Outpatient Management of Recurrent Malignant Pleural Effusion and Indwelling Pleural Catheter

Case related questions.

Scenario:
Mr. A. is a 74-year-old man, former 60-pack-year smoker (who quit ten years ago) with a past medical history of prostate cancer and Global Initiative for Chronic Obstructive Lung Disease (GOLD) stage 3B Chronic obstructive lung disease (COPD), currently treated with tiotropium/olodaterol once daily and albuterol as needed. He presents for an urgent visit because his breathing seems worse, although his chronic non-productive cough is unchanged. He has increased his albuterol use from his usual once daily to four times daily without improvement. He describes a sensation of being "unable to take a deep breath." He notes an unintentional 15 lb weight loss during the past 4 months. His room air saturation is 92%, which is similar to his baseline. After a shared decision-making discussion, he elected not to pursue lung cancer screening with a low-dose CT last year. His pulmonary exam is notable for an absence of breath sounds at the left base with dullness to percussion.

Question 1a: What is your next step for investigating Mr. A.'s change in his symptoms?

Question 1b: Can thoracic ultrasound differentiate Malignant Pleural Effusion from benign pleural disease?

Scenario cont.:
Thoracic ultrasound reveals a large anechoic left pleural effusion with pleural nodularity and thickening. You decide to perform a thoracentesis in the outpatient setting.

Question 2a: Should thoracic ultrasound be used to guide thoracentesis?

Question 2b: How much fluid should you drain? Would you use pleural manometry? When do you stop the procedure?

Scenario cont.:
You drain a total of 2.5 L of fluid. Mr. A. goes home and feels great. He returns the next day for chest CT which demonstrates a large left lower lobe mass and bilateral mediastinal and hilar lymphadenopathy. Pathology informs you of possible adenocarcinoma on cytology, awaiting additional stains.

Question 3: How do you determine prognosis?

Scenario cont.:
Mr. A. is diagnosed and staged by your thoracentesis. Molecular genotype testing is available from the cell block of the large sample obtained and shows no mutations. LENT score is moderate. He is seen by Medical Oncology within the next week and plans to start chemotherapy soon. About one month later, however, he returns to your clinic with 'that same feeling of not being able to take a big breath.' You confirm that his effusion has returned with ultrasound. He wonders what you can do about the fluid and whether draining it again will improve his symptoms.

Question 4: What options can you offer a patient with a recurrent malignant pleural effusion?

Scenario cont.:
Mr. A. decides to undergo a second thoracentesis for now, but he asks for more information about a definitive procedure for MPE. You perform a therapeutic thoracentesis without complications and explain possible definitive treatments while waiting for post procedural CXR.

Question 5: What decision factors can you use to decide one choice over the other? What are the advantages and disadvantages of pleurodesis vs. IPC?

Scenario cont.:
You explain both approaches to Mr. A., and he understands the pros and cons of both procedures. He is ready to make his decision when you notice a pneumothorax on post-procedure CXR (after thoracentesis). Mr. A is hemodynamically stable without respiratory distress.

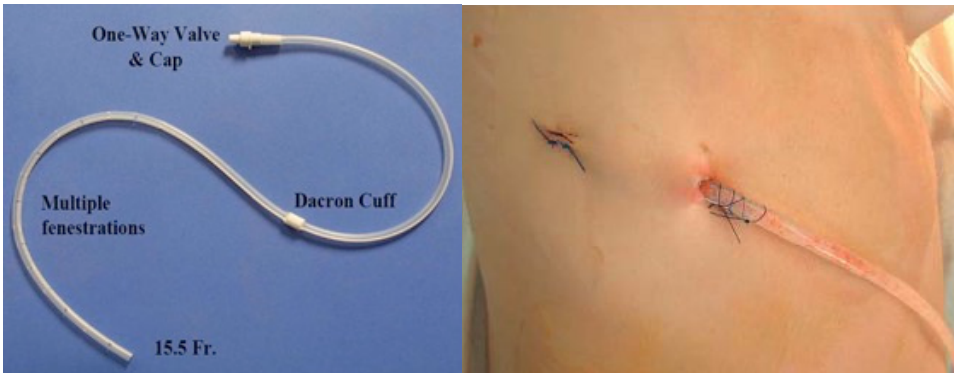
Question 6: What would you do next regarding the pneumothorax?

Question 7: What is the difference between trapped and entrapped lung?

Scenario cont.:
Based on CXR findings we know that Mr A's lung did not fully re-expand, leaving the option of serial thoracenteses or IPC. Mr. A chooses to have an IPC placed, which is performed in the outpatient setting without any issue and comments that he barely felt any pain.

The IPC (PleurX, Rocket, or Aspira catheter), illustrated in Figure 5, is a cuffed, tunneled catheter inserted as an outpatient under conscious sedation that allows drainage at home by the patient or an attendant.

Figure 5. The Indwelling Pleural Catheter



IPC prior to placement (left) and after subcutaneous tunneling into the pleural space (right).

Question 8: Does the patient need to come back to see you?

Scenario cont.:
Mr. A. returns for his suture removal and does well until his next follow-up visit. At that time, he reports no drainage for the last several days, but says he didn't want to bother you about it. On ultrasound, you see a large pleural effusion without loculations. His breathing seems to be worse, but he looks stable.

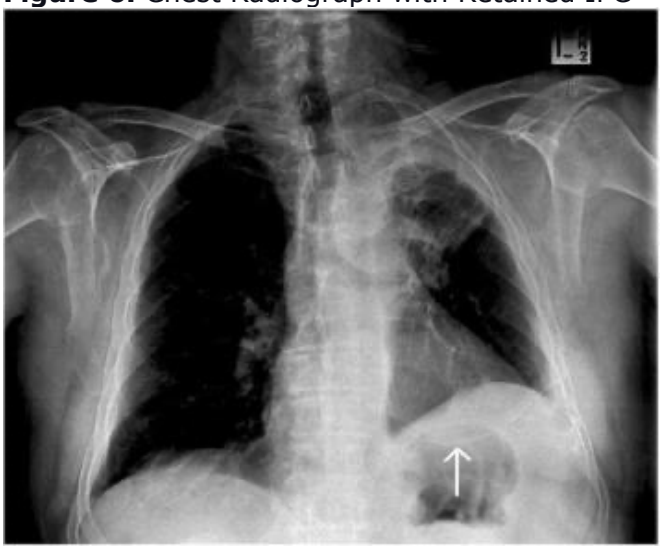
Question 9: What happened and what can you do about it?

Scenario cont.:
Mr. A. comes to the office complaining of fever, fatigue and chills. CBC shows leukocytosis with immature granulocytes. He is hemodynamically stable. You are concerned about a possible intrapleural infection/empyema.

Question 10: Would you remove the IPC? Would you use tPA/DNase?

Scenario cont.:
Mr. A. returns to your clinic four months later. He has had diminished fluid output, less than 50 ml for the last three consecutive drainages. Thoracic ultrasound confirms the absence of a pleural effusion. You decide to remove the catheter, but during removal, IPC is fractured, and half of the catheter remains within the pleural space. A chest radiograph, seen in Figure 6, illustrates the retained catheter in the left hemithorax.

Figure 6. Chest Radiograph with Retained IPC



Chest X-ray demonstrating retained IPC after fracture during removal (arrow)

Question 11: What should you do?

Outpatient Management of Recurrent Malignant Pleural Effusion and Indwelling Pleural Catheter

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Educational Objectives:

1. Review the rationale for performing outpatient thoracentesis
2. Understand a stepwise approach to managing recurrent pleural effusions
3. Recognize the pros and cons of definitive pleural interventions for malignant pleural effusions
4. Describe troubleshooting options for malfunctioning indwelling pleural catheters

Scenario:
Mr. A. is a 74-year-old man, former 60-pack-year smoker (who quit ten years ago) with a past medical history of prostate cancer and Global Initiative for Chronic Obstructive Lung Disease (GOLD) stage 3B Chronic obstructive lung disease (COPD), currently treated with tiotropium/olodaterol once daily and albuterol as needed. He presents for an urgent visit because his breathing seems worse, although his chronic non-productive cough is unchanged. He has increased his albuterol use from his usual once daily to four times daily without improvement. He describes a sensation of being "unable to take a deep breath." He notes an unintentional 15 lb weight loss during the past 4 months. His room air saturation is 92%, which is similar to his baseline. After a shared decision-making discussion, he elected not to pursue lung cancer screening with a low-dose CT last year. His pulmonary exam is notable for an absence of breath sounds at the left base with dullness to percussion.

Question 1a: What is your next step for investigating Mr. A.'s change in his symptoms?

A chest radiograph is an appropriate starting point, but if a physical exam suggests the presence of a pleural effusion, bedside ultrasound (if available) is a safe, simple, and painless test easily performed. If fluid is present, one can consider performing a

thoracentesis in the outpatient setting, unless concern exists for bleeding, such as active therapeutic anticoagulation or those with known thrombocytopenia.

It is important to send appropriate body fluid studies following thoracentesis, which may include cytology, cell count and differential, and cultures, as well as corresponding serum tests (i.e. total protein and lactate dehydrogenase (LDH)). Approximately 95% of malignant pleural effusions are exudative, and up to 50% of malignant effusions may be have a lymphocyte-predominant differential.[1]

Lung cancer is the most common cause (37.5%) of malignant pleural effusions.[2] In malignant effusions, the accumulation of fluid is caused by a combination of blockage of lymphatic drainage along parietal pleural surfaces and increased inflammation. Malignant effusions can be diagnosed by pleural fluid cytology in about 60% of cases (sensitivities vary from 40% to 87%, with a mean of about 60%). Figure 1 illustrates the variable rates with which malignant pleural effusions are diagnosed by cytology. A second sample increases the yield by 15%. A third sample is no longer recommended because the additional increase in diagnostic yield is low. Diagnostic yield also depends on the type of malignancy; for example, the sensitivity of pleural fluid cytology is only 32% in effusions due to mesothelioma.

In the case of two negative pleural fluid cytology samples, it is recommended to proceed with thoracoscopy for diagnosis (parietal pleura biopsies), staging and possible treatment of suspected malignant pleural effusions. Both medical (under conscious sedation) and surgical (under general anesthesia) thoracoscopy are options.[3]

Figure 1: Sensitivity of Pleural Fluid Cytology in Malignant Pleural Effusions

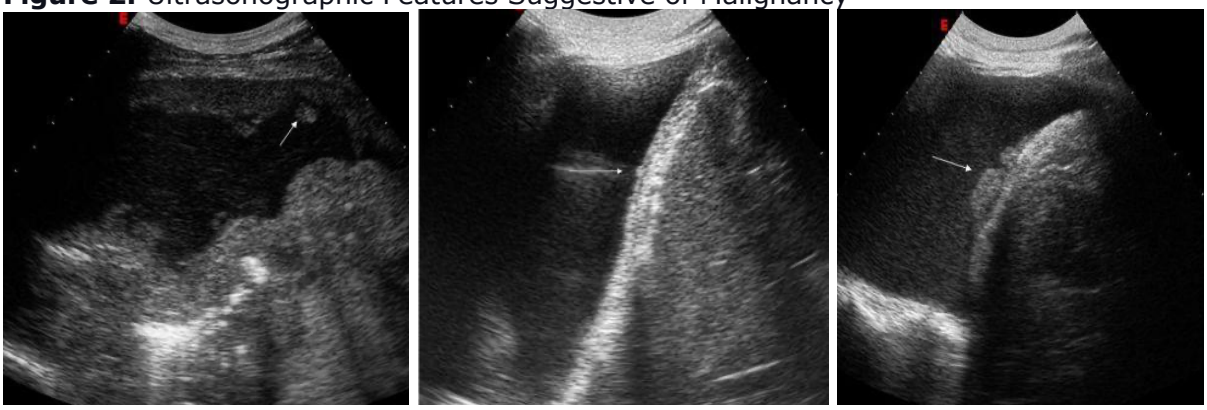
Reference	No of patients	No caused by malignancy	% diagnosed by cytology
Salyer *et al*[40]	271	95	72.6
Prakash *et al*[42]	414	162	57.6
Nance *et al*[41]	385	109	71.0
Hirsch[39]	300	117	53.8
Total	1370	371	61.6

Figure above from Maskell, NA. et al. BTS guidelines for the investigation of a unilateral pleural effusion in adults. Thorax 2003; 58:ii8-17.

Question 1b: Can thoracic ultrasound differentiate Malignant Pleural Effusion from benign pleural disease?

Thoracic ultrasound correctly diagnosed malignancy in 26/33 patients (sensitivity 73%, specificity 100%, positive predictive value 100%, negative predictive value 79%), but tissue sampling remains the gold standard. Figure 2 illustrates ultraonographic features that may suggest malignancy[4]:
-Pleural Thickening > 1 cm
-Diaphragmatic thickening > 7 mm
-Pleural nodularity

Figure 2: Ultrasonographic Features Suggestive of Malignancy



Pleural thickening >1 cm *Diaphragmatic thickening >7 mm* *Pleural nodularity*

If there is no improvement in symptoms following a thoracentesis and there is reasonable confidence that there is cancer present in the thorax, consider the following:

- Evaluate for endobronchial disease. This may be suggested by mediastinal shift on chest radiograph, or an endoluminal mass on chest CT, and should prompt bronchoscopic evaluation.
- Evaluate for lymphangitic spread: This can affect gas exchange in the pulmonary parenchyma and may be seen on chest CT.

Scenario cont.:
Thoracic ultrasound reveals a large anechoic left pleural effusion with pleural nodularity and thickening. You decide to perform a thoracentesis in the outpatient setting.

Question 2a: Should thoracic ultrasound be used to guide thoracentesis?

Iatrogenic pneumothorax is the most common complication of thoracentesis and can require chest tube placement and hospital admission. Historically, the pneumothorax rate after thoracentesis for pleural effusions has been reported to be as high as 39%, although more recent data showed lower pneumothorax rates when ultrasound guidance is used. Ultrasound guidance for thoracentesis has reduced dry taps, hemothoraces, and solid organ punctures. It is recommended to use ultrasound guidance for any pleural intervention.

Question 2b: How much fluid should you drain? Would you use pleural manometry? When do you stop the procedure?

Classically, the thought has been to limit fluid removal to 1.5 L to avoid re-expansion pulmonary edema (RPE). However, studies have shown a low rate (0.5%) of RPE with no evidence to suggest an association with the amount of fluid removed. [5] It is currently recommended to perform large-volume drainage to confirm symptomatic improvement after drainage. If no improvement is noted, other causes of dyspnea should be investigated (pulmonary embolism, pericardial effusion, pneumonia).

A pleural elastance of less than 19 cm H_2O measured after draining 500 mL of fluid predicted a 98% chance of pleurodesis success in patients without trapped lung. There is limited evidence defining the benefits on clinical outcomes of pleural manometry in patients with malignant pleural effusion (MPE), and RPE does occur despite the use of manometry at

a rate similar to that of studies not using manometry. The use of pleural manometry is likely to vary by institution and provider.

Since we rarely perform pleural manometry during thoracenteses, we must use a surrogate for intrapleural pressure. As a general rule, it is reasonable to drain until the patient experiences vague anterior chest pain, which may signal a drop in the intrapleural pressure. A small amount of air entrained back into the pleural space may relieve the pain, and actually allow further drainage after several minutes. Although not proven, there is thought that cough during drainage is related to the lung re-expanding, and that sharp chest pain is associated with the catheter irritating the diaphragm (sometimes felt in the shoulder as referred pain).

Figure 3 illustrates that the total change in pleural pressure during thoracentesis was significantly different between the patients who developed chest discomfort and both the patients who were asymptomatic and those in whom cough developed. Discomfort was associated with the largest shift in intra-pleural pressure (white box) and this can be used as a surrogate for entrapped or trapped lung.[6]

Figure 3: The Relationship of Pleural Pressure to Symptom Development During Therapeutic Thoracentesis

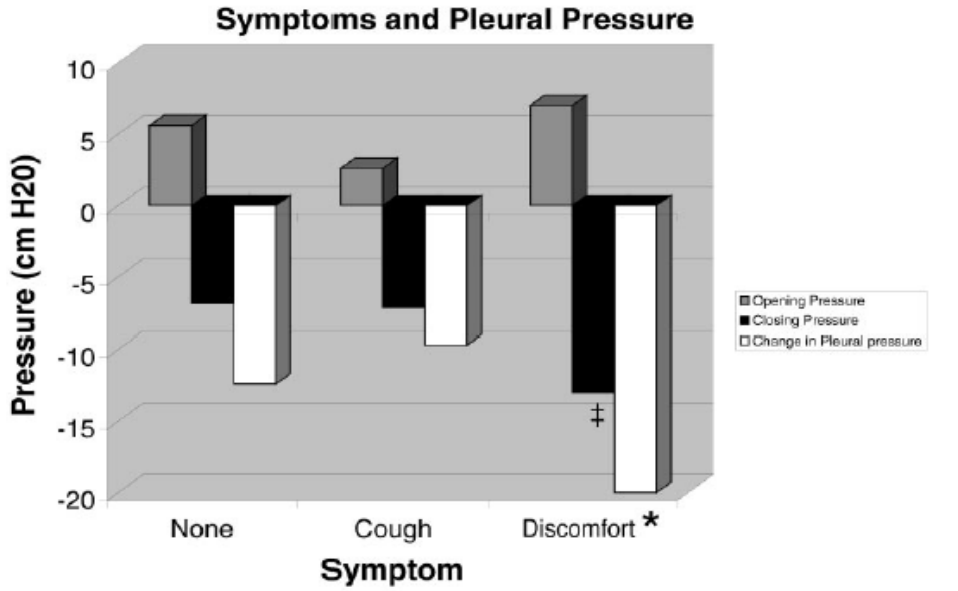


Figure borrowed from Feller-Kopman, D. et al. The relationship of pleural pressure to symptom development during therapeutic thoracentesis. CHEST 2006; 129 (6): 1556-60.

There is no data definitively supporting or refuting the need for post-thoracentesis chest radiographs, and thus practice will likely vary by institution and provider. Post thoracentesis lung ultrasound can be a quick way to rule out post-procedure pneumothorax, especially in a patient complaining of symptoms. The presence of lung sliding reliably rules out a pneumothorax in the location being imaged.

Scenario cont.:
You drain a total of 2.5 L of fluid. Mr. A. goes home and feels great. He returns the next day for chest CT which demonstrates a large left lower lobe mass and bilateral mediastinal and hilar lymphadenopathy. Pathology informs you of possible adenocarcinoma on cytology, awaiting additional stains.

Question 3: How do you determine prognosis?

In addition to TNM staging, several factors may help predict the survival of patients with malignant pleural disease, including tumor characteristics, the extent of disease, comorbidities, and performance status.

The LENT score is a risk stratification system that predicts survival and helps select the most appropriate pleural intervention in MPE, avoiding inpatient stay and procedure-related complications. Patients with a particularly poor prognosis may wish to minimize time spent in the hospital by choosing an indwelling pleural catheter or therapeutic thoracentesis over attempted pleurodesis to manage their effusion.

Patients with a low-risk LENT score had a median survival of 319 days, moderate-risk LENT score had a median survival of 130 days, while those with high-risk LENT scores had a median survival of only 44 days. The score does not replace the patient's preference or clinical judgment.[7]

Survival in malignant effusions can also be predicted by the patient's functional status as assessed by the Karnofsky Performance Score (KPS) which can be found at https://www.hiv.va.gov/provider/tools/karnofsky-performance-scale.asp. A KPS < 30 portends a median survival of 1.1 months, while a KPS > 70 is associated with a median survival of 13.2 months.[8]

Scenario cont.:
Mr. A. is diagnosed and staged by your thoracentesis. Molecular genotype testing is available from the cell block of the large sample obtained and shows no mutations. LENT score is moderate. He is seen by Medical Oncology within the next week and plans to start chemotherapy soon. About one month later, however, he returns to your clinic with 'that same feeling of not being able to take a big breath.' You confirm that his effusion has returned with ultrasound. He wonders what you can do about the fluid and whether draining it again will improve his symptoms.

Question 4: What options can you offer a patient with a recurrent malignant pleural effusion?

There are several approaches for managing a recurrent malignant pleural effusion:

- Serial thoracenteses
- Placement of an indwelling tunneled pleural catheter
- Tube thoracostomy with pleurodesis
- Medical pleuroscopy with talc poudrage
- Video-assisted thoracoscopic surgery (VATS) with talc poudrage

More than 50% of MPE will reaccumulate after initial drainage, and therefore definitive pleural intervention is a priority. The primary goal in managing a MPE is relief of symptoms (namely dyspnea) and improvement in quality of life. This should be done via the least invasive manner while also ideally minimizing the need for repeated procedures or time in the hospital. These goals can be achieved with thoracentesis, pleurodesis, or indwelling pleural catheter (IPC). It must also be individualized, and patient preferences and other factors may influence the patient to choose one method over another.[9]

Scenario cont.:
Mr. A. decides to undergo a second thoracentesis for now, but he asks for more information about a definitive procedure for MPE. You perform a therapeutic thoracentesis without complications and explain possible definitive treatments while waiting for post procedural CXR.

Question 5: What decision factors can you use to decide one choice over the other? What are the advantages and disadvantages of pleurodesis vs. IPC?

Pleurodesis vs. IPC

There is no significant difference in dyspnea or Quality of Life (QoL) measures (improvements sustained for 12 months) between patients who received pleurodesis vs IPC. Hospitalization length is significantly longer for patients undergoing pleurodesis. Patients who underwent pleurodesis also required additional pleural intervention procedures subsequently vs patients who had IPC placement (22% vs 4%). IPC are associated with increased risk of infectious complications as compared to pleurodesis. Overall, risk of infectious complications with IPC remain low (Cellulitis 7.3% and pleural space infection 4.6%).[9]

Pleurodesis Disadvantages

Pain: Patients experience chest pain following chemical pleurodesis, which typically resolves within one day. Chest pain is reported in 81% of those with doxycycline however is relatively infrequent with talc pleurodesis (5-10%). Pleurodesis pain is controlled with the intrapleural installation of topical anesthetic like Lidocaine and PRN oral or IV pain killers.[10]

Respiratory decompensation: Acute respiratory distress syndrome has been reported using talc pleurodesis, especially with non-graded/small particle talc, in approximately 1%. It is theorized that the small particles are absorbed, leading to inflammation and respiratory distress; graded talc is now available with significantly lower risk.

IPC Disadvantages

Infection and malfunction: It should be noted that IPCs are associated with a comparatively higher rate of complications than pleurodesis, even though most of these complications are minor and seldom necessitate IPC removal. Complications include pleural infection, empyema, cellulitis/tunnel infection, and catheter blockage.

Pain: In less than 1% of cases, the patient may complain of persistent discomfort necessitating catheter removal.

Drainage: The patient or caregiver must perform drainage, making it difficult for patients with poor performance status or those without a suitable caregiver.

Table 1 summarizes some of the factors that may be considered in deciding on pleurodesis or IPC for management of MPE.

Table 1. Potential Decision Factors Favoring Pleurodesis vs IPC[9]

Favors Pleurodesis	Favors IPC
Pleural apposition desired	Evidence of non-expandable lung
No caregiver available to help drain IPC	Desire to avoid a second procedure
History of poor compliance	Low pain threshold
Lack of insurance coverage	Tenuous respiratory status; higher risk of decompensation
Hospitalized	Preference for outpatient procedure or reluctant to get hospitalized
Low LENT score	High LENT score

Combined Approach

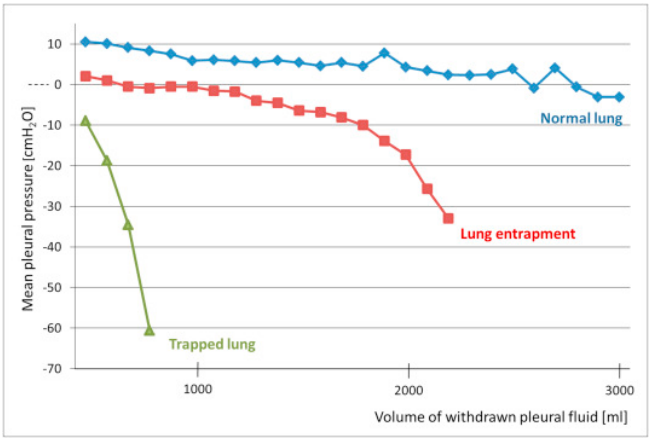
Patients with MPE and without trapped lung may be candidates for IPC placement and instilling talc through the IPC as an outpatient. The randomized IPC-Plus trial demonstrated this approach vs. IPC alone resulted in fewer catheter days, improved symptoms and better QoL.[11] This approach has not yet been reproduced in another study, but it is promising.

Scenario cont.:
You explain both approaches to Mr. A., and he understands the pros and cons of both procedures. He is ready to make his decision when you notice a pneumothorax on post-procedure CXR (after thoracentesis). Mr. A is hemodynamically stable without respiratory distress.

Question 6: What would you do next regarding the pneumothorax?

It is possible that the pneumothorax is post-procedural, but in the setting of malignancy, it is important to consider nonexpandable lung – i.e. entrapped or trapped lung – in which case, a chest tube will not enable the lung to completely re-expand. Figure 4 illustrates the relationship between mean pleural pressure and the volume of withdrawn pleural fluid, pleural elastance, of normal lung, entrapped, and trapped lung.[12]

Figure 4. Pleural Elastance of Normal, Entrapped, and Trapped Lung



Three pressure/volume curves are plotted. The blue line (top) represents normal pleural elastance. The biphasic red line (middle) represents a pressure/volume curve from a patient with lung entrapment. The steep green line (bottom) represents monophasic pressure/volume curve from a patient with trapped lung.

Figure from Grabczak et al, 2018.

Question 7: What is the difference between trapped and entrapped lung?

Table 2 lists differences in the features of trapped and entrapped lung.[13]

Table 2. Trapped vs Entrapped Lung

	Trapped Lung	Lung Entrapment
Etiology	Remote pleural inflammation Resolved pleural infection, uremic pleuritis, hemothorax	Active pleural inflammation Active pleural infection, malignancy
Symptoms	Usually asymptomatic, chronic stable effusion	Pleurisy, dyspnea
Pressure volume curve	Monophasic linear	Biphasic
Initial pleural pressure	Negative	Can be positive
Pleural elastance	>14.5 cm H20/L of pleural fluid removed	Biphasic; initial <14.5 cm H20/L, >14.5 cm H20/L after inflection point
CXR	Absent contralateral mediastinal shift, pneumothorax ex vacuo	Contralateral mediastinal shift present
Pleural Fluid	Paucicellular transudate	Exudate
Management	Observation if asymptomatic	Treat underlying process

	Decortication if significant symptoms	Tunneled pleural catheter, surgical decortication if persistent symptoms

In this case, Mr. A.'s lung did not re-expand completely, leaving the following options for managing his MPE:

- Serial thoracenteses
- Placement of an indwelling tunneled pleural catheter

Most patients find it inconvenient to return to clinic at regular intervals for repeat thoracenteses, and an entrapped or trapped lung is an indication for an indwelling pleural catheter. Dyspnea is due not only to restriction by the malignant peel, but also to physiologic changes including:

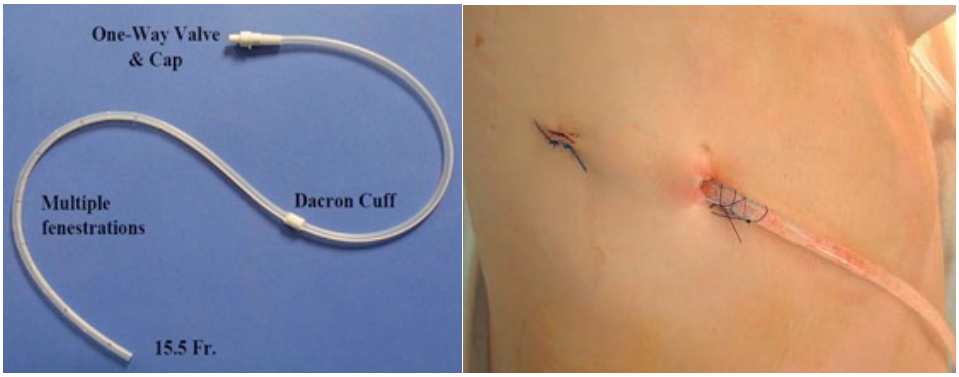
- Distension of the thoracic cavity
- Dysfunction of the affected hemidiaphragm
- Mismatch/atelectasis in the contralateral lung secondary to compression of the lung by fluid.

One study identified 11 patients with trapped lung physiology who had indwelling pleural catheters placed; 91% had symptom relief.[14]

Scenario cont.:
Based on CXR findings we know that Mr A's lung did not fully re-expand, leaving the option of serial thoracenteses or IPC. Mr. A chooses to have an IPC placed, which is performed in the outpatient setting without any issue and comments that he barely felt any pain.

The IPC (PleurX, Rocket, or Aspira catheter), illustrated in Figure 5, is a cuffed, tunneled catheter inserted as an outpatient under conscious sedation that allows drainage at home by the patient or an attendant.

Figure 5. The Indwelling Pleural Catheter



Images demonstrating an IPC prior to placement (left) and after subcutaneous tunneling into the pleural space (right)

Question 8: Does the patient need to come back to see you?

In general, we recommend (although this may vary somewhat by practice):

- The patient should return in two weeks post-procedure for a wound check, suture removal, ultrasound, and drainage (if they have not been drained that day). This gives a sense of the volume and pace of drainage, and whether they can be considered for early catheter removal.
- Patients should be also instructed to return to clinic at any time in their treatment course if their drainage is less than 50 mL for at least three consecutive drainage attempts for consideration of catheter removal.

Scenario cont.:
Mr. A. returns for his suture removal and does well until his next follow-up visit. At that time, he reports no drainage for the last several days, but says he didn't want to bother you about it. On ultrasound, you see a large pleural effusion without loculations. His breathing seems to be worse, but he looks stable.

Question 9: What happened and what can you do about it?
Mr. A.'s catheter is likely obstructed, commonly by fibrous clot that may contain a high number of malignant cells. Drainage can also be impacted by development of fibrinous loculations within the pleural cavity, which may occur in up to 14% of patients. In both cases of catheter blockage, this leads to fluid accumulation and breathlessness.

Flushing the catheter is the first step, but this rarely resolves the problem. There are several proposed measures for addressing an obstructed catheter:

- Administration of tPA via catheter as an outpatient is a consideration if facilities exist to facilitate this. Some have also reported combination of tPA with DNAse, but overall evidence is limited. Following administration, clamp the tube for 1-2 hours before draining the fibrinolytics. If this is successful and the catheter is unobstructed, the patient can be discharged to home.
- Arrange for an elective admission for tPA with or without DNase as an inpatient, especially if loculations are present, or it appears that more than one dose of tPA will be necessary.
- If the patient is in extremis, consider a thoracentesis at a site separate from the catheter for quick relief of symptoms. Definitive treatment will still be necessary.

A multinational retrospective study of intrapleural fibrinolytic therapy for IPC-related symptomatic loculations demonstrated pleural fluid drainage increased in 93% of patients and dyspnea improved in 83% following therapy. It carries a small risk of non-fatal pleural bleeding which was reported in 2 of 66 patients.[15,16]

Scenario cont.:
Mr. A. comes to the office complaining of fever, fatigue and chills. CBC shows leukocytosis with immature granulocytes. He is hemodynamically stable. You are concerned about a possible intrapleural infection/empyema.

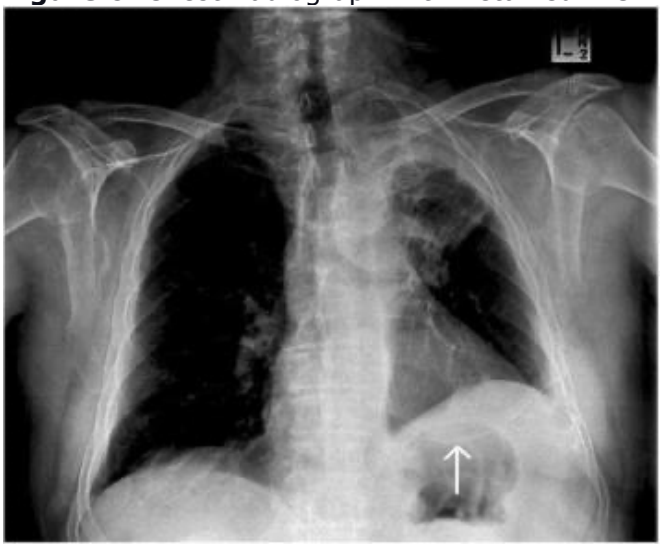
Question 10: Would you remove the IPC? Would you use tPA/DNase?

The incidence of IPC-related infection is low, with rates of cellulitis and pleural space infection of 7.3% and 4.6%, respectively. Unfortunately, there is little data regarding the management of IPC-related infection. In one case series, 72% were managed without removal of the infected IPC and mortality due to IPC infection was 9.3%. It is recommended to leave the catheter in place while connecting it to wall suction and administering antibiotics. If the infection is felt to be uncontrolled, then catheter removal is indicated.[9]

Coadministration of tPA and DNase for a complicated parapneumonic effusion through an IPC has little evidence, but it can be considered based on data from the MIST-2 trial.[17]

Scenario cont.:
Mr. A. returns to your clinic four months later. He has had diminished fluid output, less than 50 ml for the last three consecutive drainages. Thoracic ultrasound confirms the absence of a pleural effusion. You decide to remove the catheter, but during removal, IPC is fractured, and half of the catheter remains within the pleural space. A chest radiograph, seen in Figure 6, illustrates the retained catheter in the left hemithorax.

Figure 6. Chest Radiograph with Retained IPC



Chest X-ray demonstrating retained IPC after fracture during removal (arrow)

Question 11: What should you do?

IPCs can fracture during removal, especially after prolonged use. Patients with retained IPC fragments do not experience additional pain or increased risk of infection based on data with over 450 days of follow-up.[18]

Clinicians should be aware that IPC removal can be problematic, but retained fragments are safe, and aggressive retrieval is unnecessary. Removal can be reserved for infection or atmospheric communication causing hydropneumothorax.

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Outpatient Management of Recurrent Malignant Pleural Effusion and Indwelling Pleural Catheter

Post-Test Case Related Questions

1. A 60-year-old male presents to your office for management of a unilateral pleural effusion. The patient had been experiencing sub-acute worsening dyspnea over the last 4-6 weeks prompting his primary care physician to order a CXR. The CXR showed a unilateral moderate effusion on the left but no other findings of note. You perform a lymphocytic thoracentesis in the office. Initial fluid studies are consistent with an exudate. Cytology and cultures are negative. On repeat CXR the effusion has re-accumulated. What is the next best step in management of this patient?
    a. Referral for thoracoscopy for pleural biopsy
    b. Placement of an indwelling pleural catheter
    c. Repeat thoracentesis
    d. Trial of diuresis
    e. Watchful waiting and follow up in 3 months
    f. Either A or C

2. A 65 year old male with non-small cell (adenocarcinoma) of the lung and a malignant R pleural effusion present to your office for ongoing follow up. He had his first thoracentesis 10 days ago with full lung expansion on subsequent CXR and cytology was positive for malignancy (adenocarcinoma). He is here today to have a repeat thoracentesis and then CT scan following drainage. His prior CT scan from a year ago shows no evidence of effusion. You perform the thoracentesis without issue and remove 1.5 L of serosanguinous fluid. He denies any dyspnea post-procedure. He then has his CT scan and the radiologist calls to report a newly visualized pneumothorax. Which of the following is (are) the most likely cause(s) of the radiographic findings.
    a. Iatrogenic post-procedure pneumothorax
    b. Pneumothorax ex-vacuo (entrapped lung)
    c. Pneumothorax ex-vacuo (trapped lung)
    d. A or B
    e. B or C

3. A 70-year-old male with non-small cell lung cancer and malignant right pleural effusion presents to discuss ongoing management of his recurrent pleural effusion. His recent CT scan shows evidence of a nonexpandable lung. Which of the following is (are) appropriate management options for this patient's management of his symptomatic recurrent pleural effusion?
    a. Medical pleuroscopy with talc poudrage
    b. Video assisted thorascopic surgery (VATS) with talc poudrage
    c. Tube thoracostomy with pleurodesis
    d. Repeat thoracenteses
    e. Placement of an indwelling tunneled pleural catheter
    f. A, B or C
    g. D or E

Outpatient Management of Recurrent Malignant Pleural Effusion and Indwelling Pleural Catheter

Post-Test Case Related Questions with Answer Key

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