Management of tuberculous empyema

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Abstract

Objective: In an attempt to establish a treatment protocol for tuberculous empyema, we retrospectively reviewed our experience over a 3-year period.

Methods: Between January 1996 and December 1998, 26 patients (23 male and three female) with an average age of 33.8 years (range 18–61 years) presented with tuberculous empyema. The empyema was right-sided in 13, left-sided in 12 and bilateral in one patient. Patients presented with respiratory symptoms for a mean duration of 4.43 months (range 1–48 months). All patients had a computerized scan of the chest and managed according to the stage of empyema.

Results: In patients with exudative empyema \( (n = 4) \) the fluid was aspirated, but one patient required intercostal tube (ICT) drainage for 6 days. There were four patients with fibrinopurulent empyema treated with thoracoscopic drainage with a mean post-operative stay of 8 days (range 4–12 days). In the organizing stage \( (n = 18) \), initial drainage with large ICT was performed. The pleura was less than 2 cm in thickness in eight patients, for which repeated installation of streptokinase was performed (three to seven times). Satisfactory results were achieved in six patients (75%) and the remaining two required decortication. Of the ten patients with thick cortex, one required a window and nine had decortication, two of which had additional lobectomy and two had pneumonectomy. All patients fully recovered with no mortality and with a mean duration of drainage of 18 days (range 3–61 days).

Conclusion: Its stage and the state of the underlying lung should guide surgical treatment for tuberculous empyema. This protocol aims to achieve cure utilizing the least invasive approach and acceptable hospital stay.

Keywords: Empyema; Tuberculosis; Surgery

1. Introduction

There has been a little change in the management of supplicative lung and pleural disease in the last two decades [1]. Although with development of potent anti tuberculous medication the problem is better managed especially in the Third World countries, the increase number of immunosuppressed patients from, HIV, transplant, and postchemotherapy for cancer have lead to the development of more cases of tuberculosis (TB) [2]. A thoracic empyema is a collection of pus in the pleural space and according to the American Thoracic Society it could be exudative, fibrinopurulent, or organizing [3].

Tuberculous and post-tuberculous effusion are commons finding that respond to medical treatment and occasionally aspiration. In the other hand the development of tuberculous empyema is associated with high mortality and morbidity unless surgically treated. An established treatment strategy would give the best chance of cure with least complications. In this paper we reviewed our experience with management of tuberculous empyema and presenting its outcome.

2. Patients and methods

Over a period of 3 years between January 1996 and December 1998, we reviewed all cases of post-tuberculous empyema in Riyadh Chest Hospital and King Khalid University Hospital in Riyadh, Saudi Arabia. There were 26 patients (23 male and three female) with an average age of 33.8 years (range 18–61 years). All patients presented with respiratory symptoms of cough. Fever, night sweat, weight loss and malaise were also associated symptoms. The duration of these symptoms averaged 4.43 months before presentation (range 1–48 months). All patients had a diagnostic work up which included chest radiography, TB skin test, sputum send for AFB stain and TB culture. All 26 patients were diagnosed to have thoracic empyema. The empyema was diagnosed by pleural aspirate in all patients and confirmed by microscopic and biochemical analysis of the aspirate confirmed by the presence of pus cells [4].

The empyema developed in 15 patients with open pulmonary tuberculosis and they were under anti-tuberculous medication at presentation (post-tuberculous empyema). On screening the remaining 11 patients, a further four were discovered to have open pulmonary TB while the other seven patients had negative sputum culture for TB but the
pleural aspirate showed positive culture or acid fast bacilli (AFB) stain for TB (tuberculous empyema).

In post-tuberculous empyema the empyema developed during or after anti tuberculous therapy with a mean duration of 50.3 days (range 0–720 days). All 11 patients with tuberculous empyema and 10 out of 15 post-tuberculous empyema showed positive AFB and culture for TB from the pleural aspirate, 100 and 66.6%, respectively, giving a total of 81%. The five patients with negative TB in the pleural aspirate were known cases of pulmonary TB and on anti tuberculous treatment and the culture showed mixed bacterial organisms.

The empyema was assessed further with a computerized scan of the chest to establish the treatment modality according to its stage and the status of the underlying lung.

3. Results

There were 13 right-sided and 12 left-sided empyema with one patient presenting with bilateral empyema. After diagnosis all patients were started or continued to have four medications of anti-tuberculous therapy. The treatment duration ranged between 6 and 16 months with an average duration of 8.3 months. Modifications were made if needed after culture results. Broad-spectrum antibiotics were also added in selected cases.

The empyema were classified according to the American Thoracic Society classification.

There were four cases of exudative empyema, four of fibrinopurulent and 18 of organizing empyema. The stage of empyema was noted to correlate with the duration of symptoms as all patients with organizing empyema had a history of at least 2 weeks of symptoms.

The computerized scan further identified the thickness of the parital and visceral pleura and the state of the underlying lung parenchyma. The pleural thickness was estimated to be less than 2 cm in eight patients and more than 2 cm in ten. Two patients had destroyed right upper lobes and two other patients had completely destroyed left lungs. The remaining patients had either normal lung parenchyma (n = 6) or various degrees of apical fibrosis with no cavitation (n = 8).

The four exudative cases had complete aspiration with thoracosentesis set. Residual fluid after repeated aspiration in one patient needed the insertion of an ICT for 6 days.

The four fibrinopurulent patients underwent thoracoscopic drainage and breaking of the fibrinous loculation followed by intercostal tube drainage. The duration of post-operative drainage averaged 8 days (range 4–12 days).

The remaining 18 organizing (Figs. 1 and 2) empyema were managed initially with large size intercostal tube (ICT) drainage and medical treatment.

Progressive evaluation clinically and radiologically dictated the need for further therapy.

In eight patients with moderately thickened pleura (less than 2 cm) installation of streptokinase at repeated sessions was performed via the ICT. Each patient required an average of four installations (range three to seven) over an average period of 6 days (range 4–10 days). Complete resolution of the empyema was achieved in six patients (75%) and the remaining two required formal decortication. Full drainage of the empyema with no evidence of trapped lung was confirmed radiologically (Fig. 3). The duration of post-operative drainage averaged 16 days (range 3–24 days). In the other ten patients with thickened parital and visceral

Fig. 1. Pre-operative chest X-ray of right organizing tuberculous empyema.

Fig. 2. Pre-operative computerized scan of chest.
pleura (more than 2 cm), after ICT insertion a formal posterolateral thoracotomy and full decortication was performed in nine patients and one patient was not fit for the surgery and a Clagett window was created for drainage. Two patients with destroyed right upper lobes had simultaneous lobectomy and one patient with destroyed left lung had pneumonectomy at the same procedure. The surgery was done after 6 weeks from starting of the anti-TB therapy. After decortication the ICT was removed when the lung was fully expanded and the air leak have stopped. That required on average 18 days (range between 3 and 61 days) of ICT insertion.

One patient with a severely destroyed left lung and persistent bronchopleural fistula underwent pleuropneumonectomy with partial thoracoplasty.

During treatment all patients were on anti-TB therapy for an average period of 8.3 months (range 6±16 months). During surgical procedures ($n = 16$) a pleural biopsy were performed and histological evidence of TB were noted in 14 patients. In two patients the biopsy revealed chronic inflammation but pleural culture were positive for TB.

All patients were followed up for a mean period of 18 months (range between 3 and 38 months). There was no evidence of recurrence with satisfactory radiological appearance of the chest radiography. All patients were converted to sputum negative for TB at the end of the treatment.

4. Discussion

Tuberculous empyema should be managed in its acute exudative phase to avoid the development of chronic empyema which carries a high risk of morbidity and a fatal outcome may result [5]. This problem is more evidence in the third world country although now there is also an increasing number of cases in developed countries due to addiction, AIDS, transplant and the use of anti-neoplastic therapy which reduce the normal immunity of the patients.

In Riyadh the incidence of TB is still high but as there is about one third of the population are non-Saudi and mostly labor workers from the Far East the incidence of TB remains high. That might explain the predominance of male among this group. In the other hand the pilgrimage to Mecca in Arabia is a unique phenomenon with important medical and epidemiological implications. In a recent study tuberculosis was the commonest cause of pneumonia requiring hospitalization in this group [6].

For these reasons we established a management protocol in which the hospital stay is reduced and the highest percentage of cure can be achieved.

Diagnosis of tuberculous empyema consists of two items, first diagnosis of TB then the confirmation that this collection is an empyema and not a transudate [2,4].

When the diagnosis of tuberculous empyema is established there are two aims in the management. Control of the infection using the anti-TB medication in addition to the antimicrobial agents according to cultures. Secondly, the evacuation of pus with obliteration of the created space. This should be done with the least invasive method with restoration of the function of the underlying lung.

Clinical and radiological examination will diagnose the presence of intra-thoracic collection. Early aspiration and analysis of that collection is advisable for early diagnosis. Criteria of tuberculous empyema should be based on the presence of AFB in the fluid or after culture of the effusion. Additional cases will only be diagnosed after pleural biopsy.

The computerized scan (CT) of the chest should be performed early after diagnosis of empyema to stage the case and plan its management.

The following principles were followed in management of empyema:

<table>
<thead>
<tr>
<th>Collection</th>
<th>Transude</th>
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<tbody>
<tr>
<td>Empyema (Pus)</td>
<td>Organising</td>
</tr>
<tr>
<td>Exudative</td>
<td>Fibrinopurulent</td>
</tr>
<tr>
<td>Aspirate</td>
<td>Thoracoscopy</td>
</tr>
<tr>
<td>+/-ICT</td>
<td>ICT</td>
</tr>
<tr>
<td>Thin cortex</td>
<td>Thick cortex</td>
</tr>
<tr>
<td>Streptokinase</td>
<td>Decortication</td>
</tr>
</tbody>
</table>

Fig. 3. Immediate post-operative chest X-ray.
If the underlying lung was damaged, resection with or without myoplasty or thoracoplasty is added. Using the above protocol we managed to achieve satisfactory curative results with short hospital stay. The patients who required decortication have retained their lung functional capacity [7].

The use of fibrinolytic agents is still a debate, between early surgical intervention leading to early discharge and conservative management with prolonged hospital stay. In our series there was 25% failure rate in the streptokinase group requiring surgical decortication. We believe that early surgical intervention gives better results and conservative treatment should be reserved to chronically ill patients with high surgical risk.

The development of bronchopleural fistula is a devastating complication in TB and immediate drainage is mandatory. Further surgical intervention should be dictated by the initial response. The finding of fibrinous loculation can stimulate early thorascopic intervention with good outcome [8]. Late organizing empyema usually leads to trapped lung. If the cortex is less than 2 mm in thickness, streptokinase or urokinase installation via the ICT may save the patient a major thoracotomy [9].

Decortication is an extensive operation but so far it is the best treatment modality, which can offer complete resolution of the thickened parietal and visceral pleura. It also retain the functional capacity of the lung to a great extent [10].

When the underlying lung is damaged, treatment should include lung resection, lobectomy or pneumonectomy. These procedures should be undertaken carefully and in specialized centers to reduce the associated high mortality and morbidity [11]. Surgery in these cases better performed after sterilization of the empyema with negative TB. This will require at least 6 weeks of supervised anti TB treatment with four drugs.

The problem of residual space is more pronounced if the empyema developed post lung resection especially pneumonectomy, as there is no lung to fill the space. In these cases, Thoracoplasty might be the only option if myoplastic techniques were not suitable [12].

In conclusion, surgery plays an important role in management of tuberculous empyema in selected patients. In organizing empyema aggressive surgery ensure curative results with low morbidity [13]. The presence of an established protocol improves the outcome.

References