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Decortication and Thoracoscopy as Modalities of Treatment for Thoracic Empyema in Pediatric Patients.

Patel Mikir C | Senior resident in general surgery, M p shah medical college, Jamnagar, Room no 21, House Man A, M P Shah Medical Campus Jamnagar,Gujarat.

Patel Hritik R | Internship, M.P.Shah Medical college ,Jamnagar, Room no 38, Intern Hostel, M.P Shah medical college campus, Jamnagar, Gujarat

ABSTRACT

Empyema thoracis is a pyogenic or suppurative infection of the pleural space. Empyema are the most common exudative type of pleural effusion.Empyema is never a primary disease, though it is often difficult to arrive at primary focus of infection,most common cause of empyema is sequela of inadequately treated pneumonia.Acute empyema is treated by antibiotics,immediate drainage of pus via aspiration,intercostal drainage tube insertion with or without the help of thoracoscope. Thoracoscopy is an alternative procedure for multiloculated empyema which is considered in patients who do not respond to antibiotics and drainage. With thoracoscopy, Theloculations in the pleural space can be disrupted and the pleural space can be drained completely.Thoracoscopy early in the management of fibrinopurulent stage of empyema is more effective.If extensive adhesions are present or thick pleural peel entraps the lung, the procedure may be converted to open thoracotomy and decortications.In case where there is much thickening of the pleura, Decortication is the treatment of choice. It allows delicate parenchyma of lung to expand. and patients are explained breathing, exercises to promote early expansion of lung.

KEYWORDS Empyema,decortication,thoracoscopy

Introduction:

Ever since the days of Hippocrates Empyema thoracis has been known as pus in the pleural cavity. For centuries Empyema thoracis has been recognized as a serious problem. The development of antibiotic resistance has also added to the gravity of the condition. The situation has been made worse by the poor economic state and bad hygienic condition in our country.The course and clinical manifestation has been altered by inadequate and improper use of antibiotics. Majority come with the history of mild temperature,cough and chest pain. "One might add a score of cases to show that an unhealed empyema is a rule which is result of the patient's neglect or the surgeon's delay, or of inadequate and useless surgery Collection of pus and consequent compression on the lung leads to cardiopulmonary embarrassment. When acute or chronic, early diagnosis and quick treatment must be the aim.Empyema is more frequently encountered in infants and preschool children.Any of the bacterial pneumonias can be complicated by an effusion or empyema. The surgeon should observe the early stages of the disease, so he can advise whether and when thoracotomy is appropriate. In children previously in good health, the morality is less than 3%.Thoracoscopy is also indicated when the nature of the pleural process is undiagnosed, as this allows for a direct pleural biopsy that is likely to make the diagnosis while avoiding the morbidity of a thoracotomy.Inthoracoscopy suction is used to drain the chest of effusion and used to break up simple loculations and Gelatinous fibrinous deposits and blood clots are removed with a curved ring forceps clips. The visceral pleural peel can be debrided using ring-forceps, a curette and a peanut dissector .Decortication is defined as the removal of a constricting peel over the lung .Decortication is the procedure of choice in reatively healthy individuals with large chronic empyema in whom pleural sepsis is not controlled by closed-tube thoracostomy and possibly thoracoscopy, it should not be performed on patients who are markedly ill.

Objective:

To evaluate various modalities of treatment of empyema according to chronicity of the disease.

Materials and methods:

This prospective study was performed on 25 patients(15 male,10 female) over a period of 2 years. The upper limit of the patients age was 12 years.We thoroughly investigated all the patients with clinical history ,hematologicalinvestigations,radiological investigations (chest x-ray,USG) and pleural fluid analysis. CT scan was performed in selected case only.

The data was analysed& the patients were distributed in 3 stages, according to ATS(American thoracic society) staging system which is described as below,

In STAGE 1 the EXUDATIVE STAGE,CRITERIAS ARE

- Average duration of illness before admission: 4 days,
- Radiological : Minimal to mild pleural fluid effusion,Diffuse homogenous opacity
- Pleural Fluid Analysis :Culture and gram stain negative.pH, glucose, protein, andLDH are in normal range

There were 9 patients in stage 1. All the patients were given antibiotics. Initially broad spectrum antibiotics were given and then it was selected according to pleural fluid culture and sensitivity report , response to therapy was judged by serial evaluation of symptoms & signs, chest x-Ray, USG and overall general condition of patient.

In STAGE 2 of FIBRINO PURULENT STAGE

- **Average duration of illness before admission:** 10 day
- **Radiological :** Mild to moderate pleural fluid effusion, Diffuse homogenousopacity,Multipleloculation
- **Pleural Fluid Analysis :** Ph<7.2, Glucose < 40mg/dl, Protein>3gm,LDH>1000IU/L,Specific Gravity>1.018

5 patients in our study were directly present as stage 2 disease and 2 patients who failed to improve to treatment in stage 1, were also included in this stage. So total 7 patients belonged to stage 2 all of them were subjected to thoracoscopy with intercostal tube drainage and antibiotics.

In STAGE 3of ORGANISING STAGE

- **Average duration of illness before admission:** 15 day
- **Radiological :** Moderate to gross pleural effusion (>1/2 hemithorax on chest x-ray,Diffuse homogenous opacity,Loculated pleural effusion with multiple septa
- **Pleural Fluid Analysis :** Culture and gram stain positive

8 patients were directly presented as stage 3. 1 patient who converted to open surgery from thoracoscopy was also included in stage 3. So there were total 9 patients belonged to stage 3.All the patients were subjected to intercostal chest drainage and antibiotics followed by open decortications

Observation and discussion :

In our study Age group 9-12 years (52%) is more prone to empyema compare to rest of groups respectively 0-2 years(16%),3-5 years(20%),6-8years(12%).

In our study Male patients(60%) are more prone to empyema in comparison to female(40%).

Complication rate of decortication like wound infection and subcutaneous emphysema(3%) is higher than thoracoscopy(1%).no any major complication were occurred likewise brochopleuralfistula,persistent air leak and recurrence. No any complications occur in those patients treated by antibiotics alone except that 2 patients didn't improve with this treatment.

Average hospital stay of 16 days for decortication is higher than those who are treated with antibiotics(8 days) and Thoracoscopy(14 days).

Empyema is very grave disease, particularly in children and carries significantly morbidity and mortality, if not properly treated.The presence of co morbid conditions like malnutrition, pulmonary tuberculosis that alter systemic or pulmonary host defense increase the risk of empyema.In pediatric population parapnemonic effusion is the most frequent cause of empyema.

The management of empyema in children remains controversial, but the goals of the therapy were clearly outlined to Save life, to Eliminate the empyema,Reexpand the trapped lung,returnrespiratory function to normal,eliminate complication or chronicity,reduce the duration of hospital stay.Antibiotics suitable for therapy in patients suspected of having infected pleural effusions and addition of metronidazole or clindamycin if anaerobic pathogens are suspected. Antibiotics are then adjusted if the microbiological evaluation identifies specific causative pathogens.

Thoracoscopy is a modern tool in the hand of clinician to fight this grave disease.Advantages of thoracocoy are less pain, decrease the hospital stay, early mobilization and cosmetically superior with limitations of cost,sources and experience.It can't be applicable in late stage when there are thick pleura.In our series 7 patients out of 25 underwent thoracoscopy.1 patient required conversion because of technical difficulties. The average operative time was 140 minute.

Decortication represents the most invasive treatment for organizing empyema cavities. Decortication allows more rapid recovery with a decreased number of chest tube days and decrease length of hospital stay. Success rate for decortications is 90-99%. The complete surgical debridement has proved to be the most successful treatment for thoracic empyema. Although the open approach has excellent results in regards to infection control and reversal of lung function, morbidity and mortality remain higher compared to thoracoscopy procedure.

Analysis of these patients in whom traditional conservative therapy failed suggested that the initial management during the early exudative phase was often delayed and was not aggressive enough from the stand point of pleural drainage. Early decortication in these highly select patients with symptomatic, refractory empyemas shortened the hospital stay, minimized the risks of long-term use of antibiotics and prolonged chest tube drainage, completely reexpanded the trapped lung, and led to excellent long-term results.Primary operative therapy is associated with a lower in-hospital mortality rate, reintervention rate, length of stay, time with tube thoracostomy, and time of antibiotic therapy, compared with nonoperativetreatment.In our series , 9(36%) patients belong to ATS stage 3.They were subjected to decortications. These statistics favoured that treating the empyema at earlier stage has more favourable outcome then those at late stage disease.

Conclusion:

The treatment of empyema can be planned as per ATS staging system. However accurate classification of patient according to staging system is not always possible. Such cases require sound clinical judgment of clinician to select appropriate therapy.

Thoracoscopy is safe, effective and less invasive technique. It gives tremendous benefits to the patients.

Those patients with late presentation should be treated by open decorticaion. When the decortication is performed in timely manner it provides rapid resolution of the disease.

Patient with earler stage of empyema can be treated more successfully with less morbidity and mortality compared to those with advance stage of empyema. So all efforts should be made to detect and treat the disease in earlier stage.

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