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Frequency of Tuberculosis Diagnosed on Histopathology of Pleural Peel Biopsy Post Decortication in Patients with Chronic Empyema

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ABSTRACT

Objective: To elucidate the frequency and characteristics of TB in Chronic Empyema, emphasizing the role of histopathology in diagnosis, post-decortication.

Study Design: Retrospective Analytical study

Place and Duration of Study: Thoracic surgery Department Combined Military Hospital Rawalpindi, Pakistan from Aug 2014 to Aug 2023.

Methodology: A review of 2000 patients with Chronic Empyema undergoing decortication was conducted at Thoracic surgery Department Combined Military Hospital, Rawalpindi. Biopsy specimens were obtained following decortication in individuals with persistent empyema to determine the frequency of TB in pleural peel. The patients' demographic information, medical records, and current clinical state were all gathered using a stringent data collecting process. The occurrence of TB was calculated by the examination of pleural peel biopsy specimens following decortication. The data was described utilizing descriptive statistics, encompassing measures such as medians, percentages, and means. The frequency of TB was calculated by dividing the total number of participants in the study by the number of persons who were diagnosed with tuberculosis.

Results: The majority of the patients 1296(64.8%) who had decortication for persistent empyema underwent open decortication, while 704(35.2%) underwent Video-Assisted Thoracoscopic Surgery (VATS). The most common result 955(47.75%) in the histopathological study was TB, underscoring its strong correlation with persistent empyema. Additional results included malignancy 31(1.55%), pleuritis 119(5.95%), pleural fibrosis 227(11.35%), acute and chronic inflammation 433(21.65%), and nonspecific inflammation 235(11.75%). These results highlight the frequency of TB in instances of chronic empyema.

Conclusion: This study shows a high correlation between TB (47.75%) and chronic empyema. We highlight the need for early detection, precise diagnosis, and customized treatment strategies. This research emphasizes the importance of histology in the identification of chronic empyema patients, highlighting TB as the common prevalent pathology.

Keywords: Chronic empyema, Decortication, Tuberculosis.

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INTRODUCTION

Chronic empyema, is the continuous accumulation of purulent material inside the pleural cavity, it is a complex clinical condition that, if left untreated, can lead to serious complications and even death.[1,2] The majority of cases with chronic empyema are caused by bacterial infections; nonetheless, tuberculosis (TB) is still recognized as a potential etiological component, especially in areas where TB is prevalent.[3] The low bacilli count in pleural effusion and the limitations of conventional diagnostic procedures make TB empyema diagnosis challenging in these instances.[4,5] Histological examination of tissues from pleural peel biopsy samples taken after decortication is a dependable method for the diagnosis of tuberculous empyema. During decortication, the fibrosed and thicker pleural lining is surgically removed.[6,7] Because of this, the pleural tissue which might harbor mycobacteria can be accessed. Characteristics of TB infection, such as acid-fast bacilli, caseation necrosis, and granulomas, may be shown during histopathological study of these tissues.[7,8] A significant incidence of TB has been observed in histopathological study of pleural peel biopsy samples collected following decortication, according to the existing research. Some samples may reveal a prevalence of 10% to 50% in regions where TB is common.[9] This emphasizes the significance to include tuberculosis (TB) as a potential cause in the differential diagnosis of persistent empyema, even when conventional diagnostic approaches have failed to uncover it.[10]

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Recognizing the method's limitations is essential, despite histopathology's diagnostic value in pleural peel biopsy specimens following decortication. The sensitivity of the test may be affected by a number of factors, including the amount of tissue necrosis and the expertise of the pathologist. It is important to note that the procedure carries with it the danger of bleeding, pneumothorax, and infection, among other complications. Despite these restrictions, Pleural peel biopsy samples taken after decortication can be effectively used for histological Study to confirm TB empyema, This study aims to determine the frequency of tuberculosis (TB) diagnosed through histopathology of pleural peel biopsy specimen post-decortication in patients with chronic empyema. By addressing this gap, the study will provide valuable insights into the role of TB in chronic empyema and help refine diagnostic strategies, ensuring appropriate treatment and improving patient outcomes in settings where TB remains a significant public health concern.

METHODOLOGY

The retrospective analytical study was conducted at Thoracic surgery Department Combined Military Hospital Rawalpindi, located in a country with a high prevalence of TB. Ethical committee of Combined Military Hospital Rawalpindi approved the study protocol (vide serial no 521). The chosen study design enables the evaluation of a substantial patient population over a prolonged period, rendering it well-suited for addressing the research problem at hand. From August 2014 to August 2023, a total of 2000 patients had decortication procedures due to chronic empyema. The patients were selected based on the following criteria:

Inclusion criteria: Diagnosed patients of either gender with persistent empyema who underwent decortication were included in the study.

Exclusion criteria: Patients having a history of cancer, those with an infected haemothorax and those with TB that had been detected or treated were excluded.

The patients' demographic information, medical records, and current clinical state were all gathered using a stringent data collecting process. Age and sex data was collected. Data on smoking history and comorbidities such diabetes and hypertension was also recorded. By comparing radiographs taken before and after surgery, researchers were able to gauge the efficacy of treatment and determine the full degree of empyema. Histological Study of the pleural peel biopsy samples was performed, the slides were meticulously analyzed by proficient pathologists to discern three significant histological characteristics: acid-fast bacilli, granulomas, and caseation necrosis. Specialized staining techniques were employed for the regular detection of acid-fast bacilli, the causative agents of tuberculosis.

In order to provide a concise overview of the data, descriptive statistics were utilized. The occurrence of TB was calculated by the examination of pleural peel biopsy specimens following decortication. The data was described utilizing descriptive statistics, encompassing measures such as medians, percentages, and means. The incidence of TB was calculated by dividing the total number of participants in the study by the number of persons who were diagnosed with tuberculosis.

RESULTS

Tuberculosis predominated at 47.75% among 2000 chronic empyema patients receiving decortication. Compared to video-assisted thoracic surgery (VATS) (35.2%), open decortication constituted the predominant method (64.8%) as shown in Table-I.

Table-I: Patient Demographics and Diagnostic Results (n=2000)

Total Patients		
Gender	Males 1411(70.55%)	Females 589(29.45%)
Age Mean+SD	19 to 55 years 37+18	
Procedure	Open Decortication 1296 (64.80%)	VATS Decortication 704 (35.20%)
Diagnostic Results		
Tuberculosis	955(47.75%)	
Acute on Chronic Inflammation	433(21.65%)	
Nonspecific Inflammation	235(13.85%)	
Pleural fibrosis	119(5.95%)	
Malignancy	31(1.55%)	

Within 30 days following surgery, there were very few complications and (1.3%) fatalities to report. Most common complications were bleeding, infections, bronchopleural fistulas, and persistent air leaks as shown in Table-II.

Table-II: Complications Vats Decortication and Open Decortication (n=2000)

Complications	**Open Decortication 1296 (64.80%)**	**VATS Decortication704 (35.20%)**
Persistent Air Leaks	50(3.85%)	30(4.26%)
Bronchopleural Fistula	15(1.15%)	10(1.42%)
Bleeding	25(1.192%)	20(2.84%)
Infections	15(1.15%)	10(1.42%)

DISCUSSION

This study shows a high correlation between TB (47.75%) and chronic empyema. The sensitivity of the test may be affected by a number of factors, including the amount of tissue necrosis and the expertise of the pathologist.[11] It is important to note that the procedure carries with it the danger of bleeding, pneumothorax, and infection, among other complications. Pleural peel biopsy samples taken after decortication can be used for histological Study to confirm TB empyema, despite these restrictions.[12] After more conventional approaches have failed, modern technology can provide a conclusive diagnosis and help choose the best course of therapy. As diagnostic methods advance, histopathology will remain an integral part of chronic empyema therapy.[13] The diagnosis and treatment of chronic empyema, which is characterized by pleural inflammation and fibrosis, present considerable difficulties.[14-16] The high rate of tuberculosis (TB) among chronic empyema patients in our research is consistent with worldwide patterns that connect TB with empyema.[17] The high prevalence of tuberculosis (47.75%) in chronic empyema patients highlights its significant relationship and calls for careful attention in diagnostic plans and treatment strategies. Surgical procedures with low mortality rates, such as open decortication and VATS, demonstrated safety.[18-20] However, ongoing air leakage (4.5%) point to postoperative difficulties in accurately identifying tuberculosis require post-decortication histopathology.[21,22] The need for more sensitive diagnostic methods underscores the importance of histological examination in diagnosing tuberculosis in chronic empyema.[24] High-TB burden regions need to prioritize customized approaches for better patient outcomes. This emphasizes the need of holistic therapeutic strategies for persistent empyema that take into account both surgical and diagnostic factors. Future research should consider prospective multicenter studies for broader applicability. In-depth analyses of post-treatment complications, with specific counts and management details, would provide a more nuanced perspective. Long-term follow-up beyond the initial 30 days would capture delayed complications and sustained outcomes. Focusing on the factors influencing histopathological sensitivity and evaluating novel diagnostic technologies could enhance diagnostic accuracy. Lastly, comparing different treatment modalities directly and conducting subgroup analyses would contribute to refining treatment approaches and understanding patient diversity.

LIMITATIONS OF THE STUDY

The study has limitations that warrant consideration. Firstly, the single-center and retrospective design may limit the generalizability of findings, and the lack of a long-term follow-up hinders the assessment of sustained treatment outcomes. The broad nature of the exclusion criteria could potentially overlook specific patient subgroups with unique characteristics relevant to Chronic Empyema.

CONCLUSION

Patients with chronic empyema who underwent decortication had a significantly higher prevalence of tuberculosis (47.75%), highlighting the strong association between tuberculosis and chronic empyema.

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Authors' Contribution

The Following authors have made substantial contributions to the manuscript as under:

AJK & FAM: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

IA & UAS: Conception, data analysis, drafting the manuscript, approval of the final version to be published.

KR & F: Data acquisition, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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