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Department of Health Research
Ministry of Health and Family Welfare, Government of India

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Standard Treatment Workflow (STW)

EMPYEMA THORACIS IN CHILDREN

ICD-10-J86

DEFINITION

- Presence of pus or microorganism in the pleural fluid, observed on smear examination or on culture.
- Criteria for diagnosis in the absence of microorganism:
  - (a) Pleural fluid pH< 7.0
  - (b) Lactic dehydrogenase (LDH) > 1000 IU/L
  - (c) Glucose <40 mg/dL or
  - (d) Lactate > 5 mol/L or 45 mg/dL

CLINICAL FEATURES

SYMPTOMS
- Fever
- Chest pain
- Cough
- Respiratory distress
- Abdominal pain and vomiting

SIGNS
- Auscultation - decreased breath sounds & crackles
- Dullness to percussion

CAUSE OF EMPYEMA
- Bacterial pneumonia (develop in 50-70% cases of complicated pneumonia)
- Tubercular empyema
- Chest wall trauma
- Lung Abscess / Aspiration
- Common organisms: S pneumoniae, Saureus, and group A streptococci

PHASES OF EMPYEMA
The treatment depends on the stage of empyema
- Exudative phase (1-3days)
- Fibrino-purulent phase (4-14days)
- Organising phase (>14days)

Any child with diagnosed pneumonia with no improvement and spiking fever after 48 hours of antibiotic treatment may signal empyema

INVESTIGATIONS:
- **Blood:** Blood counts, Blood Culture, ASO Titre, CRP
- **Sputum:** Sputum AFB, Gram Staining and Culture
- **Radiological:**
  - Chest X-ray: PA . Obliteration of Costophrenic angle or Meniscus sign are early signs of pleural effusion.
  - USG Chest: Amount of fluid & echogenicity of fluid, loculation and pleural thickening. It can be a guide for thoracocentesis or ICD placement.
  - CT Chest: Role only in complicated cases and to detect underlying lung problems. HRCT is ideal before surgery
- **Pleural fluid Analysis:**
  - Microbiology - Gram stain, Culture (aerobic & anaerobic)
  - Cytology to see for type of cells
  - Biochemistry- LDH, PH, Glucose

TREATMENT
- Child not sick; investigation reveals a small effusion- IV fluids, Oxygen, IV Antibiotics, Analgesics
- Child looks sick; investigation reveals larger effusions & respiratory compromise - IV Antibiotics and Intercostal Chest tube Drainage

Antibiotics : 3rd Gen Cephalosporins/Extended Penicillins like Co-Amoxiclav, for 1-4 weeks
- Change based on cultures, Continue until afebrile/ ICD removed

ICD INSERTION
- Adequate sized tubes under USG guidance preferably in the mid axillary line through the safe triangle under IV sedation for children with adequate monitoring
- If USG is not available: needle aspiration, confirmation of pus and insertion of tube maybe done
- Maximum fluid to be drained:
  - 10ml/kg in small children
  - 1.5 litres in older children
- Tube to be removed at complete clinical resolution or changed when blocked

ROLE OF SURGERY
- Thoracoscopy if facilities available
- If not, thoracotomy

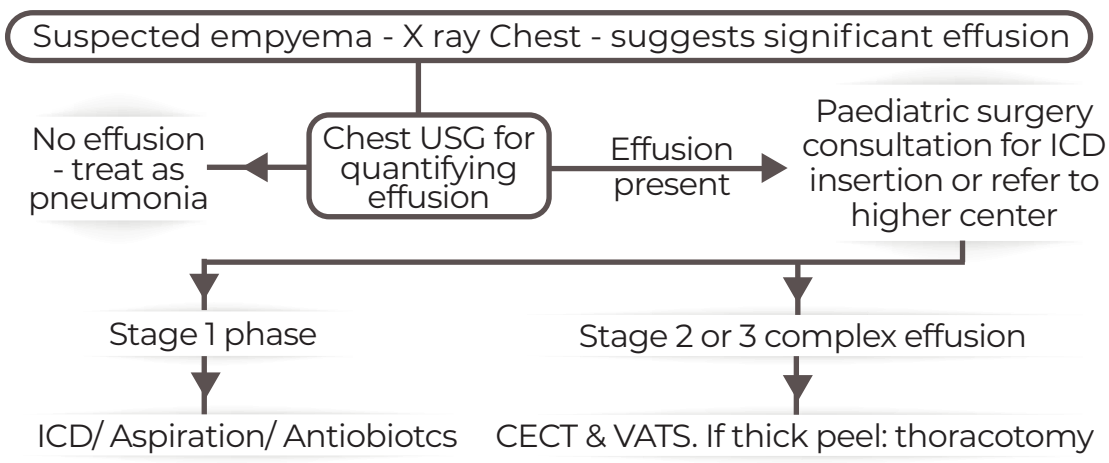
Indications for surgery:
1. Failure of ICD, Antibiotics
2. Persisting sepsis beyond 7 days of antibiotics, pleural collection despite chest tube drainage or complex or delayed empyema (with loculation)

THORACOSCOPY VS THORACOTOMY

THORACOSCOPY
- Preferred in early empyema
- Breakdown of loculi
- Complete pus drainage
- Debridement under vision
- Full lung expansion
- If peel is very thick and not amenable for removal, should be converted to thoracotomy

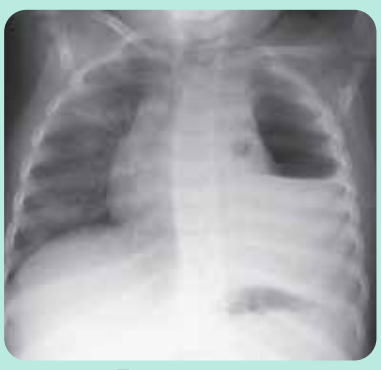
THORACOTOMY
- Formal Thoracotomy and Decortication indicated in Stage 3 and delayed cases where there is
  - Thick peel
  - Thick pyogenic material
  - Inability to develop a pleural window
  - Complex and chronic empyema
  - Underlying diseased lung

ALGORITHM OF MANAGEMENT OF CHILDHOOD EMPYEMA



FIBRINOLYTICS IN STAGE II EMPYEMA
- Safe and cost effective treatment modality that avoids surgery

Indications
- Within 2 weeks duration
- Preferably no ICD has been placed
- Imaging shows echogenic collection with septation
- Fluid analysis shows frank pus/exudative effusion


Empyema

CONTRAINDICATIONS
- Bleeding diathesis
- Suspected TB
- Hypersensitivity to fibrinolytic
- Complicated pneumonia/ lung abscess
- Air leak on insertion of ICD

PROCEDURE
- 16/18 size ICD tube inserted under sedation with local anesthesia, towards marked point of maximal collection and connected to underwater seal without any suction
- Assessed after 24 hours, no further intervention if afebrile, without distress and effusion cleared on Xray

DRUG AND METHODS
- Urokinase:
- Dose: Twice daily for a maximum of three days (6 instillations)
  - **Age** <1 year 10000 IU diluted in 10 mL NS
  - **Age** >1 year 40000IU diluted in 40 mL NS
- Instilled through the ICD and kept blocked for 30 minutes (ICD reconnected after 30 minutes)
- Children are encouraged to change their positions

MONITORING
- Resolution of clinical symptoms: fever, tachypnoea
- Drain output: Daily USG & X-ray

ICD is removed: drain output is <10mL/kg/day, chest X-ray shows good expansion
- Discharged with standard antibiotic cover of 1-2 weeks

Failure/ Indication for Surgery
- Persistence of collection on x-ray/ ultrasound after 3 days
- Clinical/Radiological worsening during therapy

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