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THE ROLE OF INTRAPLEURAL FIBRINOLYTICS AND OPEN SURGICAL DRAINAGE IN STAGE II EMPYEMA

Pulmonary Medicine

Bharathguru Nedumaran* MS MRCS MCh DNB (CTVS) Department of Cardiothoracic Surgery, Billroth Hospitals Chennai *Corresponding Author

Arunkumar Krishnasamy MS MCh DNB (CTVS) FRCS (CTH) Department of Cardiothoracic Surgery, Billroth Hospitals Chennai

ABSTRACT

Empyema is defined as the presence of pus in the pleural cavity. The evolution of empyema follows three stages - an exudate phase followed by a fibrinopurulent phase and finally an organizing phase .Here we present and compare two cases of empyema which were managed with administration of intrapleural fibrinolytics through intercostal drains and thoracotomy respectively. Among the varied management options for complicated pleural effusions/ empyema the modality that is selected should be based on the stage of presentation and must be individualized based on clinical and radiological parameters.

KEYWORDS

Empyema Parapneumonic effusion Thoracotomy Fibrinolytics

Empyema is defined as the presence of pus in the pleural cavity. There are many treatment options for empyema - antibiotics, thoracentesis, intercostal drainage, video assisted thoracoscopy(VATS) and open thoracotomy. Here we discuss two cases of empyema which were managed with fibrinolytics and thoracotomy respectively.

CASE 1

A 43 years old male presented with breathlessness, fever and cough of ten days duration. Auscultation showed decreased breath sounds and crackles in the left hemithorax. Chest Roentgenogram (CXR) showed opacification of the left hemithorax suggesting moderate to large pleural effusion. Computed tomography(CT) of the chest showed loculated pleural effusion over the left upper lobe and along the anterior aspect of the lingular segment. Another loculation was seen along the left lower lobe with small air pockets and also within the left major fissure. Complete collapse of the left lower lobe was seen. Patchy subsegmental atelectasis was noted in the apicoposterior segment of left upper lobe and inferior lingular segment.(Fig.1)

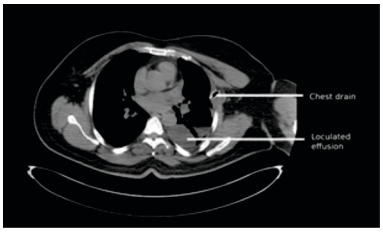

Figure 1. Computed Tomography showing left sided loculated pleural effusion with chest drain in situ.

His total counts were elevated. Intercostal drain was inserted through the left 4th intercostal space. Pleural fluid was sent for analysis. Gram stain showed few pus cells and the cell count was 1300 cells/cu.mm. Acid fast bacilli and fungal stains were negative. Biochemical analysis of the fluid showed glucose 103gms/dl, LDH 1147U and protein 5.50g/dl. Intravenous antibiotics were administered

Due to the presence of loculations and thin pleural membrane on CT scan which was radiologically suggestive of exudative phase, instillation of fibrinolytics was planned. Inj.Steptokinase(STK) 2.5 million units in 100ml normal saline was administered through the chest drain daily, for a period of 4 days. The mixture was retained in the pleural cavity for 60 minutes. The drainage of purulent fluid improved over the next five days which was 250, 450, 250, 50, and 500ml respectively. CXR showed good improvement with adequate lung expansion. Chest drain was removed and the patient was discharged.

CASE 2

A 44 years old female presented with history of dyspnea associated with fever and dry cough for 7 days. Patient had orthopnea more pronounced when she was lying on her left side for the past one month. CXR showed large left pleural effusion. Pleural aspiration done showed frank pus. CT chest showed a multiloculated left pleural effusion with thick septations. Near complete collapse of the left upper lobe relatively sparing the apicoposterior segment and collapse consolidation of the left lower lobe. Fissural extension of the pleural effusion visualized. There was diffuse thickening of the parietal and visceral pleura with prominent extra pleural fat.(Fig.2)

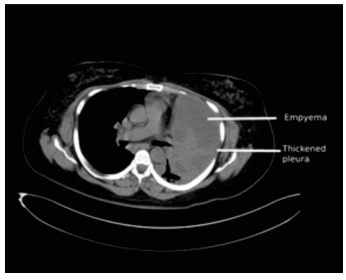

Figure 2. Computed Tomography showing massive left sided empyema with underlying collapsed lung and extensive pleural thickening

Left posterolateral thoracotomy done through 4th ICS. Left lung empyema was present with > 500ml pus. Adhesions were lysed. Pus drained. Decortication was done. Visceral and parietal pleural rind was excised. Lung freed over all surfaces. Adequate lung expansion was achieved. Pleural drains were placed. Ribs were approximated with ethibond sutures. Patient discharged after drain removal.

DISCUSSION

The pathophysiology of empyema starts initially as an exudative phase(simple effusion stage I), followed by a fibrinopurulent stage(complicated effusion with septations stage II) and later an organizing stage with pleural rind formation(stage III). These solid fibrous pleural peels may prevent lung re-expansion, impair lung function, and create a persistent pleural space with ongoing potential for infection. At this stage chronic empyema develops. (1)

Most common organisms grown in culture in the setting of community acquired pneumonias are gram positive aerobes - Streptococcus and Staphylococcus. (2) Gram negative organisms are seen in patients with associated comorbidities. In hospital acquired infections, anaerobes occupy a significant proportion with E.coli, Enterobacter and Pseudomonas being the more common infecting organisms.

Pleural fluid analysis is done to differentiate the presence of simple or complicated effusion. Once the pleural infection reaches the fibrinopurulent stage- there is a drop in pH below 7.20 and the glucose level is below 60mg/dl. The pleural fluid LDH is three times more than the upper normal limit for serum.(3) Based on the culture and

sensitivity reports antibiotics can be prescribed. Ultrasound is used to diagnose the presence of pleural effusion, to identify septations and also as guidance for diagnostic or therapeutic thoracentesis. Following aspiration ultrasound can be used to measure the presence of residual collection and for assessing adequacy of drainage after intercostal tube insertion. CT of the chest can demonstrate the presence of pleural thickening (split pleura sign) which confirms the presence of complicated parapneumonic effusion. (4)

The treatment of empyema should focus on the treatment of the ongoing infection, prevention of recurrence and avoiding complications such as restriction of lung function. (5)

In the early stage when the pleural collection is simple – observation with antibiotics may suffice. Thoracocentesis is often used in the setting of simple parapneumonic effusions. This provides us with pleural fluid for analysis and if the pleural collection is clear with minimal signs of purulent infection, it may be deemed therapeutic. ICD is the most common treatment for complicated pleural effusions and empyema. Once frank pus is aspirated on pleural tapping, ICD should be inserted. The usage of intrapleural fibrinolytics has been clinically tested and is being used worldwide to facilitate adequate and complete drainage of the pleural collection. Although their usage has not been proven to be of benefit in terms of decreased mortality or reduction in number of cases being referred for surgery through large randomized control trials,(6) smaller observational studies have described their usefulness in improving pleural drainage.(7)

VATS is an important tool in the management of stage II empyema with outcomes comparable to open surgery. VATS approach requires early referral and cannot be used for all patients. VATS does offer the advantage of early mobilization, lower chest tube duration, lesser duration of hospital stay and reduced postoperative pain.(8) VATS when used for stage III empyema has led to increased rates of conversion and the most important predictor being the time duration between onset of symptoms and surgery.(9)

Thoracotomy and open drainage with or without decortication is the gold standard of treatment. Open surgery allows for proper visualization of the pleural cavity, removal of all fluid and necrotic tissues and adequate decortication with restoration of normal lung function.(10) Various studies have shown that thoracotomy is superior to intra pleural instillation of fibrinolytics and VATS in terms of higher rates of treatment success. Early surgery leads to faster recovery and reduced operational costs when compared to non-invasive methods.(11)

CONCLUSION

In our case series the first case presented in early stage II empyema which did not warrant open surgery based on his clinical parameters and investigations. Pleural fluid drainage with fibrinolytics was offered as the preferred treatment choice which led to complete resolution of his pleural collection. The second case presented at a later stage in the spectrum of empyema and due to the presence of fulminant infection she was taken up for surgery. Decortication and pleural drainage led to immediate control of her infection and the patient recovered well.

Both patients had similar duration of hospital stay and treatment success was documented radiologically. Both patients are on regular follow up in out outpatient department. Empyema can be managed with intercostal drainage, intrapleural fibrinolytics or open surgery with equally good outcomes but the decision should be made based on the time of presentation, stage of empyema and clinical parameters.

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