleural peel in patients with trapped lung who are surgical candidates. VATS also has the option of being converted to an open thoracotomy procedure if needed. Thus, the selection of the thoracoscopic approach varies from patient to patient and by the institution and remains an area of debate in establishing the primary method of choice.

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