Caring for a patient with **malignant pleural effusion**

Find out how to recognize and respond to this condition, which is common in advanced malignancies.

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Florence Peters, 65, was admitted to your unit today with a presumptive diagnosis of metastatic breast cancer with malignant pleural effusion (MPE). Ten years ago, she was treated for breast cancer and has been cancer-free since then. However, in the past several weeks, she developed a nonproductive cough, fatigue, and shortness of breath with activity. An initial assessment reveals an absence of breath sounds in the lower half of her right lung and dullness to percussion in the areas of absent breath sounds. Mrs. Peters’ heart sounds are normal, she has no peripheral edema, and her SpO2 is 91% on room air. However, chest X-rays reveal a right-sided pleural effusion.

In this article, we’ll discuss how to recognize MPE, how it’s treated, and your role in managing the condition in a patient like Mrs. Peters.
What is MPE?
A pleural effusion is a collection of excess fluid between the parietal and visceral pleural layers of the lung. (See Examining the pleural space.) An MPE is a pleural effusion associated with advanced malignancies, typically lung or breast cancer. Other malignancies that cause MPE include mesothelioma, renal cancer, ovarian cancer, and sarcomas.\(^1\) More than 150,000 new cases of MPE are diagnosed each year, making it relatively common.\(^2\)

A patient with an MPE like Mrs. Peters will complain of feeling short of breath with activity or even at rest (depending on the volume and rate of accumulation of the effusion), fatigue, a dry cough, and chest discomfort or pleuritic pain. These symptoms often cause the patient to seek medical care.

When you assess your patient, document her baseline vital signs, \(\text{SpO}_2\), and weight. Take a complete history, including when symptoms started and the current level of dyspnea using a quantitative scale such as a visual analogue or numeric rating scale. Also ask her what exacerbates the shortness of breath or dyspnea, what makes it better, and how the symptoms affect her daily life.

Ask about the cough and whether it's productive and find out if she has chest discomfort. If so, document its severity using a pain intensity rating scale. Also document accompanying symptoms and whether the pain is worse with a deep breath (a sign of pleuritic pain). Inspect and palpate the trachea for deviation from its usual position. Tracheal deviation may signify important problems in the thorax, such as a mediastinal mass or large pleural effusion.

When you auscultate the patient's lungs, you'll note decreased to absent breath sounds in the area of the effusion. The percussion note will be dull to flat over the fluid. You may also hear a pleural friction rub. The patient's \(\text{SpO}_2\) value may be normal or low depending on the size of the effusion and the amount of normal lung tissue present.

An MPE will generally be visible on chest X-ray. Other diagnostic studies that may be performed include ultrasound and computed tomography (CT) scan. Ultrasound- or CT-guidance may also be used for thoracentesis.

First steps:
Symptom management
Supplemental oxygen may ease the patient's symptoms by improving hypoxemia and reducing the workload of the heart and lungs. If prescribed, administer morphine for pain relief and to manage anxiety, which can increase respiratory rate and lead to respiratory alkalosis.\(^3\)

Because fatigue is a common symptom of MPE, plan your interventions so that the patient doesn't need to expend much energy until the MPE is drained and lung function and expansion improves. Help her with basic care needs, such as bathing and toileting, to conserve her energy. To meet respiratory caloric needs, she should eat frequent, small meals of high-calorie foods that are easy to swallow.

The healthcare provider will perform thoracentesis to obtain pleural fluid for lab analysis, remove excess fluid, and provide short-term symptom relief. He may also obtain pleural biopsy specimens. Because thoracentesis is therapeutic as well as diagnostic, we'll discuss the procedure in more detail under treatments.

During Mrs. Peters’ thoracentesis, the healthcare provider drains 500 mL of pleural fluid. Samples sent to the lab reveal that the fluid is exudative. (For details on types of pleural effusions, see High water marks.) Pleural fluid cytology is positive for cancer cells, confirming the diagnosis of MPE.

While Mrs. Peters awaits the results of the diagnostic studies, her MPE reaccumulates (a common occurrence in the first 30 days after...
High water marks
The first step in identifying the cause of a pleural effusion is to determine if the effusion is exudative or transudative.

An exudative pleural effusion is caused by local factors that influence the formation and absorption of pleural fluid. Besides cancer, causes of exudative pleural effusions include bacterial pneumonia and viral infection. To treat the effusion, the healthcare team also has to treat the underlying disease.

Transudative pleural effusions are caused by systemic factors, such as left ventricular failure and cirrhosis.

A patient with an exudative pleural effusion will meet one or more of the following criteria; a patient with a transudative pleural effusion will meet none:

- pleural fluid lactate dehydrogenase (LDH) level more than two-thirds the upper limit of normal for serum LDH
- pleural fluid protein/serum protein ratio greater than 0.5
- pleural fluid LDH/serum LDH ratio greater than 0.6.

When MPE recurs
The general treatment for MPE is palliative. Patients like Mrs. Peters, who’ve developed MPE associated with metastatic cancer may survive for several months or years, depending on the primary malignancy causing the MPE. Her prognosis influences the treatment plan.

An MPE in a patient with a solid tumor is typically associated with end of life, so refer her to a social worker and to hospice, if chemotherapy isn’t effective. (Discussions about end-of-life care should start now no matter what.) Take the time to listen to her concerns and anticipate physical care needs to reduce the burden on the patient. Educate her and her family to help reduce anxiety and encourage them to be active participants in patient care.

If the pleural effusion is small, systemic cancer treatment may not be needed; however, if the primary tumor can be treated, clinicians may decide to treat the tumor. This is the case with Mrs. Peters, who’s scheduled for chemotherapy after her MPE is treated.

Treatment options
Thoracentesis
This treatment is considered only a temporary measure for symptomatic relief in MPE. Because the patient also has cancer cell shedding, the MPE will reaccumulate without more permanent therapy (more on that later).

In thoracentesis, a catheter is placed into the pleural space to drain excess fluid. The procedure can be performed at the bedside, using local anesthesia and anatomic landmarks or under image guidance. Having the patient awake and able to report symptoms is valuable.

The practitioner should remove the fluid slowly and avoid removing too much at one time (generally no more than 1,000 mL, although some research shows removal of more fluid may be tolerated). Removing too much fluid too quickly could result in pulmonary edema, hypotension, or circulatory collapse from the rapid reexpansion of the involved lung. Removing too much fluid quickly may also let fluid reaccumulate rapidly because cancer cells are still restricting the flow of fluid in the pleural space.

After a thoracentesis, obtain a chest X-ray to document MPE drainage and to make sure that the patient hasn’t developed a pneumothorax or hemothorax during the procedure. Tell her to report sudden onset of shortness of breath (a possible symptom of pneumothorax), abnormal bleeding at the catheter insertion site, hemoptysis, or palpitations. Monitor for signs of infection, hypoxemia, cyanosis, tachycardia, respiratory changes, hemoptysis, and changes in breath sounds indicating the reaccumulation of the pleural effusion. Check vital signs regularly and administer analgesics as prescribed for pain management.

Another complication from thoracentesis, especially repeated procedures, is fluid loculations from scar tissue formation. Pleural fluid loculations are small amounts of fluid in the pleural space separated by scar tissue or fibrinous tissue. The healthcare provider can place catheters to drain at different sites, open the chest to drain, or use fibrinolytics (administered through a chest catheter) to break up the fibrinous material.

Tube thoracostomy
Placing a chest tube for drainage is another method of managing MPE. Chest tubes come in two basic types:

- Polyvinyl chloride catheters are large (typically #26 to #36 French) and rigid and usually used after surgery to manage thick, bloody drainage. These tubes can be placed at the bedside using anatomic landmarks to guide

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placement. However, because of the size of these tubes, insertion can be painful. It’s best done with the patient under moderate sedation and analgesia or under general anesthesia in the OR. Patients rarely are discharged with this larger chest drainage tube because it’s difficult to manage at home.

- Pigtail catheters are smaller (#8 to #12 French) and made of silicone, so they’re much more flexible, easier and less painful to insert, and more comfortable for the patient. Although they can be inserted at the bedside, they’re usually placed in the interventional radiology department under fluoroscopic guidance. Once a pigtail catheter is in position, the tip is curled to lock it into place and prevent a penetrating injury—thus the name “pigtail.”

Once in place, either type of chest tube is connected to a chest drainage unit or a drainage bag with a one-way valve to collect fluid. An available portable drainage system holds up to 500 mL of fluid and can be emptied with a twist-lock syringe. This drainage system could be used for a patient with MPE if drainage volume isn’t too large, she wants to be more mobile, she or a family member is dexterous enough to empty the container, and the clinician doesn’t plan to further treat the MPE.

If a patient is very near to the end of her life, managing MPE with a pigtail catheter to a gravity drainage bag with a one-way valve is a reasonable option to manage recurrent MPE and shortness of breath.

The patient needs a postprocedure chest X-ray to confirm catheter placement and rule out pneumothorax. Complications associated with tube thoracostomy are the same as with thoracentesis.

**Tunneled indwelling pleural catheter with intermittent drainage**

Another method for managing MPE is use of an indwelling pleural catheter. Patients feel a sense of control with this catheter because it lets them be at home and not continuously connected to a drainage system for the remaining time that they have.

These silicone catheters are generally placed in the interventional radiology department using image guidance and are tunneled into the pleural space. The catheter has a one-way valve that prevents air from entering the chest cavity and fluid from coming out when not being drained.

Once the catheter is placed and a chest X-ray has ruled out pneumothorax, the patient can go home and manage her effusion as an outpatient. Two to three times per week, or as ordered by the healthcare provider, she or her caregiver will need to drain the catheter using the appropriate supplies. Usually only 500 to 1,000 mL of fluid is removed at one time, and fluid amounts should decrease over time. Monitor the patient for adverse reactions to chest tube placement and teach her and her family how to drain the catheter, manage problems, and care for the insertion site.

**Because MPE is common in the last 4 to 6 months of life, it can significantly affect the quality of the patient’s last days.**

**Chemical pleurodesis**

Generally, a chest tube alone isn’t adequate to manage MPE. If the patient is expected to live more than a few weeks, the clinician will attempt a more permanent treatment method, such as chemical pleurodesis. In this procedure, he places a chest tube to drain the effusion, then instills a sclerosing agent. This is a less-invasive option than talc pleurodesis, because the pleurodesis is considered successful if the MPE doesn’t recur on chest X-ray and the patient’s dyspnea resolves or lessens. At this point, the chest tube is removed and the patient can be discharged. The chest tube site usually heals in a few days.

**Video-assisted thoracoscopic surgery (VATS)**

With the patient under general anesthesia in the OR, the clinician inserts a thoracoscope through a small chest incision and administers aerosolized talc by insufflation onto the pleural surface. Because the clinician can see the pleural space while administering the sclerosing agent, all pleural surfaces can be covered and adhesion formation is close to 100%. A chest tube will be placed after the procedure because the surgeon entered the chest cavity.

Adverse reactions to VATS are the same as those for tube thoracostomy with a sclerosing agent. This is a less-expensive procedure with a 100% success rate. However, because VATS is considered a surgical procedure, the patient usually has to stay in the hospital a few days to recover.

**Other surgical methods**

A pleuroperitoneal shunt is a tube or passage that lets fluid from the pleur-
al effusion move to the peritoneal space, where it will slowly be absorbed. This procedure may be performed if chemical pleurodesis wasn’t effective. The shunt must be manually pumped by the patient or caregiver, and complications can arise if the shunt becomes blocked.3,8

Pleurectomy is reserved for patients who can withstand a long surgical procedure and have a longer life expectancy. In this procedure, the surgeon removes the parietal pleura and obliterates the pleural space.3,8 This is a major surgical procedure done under general anesthesia, and patients need to be monitored for pneumonia and venous thromboembolism.

End-of-life issues
Because MPE is common in the last 4 to 6 months of life, it can significantly affect the quality of the patient’s last days.9

Management of dyspnea at end of life is paramount. Administer morphine and oxygen therapy as prescribed and provide comfort measures. Position the patient for maximal lung expansion by sitting her up in bed. Teach her pursed lip breathing to help reduce the feeling of breathlessness and control respiratory rate. Advise her to pace herself so she doesn’t become short of breath. Running a fan can help reduce the feeling of breathlessness. Refer her and her family to hospice and a social worker to maximize the quality of her remaining life span.

Mrs. Peters, the patient we met at the beginning of this article, had an indwelling pleural catheter placed, and her husband was taught how to drain it three times a week. This lasted for about 10 weeks. Eventually the effusion was only producing 75 mL at a time. Mrs. Peters’ shortness of breath and cough resolved, and the catheter was removed. Mrs. Peters went on hospice about 6 months later and died peacefully at home.

REFERENCES

RESOURCES

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