

Feasibility and Effectivity of Video-Assisted Thoracoscopic Surgery (VATS) in the Management of Acute Empyema Thoracis

Acute thoracis empyema is an ancient disease condition that continues to be an important clinical problem worldwide. It is characterized as active inflammation and effusion between the parietal and visceral pleural spaces that progresses from stage I (exudative), through stage II (fibrinopurulent), to stage III (chronic organized) for 3 to 6 weeks.¹ Thoracic empyema is mainly secondary to pneumonia. According to clinical studies, 50-70% of individuals with pneumonia develop parapneumonic effusion (Stage I), 20% develop pleural empyema in a fibrinopurulent or organized stage (Stage II or III), and 5-10% develop empyema thoracis despite receiving antibiotics.² Other etiologies of empyema include blunt or penetrating chest trauma, tuberculosis, mediastinitis with pleural extension, postsurgical etiologies, etc. Since Bangladesh is 1 of the 5 countries that contribute over half of the world's pneumonia cases and timely identification of acute thoracis empyema is critical to treatment outcomes, healthcare professionals should be familiar with thoracic empyema phases, diagnostic tools, and management protocols.^{3,4}

According to the published comprehensive, evidence-based guidelines of The American Association for Thoracic Surgery (ATS), the primary concern of empyema thoracis management is to achieve evacuation and expansion goals and treatment modalities include antibiotic administration, chest tube drainage, intrapleural fibrinolytic therapy, and surgical intervention like VATS (Video-assisted thoracic surgery).⁵ Although there is no clear consensus on the most effective method: primary surgical intervention versus non-surgical management, VATS is becoming more popular among thoracic surgeons globally.⁶ Moreover, based on the current British Thoracic Society guidelines VATS should be considered over thoracotomy in the surgical management of acute thoracis empyema.⁷

VATS is a minimally invasive thoracic surgery, that involves evacuation by suction, disruption of fibrous pleural septations, and peeling off adhesions until the empyema cavity becomes a single space. Prior to surgery, chest computed tomography should be conducted to gather anatomical details regarding the empyema's location, size, extent, and pleural surface thickness.⁸ As for the procedure, the thoracoscope, a tube-like structure with a small camera at the end, is inserted through a small cut (incision) between the ribs. This lets the surgeon see the entire chest cavity without having to open up the chest or spread the ribs.⁹ In addition to visualization of the entire thoracic cavity, advantages of VATS include removal of the purulent pleura, and accurate placement of the thoracic drain with less surgical trauma, improved postoperative pain control, less respiratory compromise, and reduction in postoperative complications including 30-day mortality.¹⁰

Involving 1954 patients with stage II parapneumonic empyema thoracis, a meta-analysis of nine trials was conducted to compare the outcomes of VATS and open thoracic surgery for empyema management. Compared to open thoracic surgery, VATS exhibited a shorter operation duration (64-153 vs. 137-228 min) and a shorter postoperative hospital stay (5-16 vs. 7-21 days). Treatment-related morbidity rates were 0-52% for VATS and 0-57% for open thoracic surgery, and mortality rate was 0-10% for VATS and 0-16% for open thoracic surgery. The relapse rate of empyema after VATS was 0-5%, but the rate for open thoracic surgery was 3-12%.¹ Casali et al. demonstrated that VATS decortication in tuberculous empyema had a shorter postoperative hospital stay and chest drainage duration than thoracotomy, as well as a greater improvement in subjective dyspnea.¹¹ Although VATS requires a smaller, specially trained surgical team, it comes with higher costs. And aside from the cost concern, the potential

drawbacks of VATS are relatively minor, primarily involving the inability to tolerate one-lung ventilation and severe coagulopathy.⁵ Considering limited drawbacks, VATS, therefore, proves to be more effective and feasible for patients, whether draining parapneumonic effusion or performing decortication for tuberculous empyema thoracis.

Based on current evidence, VATS is recommended as the preferred, safe, effective and feasible approach for stage II and mixed (II/III) empyema thoracis management. This underscores a growing need for multiple training centers with adequate logistical support. Because, skilled thoracic surgeons trained in VATS, operating in well-equipped hospitals, undoubtedly represent a promising advancement for thoracic surgery in Bangladesh.

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References:

1. Makoto Endoh, S. S. (2021). Strategy for surgical treatment of acute thoracic empyema in adults. *Current Challenges In Thoracic Surgery*. <https://doi.org/10.21037/ccts.2020.04.02>
2. Tsai, Y. M., Gamper, N., Huang, T. W., Lee, S. C., & Chang, A. H. (2019). Predictors and Clinical Outcomes in Empyema Thoracis Patients Presenting to the Emergency Department Undergoing Video Assisted Thoracoscopic Surgery. *Journal of clinical medicine*, 8(10), 1612. <https://doi.org/10.3390/jcm8101612> PMID:31623408 PMCID:PMC6832114
3. Iguina MM, Danckers M. Thoracic Empyema. [Updated 2023 Jul 4]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK544279/>
4. Santana-Rodríguez, N., Aldebakey, H., Albalkhi, I., Hussein, M., Alshammari, A., Ahmed, A., ... & Migliore, M. (2022). Surgical management of parapneumonic empyema. *Shanghai Chest*, 6. <https://doi.org/10.21037/shc-22-11>
5. Shen, K. R., Bribriescio, A., Crabtree, T., Denlinger, C., Eby, J., Eiken, P., Jones, D. R., Keshavjee, S., Maldonado, F., Paul, S., & Kozower, B. (2017). The American Association for Thoracic Surgery consensus guidelines for the management of empyema. *The Journal of thoracic and cardiovascular surgery*, 153(6), e129-e146. <https://doi.org/10.1016/j.jtcvs.2017.01.030> PMID:28274565
6. Ahmed, A. E., & Yacoub, T. E. (2010). Empyema thoracis. *Clinical medicine insights. Circulatory, respiratory and pulmonary medicine*, 4, 1-8. <https://doi.org/10.4137/ccrpm.s5066> PMID:21157522 PMCID:PMC2998927
7. Roberts ME, Rahman NM, Maskell NA, et al British Thoracic Society Guideline for pleural disease *Thorax* 2023;78:1143-1156. <https://doi.org/10.1136/thorax-2023-220304> PMID:37553157
8. Silen ML, Naunheim KS. Thoracoscopic approach to the management of empyema thoracis. Indications and results. *Chest Surg Clin N Am* 1996;6:491-9.
9. <https://www.lung.org/lung-health-diseases/lung-procedures-and-tests/video-assisted-thoracic-surgery>
10. Endoh, M., & Shiono, S. (2020). Strategy for surgical treatment of acute thoracic empyema in adults. *Current Challenges In Thoracic Surgery*, 3. doi:10.21037/ccts.2020.04.02
11. Casali, C., Storelli, E. S., Di Prima, E., & Morandi, U. (2009). Long-term functional results after surgical treatment of parapneumonic thoracic empyema. *Interactive cardiovascular and thoracic surgery*, 9(1), 74-78. <https://doi.org/10.1510/icvts.2009.203190> PMID:19366725