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Original Research Paper

Cardiothoracis

COMPARATIVE OUTCOMES OF VIDEO-ASSISTED THORACIC SURGERY (VATS) AND OPEN THORACOTOMY: A PEDIATRIC CASE SERIES FROM INDIA

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ABSTRACT This study evaluates the clinical differences between Video-Assisted Thoracic Surgery (VATS) and Open Thoracotomy in pediatric patients presenting with thoracic infections and related pathologies. Eleven cases were retrospectively analyzed, comparing postoperative recovery, morbidity, mortality, and length of hospital stay. VATS demonstrated shorter hospitalization and fewer complications, whereas Open Thoracotomy remained essential for advanced or anatomically complex disease. These findings align with international data from centers in India, the United States, and the United Kingdom, supporting the progressive shift toward minimally invasive thoracic surgery in pediatric care.

KEYWORDS : VATS, Pediatric Thoracic Surgery, Open Thoracotomy, Empyema, Minimally Invasive Surgery, Case Series

INTRODUCTION

Thoracic surgery plays a pivotal role in managing pediatric respiratory infections, empyema, and sequelae of tuberculosis. Over recent decades, Video-Assisted Thoracic Surgery (VATS) has gained prominence as a minimally invasive alternative to conventional open thoracotomy. Its clinical advantages—reduced postoperative discomfort, quicker mobilization, and shorter inpatient stay—have contributed to its increasing adoption in both adult and pediatric populations.

Despite these benefits, Open Thoracotomy remains indispensable in cases involving complex pleural disease, dense adhesions, or advanced-stage infections where thoracoscopic visualization is limited. Global literature from the USA, UK, and India consistently indicates superior recovery with VATS, though both modalities have defined and irreplaceable roles based on disease severity.

This study presents a comparative analysis from a tertiary-care center in India, evaluating clinical outcomes of pediatric patients undergoing either VATS or Open Thoracotomy. The objective is to assess differences in morbidity, mortality, postoperative complications, and duration of hospitalization.

METHODS

A retrospective observational study was conducted involving eleven pediatric and adolescent patients admitted for thoracic infections or related conditions. Data were retrieved from inpatient records, operative notes, radiological investigations, and discharge summaries.

Inclusion Criteria

- Age below 18 years (one patient aged 17 included due to adolescent classification)
- Diagnosed thoracic infection, empyema, or related pathology
- Underwent either VATS or Open Thoracotomy

Data Collected

- Age, sex, and presenting complaints
- Preoperative diagnosis
- Surgical procedure performed
- Duration of hospitalization
- Postoperative complications
- Mortality outcomes

Patients were categorized into two groups:

1. VATS group (n = 5)
2. Open Thoracotomy group (n = 6)

Given the small sample size, analysis was descriptive, focusing on outcome trends.

RESULTS

Among the eleven patients evaluated, five underwent VATS and six underwent Open Thoracotomy. The majority presented with symptoms such as fever, persistent cough, and respiratory distress.

Length of Hospital Stay (LOS):

VATS: 24–36 days (mean shorter stay)
Open Thoracotomy: 28–37 days (longer stay; one mortality)

Complications:

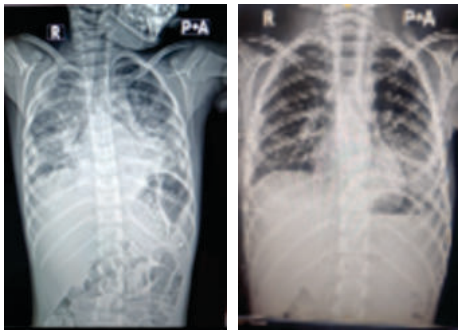
VATS group: 0 major complications
Open group: Mild postoperative infections, respiratory distress, pneumonia

Mortality:

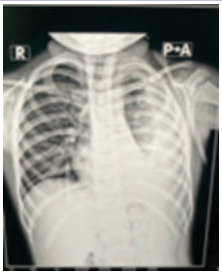
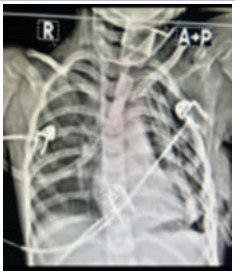
Only one death occurred, involving Rachana, who deteriorated immediately postoperatively following Open Thoracotomy.

Trend Summary:

- VATS patients demonstrated faster recovery and fewer complications.
- Open Thoracotomy remained essential for cases with severe disease or pleural organization impeding thoracoscopic access.



Case Capsule 1: Aarya Pardhi
Demographics: 4-year-old female
Short History: Presented with cough and cold for 5 days
Procedure: Open Thoracotomy
Hospital Stay: 28 days
Morbidity: None
Mortality: No
X-ray Image:

Case Capsule 2: Kavya
Demographics: 3-year-old female
Short History: Left-sided empyema
Procedure: Open Thoracotomy
Hospital Stay: 29 days
Morbidity: Mild postoperative pneumonia
Mortality: No
X-ray Image:


Case Capsule 3: Piyush
Demographics: 2-year-old male
Short History: Cough and cold for 5 days
Procedure: Open Thoracotomy
Hospital Stay: 37 days
Morbidity: Respiratory distress
Mortality: No
X-ray Image:

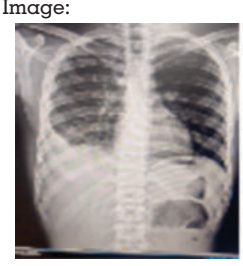

Case Capsule 4: Ashish Mazi
Demographics: 4-year-old male
Short History: Cough and cold for 5 days
Procedure: VATS
Hospital Stay: 24 days
Morbidity: None
Mortality: No
X-ray Image:

Case Capsule 5: Rachana
Demographics: 7-year-old female
Short History: Fever and cough for 8 days
Procedure: Open Thoracotomy
Hospital Stay: 15 days
Outcome: Postoperative death
Morbidity: Rapid deterioration immediately after surgery
X-ray Image:


Case Capsule 6: Dikshita
Demographics: 2-year-old female
Short History: Cough and cold for 3 days
Procedure: Open Thoracotomy
Hospital Stay: 31 days
Morbidity: Mild postoperative infection
Mortality: No
X-ray Image:

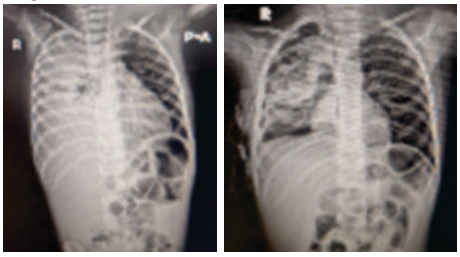

Case Capsule 7: Yuvraj
Demographics: 8-year-old male
Short History: Cough and cold for 10 days
Procedure: VATS
Hospital Stay: 36 days
Morbidity: None
Mortality: No
X-ray Image:


Case Capsule 8: Asmal
Demographics: 6-year-old male
Short History: Cough and cold
Procedure: VATS
Hospital Stay: 25 days
Morbidity: None
Mortality: No
X-ray Image:




Case Capsule 9: Ram Raut
Demographics: 17-year-old male

Short History: Cough, cold, and underlying tuberculosis
Procedure: VATS
Hospital Stay: 27 days
Morbidity: TB-related complications
Mortality: No
X-ray Image:



Case Capsule 10: Angal
Demographics: 2-year-old female
Short History: Cough, fever, and cold
Procedure: Open Thoracotomy
Hospital Stay: 35 days
Morbidity: Mild postoperative infection
Mortality: No
X-ray image-

DISCUSSION

This case series highlights distinct outcome differences between VATS and Open Thoracotomy in the pediatric population. Consistent with global literature, VATS demonstrated shorter hospitalization, fewer complications, and smoother postoperative recovery. Patients undergoing VATS benefited from less tissue trauma, improved postoperative mobility, and minimized pain, which collectively contributed to faster discharge.

Comparing these findings to international benchmarks:

- AIIMS New Delhi reports near-zero mortality and reduced morbidity in pediatric VATS cases.
- Memorial Sloan Kettering (USA) and Mayo Clinic document similar reductions in postoperative complications.
- Royal Brompton Hospital (UK) routinely favors VATS for uncomplicated empyema due to its superior safety profile.

In contrast, Open Thoracotomy retains an essential role, especially in advanced empyema with dense pleural adhesions, unexpandable lung, or loculated collections. These situations may compromise thoracoscopic visualization, necessitating an open approach. The single mortality in this study occurred in a patient undergoing open thoracotomy for severe disease, reflecting the known risks associated with advanced pathology rather than the procedure alone.

Limitations

1. Small sample size (n = 11), which limits statistical power.
2. Retrospective design, which may introduce selection and information biases.
3. Single-center data, restricting generalizability.
4. Variable disease severity among patients, influencing outcomes independently of surgical modality.
5. Lack of long-term follow-up, particularly regarding lung function recovery and recurrence.

Despite these constraints, the findings align with established international evidence regarding the advantages of minimally invasive thoracic surgery.

CONCLUSION

VATS emerges as a more favorable surgical option for pediatric thoracic infections due to its reduced postoperative morbidity, shorter hospitalization, and excellent safety profile. However, Open Thoracotomy remains indispensable for advanced or anatomically complex cases. Together, both procedures complement each other, enabling tailored management based on individual patient pathology.

Ongoing advancements in pediatric thoracoscopy, surgeon expertise, and perioperative care are likely to further expand the applicability of VATS in the coming decade.

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