Video assisted thoracoscopic surgery (VATS) for complicated para-pneumonic empyema in two children

***Mathula Hettiarachchi[1], Pathum Dissanayake[2], Ashoka Wijeyananda[3], MAM Faizal[4]**

Sri Lanka Journal of Child Health, 2021; **50**(2): 340-341
DOI: http://dx.doi.org/10.4038/sljch.v50i2.9584
(Keywords: Empyema, decortication, fibrinolysis, VATS, child, Sri Lanka)

Introduction

Empyema is defined as the presence of pus in the pleural cavity, a rare but recognized complication of bacterial pneumonia in children. Around 0.6% of bacterial pneumonias could progress to empyema[1]. Though a rare complication, its prevalence has been increasing in developed countries[2]. At present, minimally invasive therapeutic modalities such as intra-pleural fibrinolysis and VATS have surpassed more invasive modalities like thoracotomy for paediatric empyema[2]. We report cases of two children who had complicated empyema treated successfully with VATS and decortication.

Case 1

A 5-year-old girl presented with fever and cough for one week. On examination, she was febrile with respiratory distress. She had evidence of consolidation and pleural effusion on the left side. Investigations showed neutrophil leucocytosis and elevated C-reactive protein (CRP) of 217mg/dl. Ultrasound scan (USS) of the chest revealed densely encysted effusion on the left side confirming the diagnosis of empyema. Urgent pleural fluid drainage was done and broad spectrum antibiotics were started. Pleural fluid analysis revealed leucocytosis with elevated lactate dehydrogenase (LDH) level and *Streptococcus pneumoniae* culture positivity.

[1]*Consultant Paediatric Surgeon and Senior Lecturer in Surgery, Sirimavo Bandaranaike Specialised Children's Hospital, Faculty of Medicine, University of Peradeniya,* [2]*Consultant Paediatrician and Senior Lecturer in Paediatrics, Professorial Paediatric Unit, Teaching Hospital Peradeniya, University of Peradeniya,* [3]*Consultant Anaesthetist,* [4]*Consultant Paediatric Intensivist, Sirimavo Bandaranaike Specialised Children's Hospital, University of Peradeniya*
**Correspondence:* drmathula@yahoo.co.uk

https://orcid.org/0000-0003-0986-5951

(Received on 29 April 2020: Accepted after revision on 19 June 2020)
The authors declare that there are no conflicts of interest
Personal funding was used for the project.

Tissue plasminogen activator (tPA) administered through the intercostal catheter was used as first line treatment for the empyema. The tPA therapy was continued for 7 days but there was no significant response due to the organising stage of the empyema.

Since there was inadequate response for tPA therapy, it was decided to proceed with decortication with minimally invasive VATS procedure. The procedure was done under general anaesthesia with endotracheal intubation and right lateral positioning. Satisfactory lung collapse was achieved with pneumothorax of 6mm Hg. The left lung was found to be entrapped with dense fibrous peel which was excised to improve the lung expansion and infection (Image 1).

Image 1 - Dense fibrinous peel in organising stage of empyema

Post operatively she had antibiotics continued for further 3 weeks prior to discharge and maintained optimum functional respiratory status up to the last follow up at 6 months.

Case 2

A 4-year-old boy presented with fever and productive cough for 5 days. On examination, he was ill and febrile with evidence of left side consolidation complicated with a large pleural effusion. He was started on broad-spectrum antibiotics and the pleural effusion was confirmed to be an empyema which was treated with pleural drainage and intra-pleural tPA for 7 days. However, he continued to have high fever with rising inflammatory markers suggestive of poor response; hence, thoracoscopic decortication was carried out. The procedure was technically less complicated here because the empyema was at the fibrino-purulent stage (Image 2).

Image 2 - Fibrinous material in fibrinopurulent empyema

He was discharged in 10 days post procedure.

Discussion

Empyema should be suspected when a child develops pleural effusion while on treatment for pneumonia. Staging of empyema depends on thickness and severity of the fibrinous exudate. Stage 1 empyema, also called the exudative phase, consists of a thin effusion with minimal fibrinous exudate and cells which have a good response to antibiotics with or without drainage[1]. Stage 2 empyema entails fibrino-purulent exudate with thick frank pus in the encysted pleural cavity due to fibrinous septae while stage 3 empyema signifies organising stage with thick fibrinous peel encasing the lung and limiting expansion[1].

Early diagnosis of empyema is crucial to prevent progression to later stages. Diagnosis is made by the USS of the pleural cavity showing a septated effusion combined with analysis of pleural fluid characterised by leucocytosis, pH less than 7.3 and elevated LDH[2]. *Streptococcus pneumoniae*, *Streptococcus pyogenes* and *Staphylococcus aureus* are the frequent pathogens isolated in pleural fluid culture, but it is mostly negative in empyema due to early antibiotic therapy[1,2] .

Management of empyema in children is controversial but the objective is to eliminate the infection and restore pleural fluid circulation[1]. The failure rate of conservative management is 23.6%[1]. Intra-pleural fibrinolytic therapy is the standard first line treatment in many centres yet some centres perform VATS as first line treatment[1,3]. The overall success rate of fibrinolysis is 84.5% with a high failure rate for organized fibrotic stage[1]. Complications of fibrinolytic treatment include pain following installation and the risk of bleeding. In our setting, VATS was performed as second line treatment when there had been inadequate response to tPA therapy. However, there is emerging evidence that early primary surgical decortication reduces hospital stay with a success rate of 83%-100% although risk of anaesthesia and surgery related morbidity remains[1,3,4]. Regular follow up is recommended in these children until they are clinically improved and the chest x ray is normal[5].

VATS for paediatric empyema has a remarkable outcome when other minimally invasive therapy fails. Surgical intervention should be considered early in the course of illness to prevent significant long term morbidity due to organising empyema.

References

1. Cremonesini D, Thomson AH. How should we manage empyema: antibiotics alone, fibrinolytics, or primary video-assisted thoracoscopic surgery (VATS)? *Seminars in Respiratory and Critical Care Medicine* 2007; **28**(3): 322-32. https://doi.org/10.1055/s-2007-981653 PMid: 17562502

2. Hawkins JA, Scaife ES, Hillman ND, Feola GP. Current treatment of paediatric empyema. *Seminars in Thoracic and Cardiovascular Surgery* 2004; **16**(3): 196-200. https://doi.org/10.1053/j.semtcvs.2004.08.004 PMid: 15619185

3. Avansino JR, Goldman B, Sawin RS, Flum DR. Primary operative versus non-operative therapy for paediatric empyema: a meta-analysis. *Pediatrics* 2005; **115**(6): 1652-9. https://doi.org/10.1542/peds.2004-1405 PMid: 15930229

4. Li ST, Gates RL. Primary operative management for paediatric empyema: decreases in hospital length of stay and charges in a national sample. *Archives of Paediatrics and Adolescent Medicine* 2008; **162**(1): 44-8. https://doi.org/10.1001/archpediatrics.2007.10 PMid: 18180411

5. Chibuk TK, Cohen E, Robinson JL, Mahant S, Hartfield DS, Canadian Paediatric Society. Paediatric complicated pneumonia: diagnosis and management of empyema. *Paediatrics and Child Health* 2011; **16**(7): 425-7.