



St. Paul Hospital Millennium Medical College

Post Graduate Study Program

Surgical Decortication outcome and Associated factors among
Adult Patients with Empyema Thoracis at Saint Paul Hospital
Millennium Medical College, Addis Ababa, Ethiopia, 2015 E.C

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Addis Abeba Ethiopia

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St. Paul's Hospital Millennium Medical College Department of Surgery Post Graduate Study Program

Assessment of surgical Decortication Outcome and Associated Factors Among Patients with Empyema Thoracic at Saint Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia, 2015 Ec.

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Abstract

Background: Empyema thoracis is a prevalent health issue with a rising incidence observed in recent studies. The causes of empyema vary significantly depending on geographic location and economic status. In developed countries, trauma is the primary cause, whereas infectious causes, particularly tuberculosis, rank highest in developing nations. Surgical decortication, whether performed through video-assisted thoracoscopy or open surgery, remains the primary treatment method, for stage II-III pleural empyema as classified by the American Thoracic Society.

Objectives: to assess the outcome of surgical decortication and associated factors among patients with empyema thoracis at St. Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia, From May 1, 2010 to April 30, 2015 E.C.

Methods: Hospital based cross-sectional study was carried at St, Paul hospital, Addis Ababa, Ethiopia. 5-year retrospective review of all complete records of patients who were operated included. And also, binomial logistic regression was done to determine factors associated with treatment outcome considering a significance level of 0.05

Results: a total of 53 patients were included in the study of which male to female ratio was 3.4:1 and mean age was 38 ± 13.8 yr. Average duration of symptoms before visiting our hospital was 4.45 ± 5.27 months and total hospital stay was 15 ± 11.29 days and cough (86.8%), fever (75.5%) and weight loss as well as shortness of breath were leading complaints to visit health care facility. Majority of the patients were diagnosed as stage III empyema and open thoracotomy and abscess drainage being the most common procedure done. Over all complications encountered intraoperatively accounts to 26.4%, bleeding being the most common one. During follow up month 95.2 % of patients showed both clinical and radiologic improvements and returned to their daily activities and there was no death.

Conclusion and recommendation: in general, based on our experiences, out come after decortication for empyema was favorable. Majority of patients returned to their base line functions and got improved clinically and radiologically. So, we encourage early decortication and abscess drainage in patients with empyema which increases morbidity and mortality .

Keywords: Empyema Thoracis, Hospital Stay, Treatment Outcome, Surgical Decortication

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Contents

Abstract.....	II
Acknowledgements.....	III
LIST OF TABLES.....	VI
LIST OF FIGURES	VII
ACRONYMS AND ABBREVIATIONS	VIII
1.1 Background.....	1
1.2 Statement of the Problem.....	3
1.3 Significance of the Study	3
2. Literature Review.....	5
2.1 Theoretical background of empyema and its management.....	5
2.2 Epidemiology, Complications and Types of empyema thoracis.....	5
2.4 Clinical characteristics, Duration of complaints and predisposing factors	7
2.5 Conceptual framework.....	8
3. Objectives	9
3.1 General Objectives.....	9
3.2 Specific Objectives	9
4. Methods	10
4.1 Study Design.....	10
4.2 Study Area and Study Period.....	10
4.3 Source Population	10
4.4 Study Population.....	10
4.5 Inclusion Criteria	10
4.6 Exclusion Criteria	10
4.7 Sample Size.....	10
4. 8 Sampling Method.....	11
4.9 Measurement.....	11
4.9.1 Dependent Variables.....	11
4.9.2 Independent Variables.....	11
4.10 Data Collection Procedure and Data Quality Management	11
4.10.1 Data Collectors.....	11
4.10.2 Data Collection Procedure	11

4.11 Operational Definitions:.....	11
4.12. Data Quality Control and Management:	12
4.13 Data Analysis Plan and Procedures	12
4.14. Ethical Consideration.....	13
4.15 Dissemination of Results	13
Chapter V: Budget Breakdown	15
6. Work plan.....	16
Chapter VII: Results and Discussion	17
7.1: Results.....	17
7.1.1: Socio-demographic characteristics of Respondents.....	17
Analysis of Clinical characteristics and Duration of complaints	18
Analysis of types, frequencies of complications, intervention pattern and Outcome of Surgical Management.....	22
Discussion	26
Chapter VIII: Conclusion and Recommendation	28
8.1 Conclusion	28
8.2 Recommendation.....	28
7. References.....	29
8. Annex.....	33
8.1. Annex I: Information Sheet.....	33
8.2 Annex II: data collection format	34
8.2.1 Socio-demographic and Clinical characteristics of a patient	34
8.2.2 Laboratory findings.....	35
8.2.3 Preoperative, Intraoperative features and types of surgical procedures.....	36
8.2.4 Postoperative mortality	37
8.2.5 Procedure related Complication.....	38
Was there any Procedure related Complication occurred?	38
Approval of the Primary Advisors	39

LIST OF TABLES

Table 1 Shows the distribution of budgets for each personnel and materials	15
Table 2 shows the distribution of the activity to be done with the corresponding of its time period.....	16
Table 3: Shows Socio-demographic characteristics of respondents, ...	17
Table 4: Shows Analysis of Clinical characteristics and Duration of complaints	19
Table 5: shows post op complications of decortication for empyema thoracis patients.....	23
Table 6: shows Binary logistic regression Analysis of Associated Factors with surgical decortication outcome for empyema thoracis	25

LIST OF FIGURES

Figure 1.1 Conceptual framework adapted from literature reviews	8
Figure 2: The proportion of patients who underwent decortication by region from where they came in Ethiopia, 2015EC.	18
Figure 3: Shows The common presentations of patients with empyema thoracis at SPHMMC, Addis Abeba, central, Ethiopia, 2015EC.....	21
Figure 4: shows the proportion of patients by etiology of empyema at SPHMMC, Addis Abeba, Ethiopia, 2015EC	22
Figure 5:shows Surgical decortication outcome for patients with empyema thoracis, at addis Abeba, Ethiopia, 2015 E.C	24

ACRONYMS AND ABBREVIATIONS

AIDS _____ Acquired Immunodeficiency Syndrome

ASA _____ American Association of Anesthesiology

CT _____ Computed Tomography

E.C _____ Ethiopian Calendar

ECOG _____ Eastern Cooperative Oncology Group

HIV _____ Human Immunodeficiency Virus

LDH _____ Lactate Dehydrogenase

MD _____ Medical Doctor

OTD _____ Open Thoracotomy and Decortication

SD _____ Standard Deviation

SPHMMC _____ St. Paul Hospital Millennium Medical College

SPSS _____ Statistical Package for Social Science

ST. _____ Saint

TE _____ Thoracic Empyema

TASH _____ Tikur Ambessa Specialized Hospital

TB _____ Tuberculosis

UK _____ United Kingdom

USA _____ United States of America

VATS _____ Video Assisted Thoracoscopic surge

Chapter one: Introduction

1.1 Background

Empyema is a Greek term referring to "pus in the pleural cavity" that can be defined as a purulent pleural effusion caused by a pleural space infection, and it has an assortment of underlying causes, the most of which include post-bacterial pneumonia caused by either TB or an infection following penetrating chest wounds or surgical operations(1,2). Empyema should be considered when a pleural effusion is loculated, especially if adjacent to an area of pulmonary consolidation(3).

In Europe estimated that approximately 250,000 people with pneumonia died in 2019. The occurrence of pleural effusion is associated with a 3–6-fold increase in mortality and complications in up to 50% of patients affected by pneumonia of which 15% are evolving into empyema(4). In a multicenter randomized study set in the United Kingdom, the observed mortality rate from pleural infection was reported to be up to 22%. Since conservative treatment seems to fail in approximately one-third of patients who develop parapneumonic empyema, surgery is required to achieve debridement of the pleural space, infection control, and lung re-expansion. The median length of stay of these patients ranges from 12 to 15 days and the overall hospital costs due to empyema per annum in the United Kingdom and the United States combined is around 320 million US dollars.(3)

The mortality of empyema frequently depends on the degree of severity of the comorbidity; Immunocompromised conditions either iatrogenic (transplantation and cancer therapy), the result of drug abuse or HIV impose further risk in developing thoracic empyema Which may range from as low as 1% to over 40%(5,6).

Since 1990 empyema thoracis starts to increase in incidence worldwide and appears to have a higher incidence in the developing parts of the world, where tuberculous etiology of empyema is more common, likely due to poor health-seeking behavior, poverty, and malnutrition(7).

Primary empyema occurs as a complication of intrinsic infection of the lung. Secondary empyema results from extrinsic sources, that is, invasive procedure to the chest or traumatic damage.(3) The most common precursor of empyema is bacterial pneumonia and subsequent

parapneumonic effusion. Other causes of empyema include bronchogenic carcinoma, esophageal rupture, blunt or penetrating chest trauma, mediastinitis with pleural extension, infected congenital cysts of the airway and esophagus, extension from sources below the diaphragm, cervical and thoracic spine infections, as well as postsurgical etiologies(8). Tuberculosis is still the most common cause leading to fibrothorax requiring pleural decortication followed closely by pyogenic lung infections and trauma.(9)

The American Thoracic Society divides empyema into three phases, each of which might take 3-6 weeks to manifest. These stages are (I) exudative (acute), where the lung is compliance and will expand again after the effusion is removed; (II) fibrinopurulent; and (III) organized (chronic), where the visceral and parietal pleurae are completely or partially covered with a dense layer of fibrin (rind), which can result in restricted lung and loculated pleural effusions.(2,3,10–12)

The appropriate management of pleural empyema remains controversial. It should be managed properly by using enough systemic antibiotics to sterilize the empyema cavity, adequate pleural fluid drainage, and sufficient lung expansion. Thoracentesis, tube thoracostomy, VATS, open decortication, open thoracostomy, and vacuum assisted treatment are all options for pleural fluid drainage(10). Decortication is considered as a method of choice when there is thick inflammatory coat over the lung which prevents the lung to expand in which organization of the fibrinous clots into fibrotic peel could determine lung encasement. Decortication involves either VATS or open thoracotomy(11). VATS decortication showed superior out come in treatment of empyema thoracic when compared with open decortication in terms of post-operative advantages like less pain, morbidities, mortalities, and complications(13–16)

The following laboratory or clinical diagnosis of empyema thoracis can be made with any one of the following pleural fluid features irrespective of their origin: positive bacterial studies, glucose level below 60 mg/dL, pH below 7.20, or lactate dehydrogenase (LDH) more than three times the upper normal limit for serum, Frank pus at tapping (17) Medical imaging examination findings of pleural loculations and septations on ultrasound, or pleural thickening and enhancement on computed tomography (CT), can also suggest the diagnosis; however, the definitive diagnosis is a positive culture(18)

1.2 Statement of the Problem

Empyema remains a potentially serious condition with multiple etiologies including post-pneumonic, post-resection, and post-traumatic(19). It is an ancient disease that continues to be an important clinical problem. Despite the widespread use of antibiotics and availability of pneumococcal vaccines, empyema remains the most common complication of pneumonia and an important cause of morbidity and mortality worldwide. The incidence of empyema in the United States has been increasing since the 1990s(20). There are approximately one million patients hospitalized each year with pneumonia. Of those hospitalized, 20-40% have a parapneumonic effusion, and 5-10% of these parapneumonic effusions progress to empyema; Approximately 15% of these patients die, and 30% require surgical drainage of the pleural space(8).

Despite its potential benefits, the success rate of surgical decortication and the factors associated with its outcome remain unclear in Ethiopia. Therefore, this study aims to assess the surgical decortication outcome and associated factors among patients with empyema thoracic at a SPHMMC in Addis Ababa, Ethiopia, over a 5-year period. The findings of this study could inform clinical practice and policy-making in the management of empyema thoracic in Ethiopia and other low-income countries.

1.3 Significance of the Study

Early diagnosis and making timely surgical decortication can help to reduce morbidity and mortality of patients with empyema thoracis. The researches have shown that Recently, the incidence of empyema thoracis is increasing with a mortality ranging from 4.2 to 24%; further more could be as high as 25 to 75% in the elderly and debilitated patients which makes it an important cause of morbidity and mortality worldwide. In addition to that, in clinical practice, sequence of management of empyema thoracic remains controversial as a result patient rarely present in the “pure” stage and lack of adequate data on unfavorable outcome of specific procedures. Thus, assessing Surgical Decortication Outcome and associated factors among patients with empyema thoracic in different setup area is very important to reduce morbidity and mortality, determine the management's intended goal, change any modifiable risk factors, and decide the appropriate course of action. Moreover, on the base of my knowledge study conducted on surgical decortication outcome and associated factors among patients with thoracic empyema in Ethiopia, particularly at SPHMMC, is limited and also there is scarcity of literature review

that is why I am intended to conduct my study to assess decortication outcome and associated factors.

Therefore, this study aimed to identify Surgical Decortication Outcome as well as assess the factors that can be used to prognosticate the outcome of management of empyema thoracis in Ethiopia.

2. Literature Review

2.1 Theoretical background of empyema and its management

The term "empyema" describes pus in the pleural space, which is frequently brought on by adjacent pneumonia, pulmonary TB, injury to a chest wall, or a sequel of thoracic procedure. About 2,400 years ago, it was originally diagnosed and treated by Hippocrates 2,400 years ago. So it is a well-known disease that significantly increases the morbidity and mortality associated with pneumonia.(18,21)

Several studies have shown that management of empyema thoracic varies on the stage and severity of the disease, although in advanced instances when medical treatment has failed, either open or VATS surgical decortication is frequently required.(8,18,22)

Decortication is the surgical procedure that eliminates thickened pleura from the lung and chest wall, as well as that pleura's stuffed effusion or empyema sac. It has been carried out for more than 70 years to treat non-tuberculous illness. Delorme, the brilliant chest surgeon who pioneered the procedure, likely performed the first real decortication in 1895. Three large areas where it is indicated are pyogenic empyema, tuberculous empyema and the clotted hemothorax (traumatic empyema).(23,24)

2.2 Epidemiology, Complications and Types of empyema thoracis

Several studies have found that incidence of empyema thoracic is increasing and become public health problem. For instance, in 2006 Light, R. W. reviewed on "Parapneumonic effusions and empyema" and found that there are approximately 1 million patients hospitalized in the United States each year with pneumonia. Of those hospitalized for pneumonia, 20% to 40% will develop a parapneumonic effusion, and 5% to 10% of these parapneumonic effusions will progress to an empyema; Approximately 15% of these patients with empyema die, and 30% require an operation in their chest to clear the infection making in the hospital mortality rate in the adult population approximately 16.1% (3,8,17). In 2016 further study in Japan elucidated that 2,833 cases of empyema and hospital mortality rate of 6.9% (25). In both studies incidence of empyema thoracic is increasing but in hospital mortality rate is better in Japan than in USA.

Several studies found that Hemorrhage, Persistent air-leak and bronchopleural fistula, Persistent lung collapse, Injury to vital structures, Retained infective focus and sepsis, Severe postoperative

pain, Chest wall deformity and scoliosis are most commonly encountered procedure related post-operative complications(9,24,26,27). Another cross-sectional studies which was done at TASH in Ethiopia showed 58.1% of patients has developed one or more complications during or later in subsequent days. Eventually those authors concluded that early identification of TE and aggressive management with antibiotics or antituberculosis, drainage with chest tube, and surgical treatment when closed tube drainage fails is recommended to improve the high mortality and morbidity.(28,29)

According to non-randomized retrospective study conducted in Denmark 2011 showed a number of factors including predisposing conditions, noso-comial infection, insufficient initial antimicrobial therapy, lack of fibrinolytic therapy, longer illness duration, older age, intrapleural thrombolysis, and thoracic surgery that have been linked to unfavorable outcomes(30). Another research revealed comorbidities as independent risk factors for postoperative complications and death, including heart failure, chronic obstructive pulmonary disease, Malnutrition and presence of preoperative bronchopleural fistulae and renal failure.(31,32)

In addition to patient-related factors, the surgical approach and technique can also affect the success of surgical decortication. for example, systematic review of 68 papers comparing video-assisted thoracoscopic surgery (VATS) with open thoracotomy conducted in UK found that VATS was associated with shorter hospital stay, less pain, and faster recovery, had higher treatment success, lower chest tube duration, reduced postoperative pain and complications including atelectasis, prolonged air-leak, sepsis and 30-day mortality(16). Moreover, another comparative study conducted in Ethiopia also showed that VATS is better than open decortication in terms of aforementioned favorable outcomes(4,33). Even though, this group of authors concluded that video-assisted thoracoscopic surgical decortication is superior to open surgery in the management of adults with primary empyema, some studies showed opposite results; for instance, systematic review conducted in Japan 2020 found no superior results with VATS versus open surgery decortication in the treatment of thoracic empyema. Therefore, VATS and open thoracotomy decortication can be recommended in the surgical management of thoracic empyema; In advanced empyema patients, VATS can be easily leaded to the conversion to an open surgery. Another systematic review and meta-analysis done in Iran 2018 has revealed of 1120 patients who underwent VATS treatment 252 patients converted to OTD making

conversion rate 22.5%. Although VATS has shown far superior than OTD in terms of operative time and length of hospital stay, it has higher conversion rate to OTD, with no additional benefits in terms of mortality, prolonged air leakage, wound infection, and recurrence rates(34).

According to these authors, issue of empyema thoracic management regarding timing and the best surgical approach still remains area of controversies and debate even if some of recent guidelines support the use of thoracoscopic surgery in stage II-III empyema. So, it requires controlled clinical trials to develop guidelines. (10)

One single center retrospective study conducted in 2018 in India on outcome of surgical management of empyema thoracis found history of infection with tuberculosis (42%), pyogenic (28%) infection and history of trauma (12%)(9); Similar study which was done in Gondar university hospital and TASH in Ethiopia showed the Causes of empyema were pulmonary tuberculosis (56%), pneumonia (36%) and lung abscess (7%)and Thirty-seven (59.7%) patients tuberculosis, followed by trauma12(19.4%) and pneumonia 11 (17.7%) (35) respectively implying that empyema thoracis owing to infection is still the most typical indication for pleural decortication in nations with limited resources; among infectious causes Tuberculosis being most common leading cause of thoracic empyema that requires pleural decortication followed by pyogenic lung infections and trauma, though in the developed countries traditional indication has changed from infection to trauma(28).

2.4 Clinical characteristics, Duration of complaints and predisposing factors

According to the cross sectional study conducted in India, in 2018 most of the patients suffered from cough (88%), dyspnea (74%), fever (82%) and hemoptysis (22%). (9)

Another study conducted in university of Gondar, north west of Ethiopia also showed most common presentations were productive cough, 97.5% fever 93.8%, weight loss (79%), chest pain (77.92%)shortness of breath (75.3 2%)-night sweating (71.62%)and hemoptysis (27.2%) as well as the mean duration of symptoms prior to presentation was (97.4) days, and common comorbidity being HIV/AIDS 60%(35). Similar study which was conducted at TASH showed average duration of complaints prior to presentation was (8.02 +/- 4.37) months from the onset of symptoms (range from 1-16 months) and the most presenting complaints being shortness of breath 43(69.4%), cough 43(69.4%), chest pain 47(75.8%), fever 30(48.4%), weight loss 21(33.9%) poor appetite 9(14.5%) and hemoptysis 1(1.6%). (28). Hence all authors found that

cough, dyspnea and hemoptysis were most common presenting complaints. However none of them demonstrated causal link between duration of presentation and management outcome.

2.5 Conceptual framework

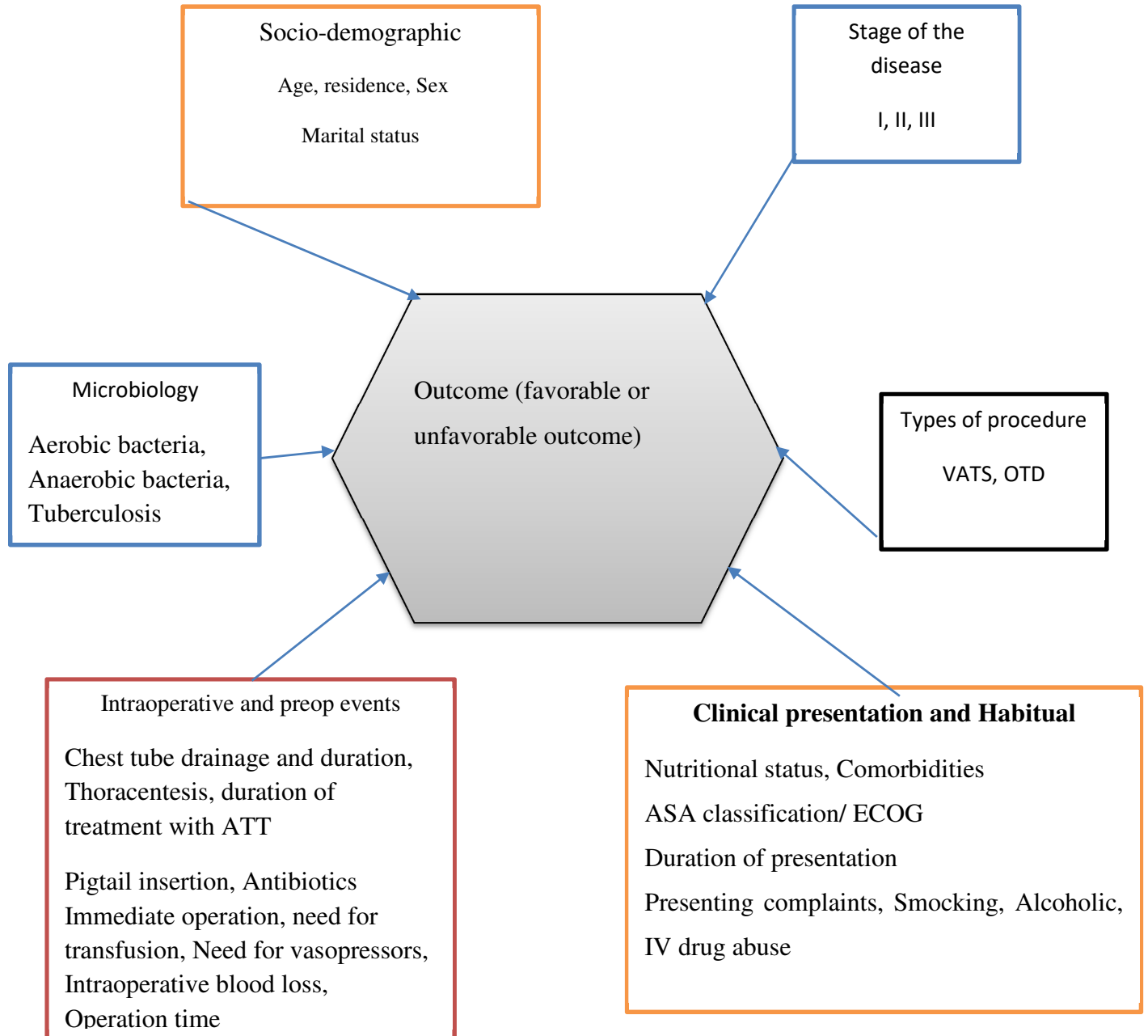


Figure 1.1 Conceptual framework adapted from literature reviews

3. Objectives

3.1 General Objectives

To determine the outcome of decortication and associated factors Among patients with empyema thoracis at A Tertiary Hospital, Addis Ababa, Ethiopia,

3.2 Specific Objectives

To evaluate the outcome of decortication for patients with empyema thoracis at SPHMMC Addis Ababa, Ethiopia 2015 E.C

To determine factors associated with outcomes among patients managed surgically for empyema thoracis at A SPHMM, Addis Ababa, Ethiopia, 2015E.C

To provide recommendations for improving the success rate of decortication for empyema thoracis and reducing the incidence of complications SPHMMC Addis Ababa, Ethiopia 2015 E.C

4. Methods

4.1 Study Design

A health facility based, cross sectional study design using record review was conducted.

4.2 Study Area and Study Period

In Addis Ababa, Ethiopia, at St. Paul Hospital, the study was carried out. The largest public hospital, St. Paul Hospital, which was established in 1969 and serves as a teaching and tertiary referral facility since 2007. The study was conducted from sene 22 to pagumen 1, 2015 E.C

4.3 Source Population

All patients with empyema thoracis at SPHMMC registered between May 1, 2010 and April 30, 2015 E.C at St. Paul Hospital.

4.4 Study Population

Patients who underwent decortication between May1, 2010 and April 30, 2015 E.C and meet the eligibility requirements.

4.5 Inclusion Criteria

Thoracic empyema patients for whom decortication was done at St. Paul hospital. Patients registered with full information including age, sex, diagnosis, stage, Region as well as diagnosed by CT scan with formal reading, pus upon aspiration or culture in the registration book or in the chart are considered to be eligible for the study.

4.6 Exclusion Criteria

Patients card with incomplete information at registration, lacking of clear definition/ stage of empyema, complete outcome/complication/conversion data list

4.7 Sample Size

All patients who underwent decortication in the three years period starting from May 1, 2010 to April 30, 2015 E.C. was included in the study.

4. 8 Sampling Method

All eligible patients with thoracic empyema whose chart be find during the data collection period was included in this study.

4.9 Measurement

4.9.1 Dependent Variables

Outcome (favorable or unfavorable outcome)

4.9.2 Independent Variables

Age of patient at diagnosis

Sex of patient

Marital status patient

Etiology of empyema

Duration of illness

Stage of empyema at diagnosis

Nutritional status

Comorbidities

ASA classification/ ECOG

Type of decortication

4.10 Data Collection Procedure and Data Quality Management

4.10.1 Data Collectors

Before the actual data collection, the principal investigator assessed patients 'chart for relevant variables on the chart and based on data extraction tools prepared the data was extracted and collected by trained general medical practitioner

4.10.2 Data Collection Procedure

Before collecting the data, the charts of patients was identified by their medical record number and then, data collector extracted and reviewed the charts.

4.11 Operational Definitions:

Unfavorable outcome: Unfavorable outcome is defined as the occurrence of one or more of the following conditions within 30 days of surgery: the persistence or deterioration of empyema

thoracic symptoms and signs, including fever, chest pain, dyspnea, cough, and radiological findings; the need for reoperation or drainage or death.

Favorable Outcome: Thoracic empyema successfully resolved in accordance with the following standards: complete disappearance of symptoms (cough, dyspnea, fever, and chest discomfort); Radiographic results have improved (pleural fluid or abscess size has shrunk); No need for additional procedures (such as a second operation or drainage).

Postoperative length of stay was defined as the number of days from initial operative intervention to discharge.

Death was defined as in-hospital or 30-day mortality from the procedure.

Readmission was defined as readmission to any hospital within 30 days from surgery or discharge

Decortication is the term for the surgical technique used to remove the fibrous membrane or peel that surrounds the lung and is the cause of the empyema.

Empyema thoracis: Empyema thoracis will be defined as the presence of pus in the pleural cavity, confirmed by radiological or clinical examination.

4.12. Data Quality Control and Management:

Discussion made to data collector regarding the tools, objectives of the research and how to maintain the quality of the data for two days before data collection time. The principal investigator supervised every aspect of the review. The Review checklist was collected in daily basis and checked for completeness by the principal investigator closely.

4.13 Data Analysis Plan and Procedures

Analysis differed from data extraction formats that have inconsistent, incomplete data and that wasn't fully filled with the information on the patient's chart. Data was entered using EpiData version 3.1 and exported to SPSS version 26 for analysis. Basic descriptive analyses like frequency, proportion, mean and median were done.

And also, binominal logistic regression was done to determine factors associated with treatment outcome at p-value of 0.05

4.14. Ethical Consideration

Ethical clearance was obtained from SPHMMC ethical committee and a support letter was submitted from the hospital. All information obtained from the patients' card records kept anonymous. There was no conflict of interest

4.15 Dissemination of Results

The final result of this study was disseminated to SPHMMC and concerned bodies

Chapter V: Budget Breakdown

Table 1 Shows the distribution of budgets for each personnel and materials

S/N	ITEMS	MEASUREMENT	QUANTITY	UNIT PRICE	TOTAL
	Pen	pieces	10	15	150
	Notebook	Pieces	5	75	375
	Marker	pieces	5	45	125
	Photocopy fee	Pieces	356*3	2	2,136
	Data collectors fee	Per day	3*30	200	18, 000
	Supervisor fee	Per day	1*30	250	7, 500
	Refreshment				500
	Contingency 5%				1439.3
	Total				30225.30

6. Work plan

Table 2 shows the distribution of the activity to be done with the corresponding of its time period

Tasks	march	April	may	June	July	August	September	October
Submit topic selection								
Topic approval								
Draft submission to advisor								
Proposal defense								
Final proposal, revision and submission								
Data Collection then analysis								
Thesis writing								
Draft research paper submission to advisor								
Research paper submission to research office								
Research paper defense								
Final paper submission								

Chapter VII: Results and Discussion

7.1: Results

7.1.1: Socio-demographic characteristics of Respondents

In the study a total of fifty-three (53) patients who underwent surgical decortication were included in the study. The mean age of the respondents was 38.08 years with standard deviation of 13.848 years and minimum and maximum age was 19 and 77 years respectively.

Of the total study subjects 41(77.4%%) were male and 12 (22.6%) were female and majority of patients came from Addis-Abeba 25(47.2%) and Oromia region 16 (30.2%). Regarding to the marital status majority of respondents are currently married 30 (56.6%) and 36(67.9%) came from urban areas making it more commonly affected than rural population

Table 3: Shows Socio-demographic characteristics of respondents,

Variable Name and Category				N	Percentage (%)
Address	Addis-Abeba			25	47.2
	Oromia			16	30.2
	Amhara			6	11.3
	SNNPR			6	11.3
Residence	urban			36	67.9
	rural			17	32.1
Marital status	Married			30	56.6
	Single			23	43.4
Sex	male			41	77.4
	female			12	22.6
Age	N	Minimum	Maximum	Mean	Std. Deviation
	53	19	77	38.08	13.848



Figure 2: The proportion of patients who underwent decortication by region from where they came in Ethiopia, 2015EC.

7.1.2 : Analysis of Clinical characteristics and Duration of complaints

The most common symptoms complained were cough 46(86.8%), fever 40(75.5%), weight loss 27(50.9%) shortness of breath 23(43.3%), chest pain 17(32.1%) and other least complaints were Appetite loss 3(5.7%) and hemoptysis 2(3.8%). On our study right side of the lung 31 (58.5%) more frequently affected than the left one 20(37.7%) and there were two patients with bilateral empyema 2(3.8%). Of 53 study subjects 21(39.6%) diagnosed to have TB empyema as cause, followed by Pneumonia 16(30.2%) and traumatic covering 13(24.5%); post-operative empyema being 3(5.7%). Forty-seven patient denied history of substance use while five subjects claimed to have history of current smocking and one patient was both smoker and alcoholic. Among study subjects thirteen patients had history of comorbidities making (24.5%) hypertension 7 (53.8%) and HIV/AIDS 3(23.1%) being the most common illnesses. Overall average duration of symptoms before presenting to our hospital was 4.45 months $\pm$ 5.27. In this study average hospital stay was 15 days ranging 4 to 60 days with SD of 11.29

Table 4: Shows Analysis of Clinical characteristics and Duration of complaints

Shortness of breath	Yes	23	43.3
	No	30	56.6
	Total	53	100
Weight loss	Yes	27	50.9
	No	26	49.1
	Total	53	100
Fever	Yes	40	75.5
	No	13	24.5
	Total	53	100
Cough	Yes	46	86.8
	No	7	13.2
	Total	53	100
Chest pain	Yes	17	32.1
	No	36	67.9
	Total	53	100
Appetite loss	Yes	3	5.7
	No	50	94.3
	Total	53	
Hemoptysis	Yes	2	3.8
	No	51	96.2
	Total		
Affected side of the chest	Right	31	58.5
	Left	20	37.7
	Bilateral	2	3.8
Causes of empyema	TB	21	39.6
	Parapneumonic	16	30.2
	Post op	3	5.7
	Traumatic	13	24.5
Stages of empyema	Stage I	4	7.5

		Stage II		21	39.6
		Stage III		28	52.8
		Total		53	100.0
Comorbidities		HIV/ADIS		3	5.7
		DM		2	3.8
		HTN/CV diseases		7	13.2
		ESRD		1	1.9
		Total		13	24.5
Substance users		Only Smokers		5	9.4
		Only Alcoholics		0	0
		Both		1	1.9
		Neither		47	88.7
Types of surgery		OTD		47	88.7
		VATS		6	11.3
		Total		53	100.0
Anti TB treatment		Yes		19	90.5
		No		2	9.5
		duration	2-5month	5	17.6
			6 and above	14	82.4
	N	Minimum	Maximum	Mean	St. Deviation
Duration of illness in months	53	1	24	4.45	+/_ 5.27
ICU stay in day	3	1	13	8.66	+/_ 6.65
Total hospital stays in days	53	4	60	15.037	+/_ 11.29

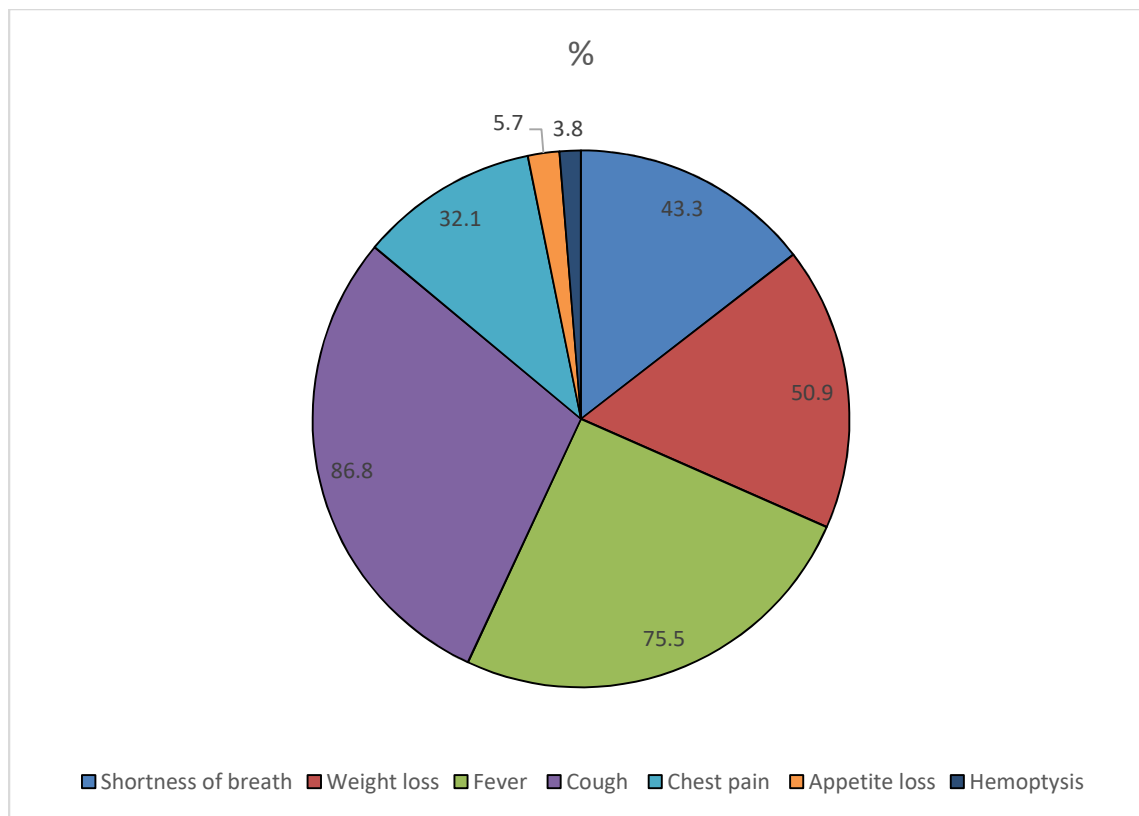


Figure 3: Shows The common presentations of patients with empyema thoracis at SPHMMC, Addis Abeba, central, Ethiopia, 2015EC.

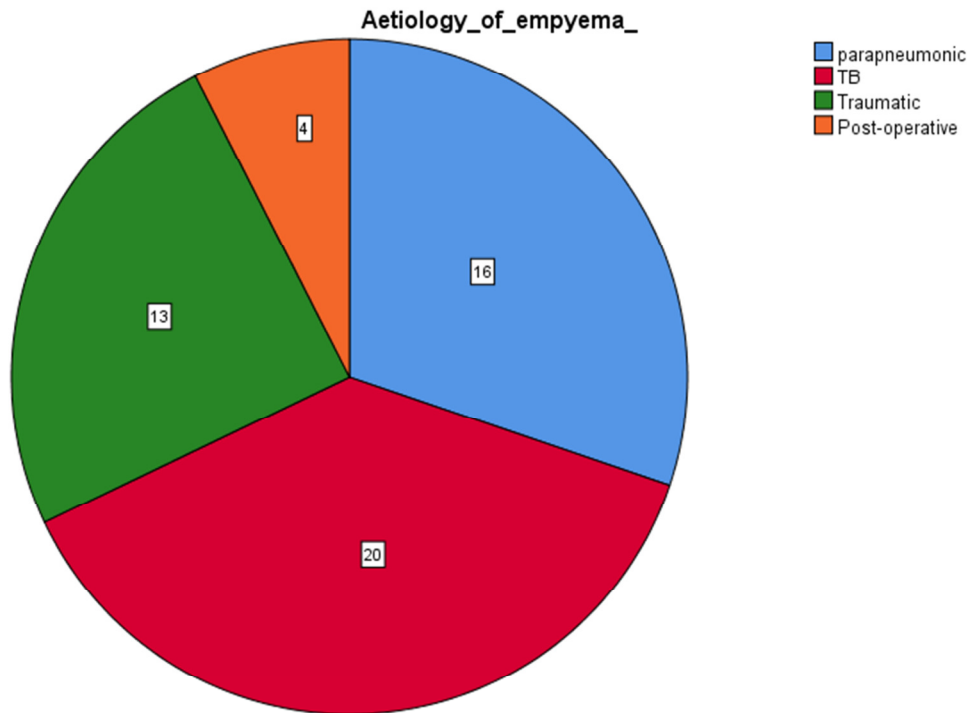


Figure 4: shows the proportion of patients by etiology of empyema at SPHMMC, Addis Abeba, Ethiopia, 2015EC

7.1.3: Analysis of laboratory results and imaging findings and modalities of diagnoses

All patients were diagnosed with history, physical examinations, and imaged with chest x-ray and CT scan, the most common findings being massive bilateral pleural effusion and thickening and calcification of pleura suggesting empyema thoracis. As well those patients investigated with basic laboratory tests and culture and sensitivity as well as gram staining. Of five patients who were investigated with culture and sensitivity, one become positive and pseudomonas and Klebsiella pneumonia were detected. Forty-six (86.8%) patients had follow up imaging of which 45(84%) found to be well expanded lung.

7.1.4: Analysis of types, frequencies of complications, intervention pattern and Outcome of Surgical Management

In majority of patients 39(73.6%) surgery completed without intraoperative events, but there were minor incidents 14(26.4%). The most frequent complications that arose after surgery were bleeding 9(17%) followed by BPF 5(9.4%). About 18(34%) patients needed blood transfusion and 3(5.7%) of patients transferred to ICU for monitoring and better care where they stayed average 8.66 days raging 1 to 13 days with SD of 6.65 days. Of 21 patients with TB empyema 19(90.5%) were treated with anti TB, among whom 14(82.4%) completed treatment. Twenty-eight patients were treated with both chest tube and antibiotics covering (52.8%) while

19(35.8%) treated with antibiotics only and 5 (9.4%) were operated immediately. In majority of patients 47(88.7%) open thoracotomy and decortication was done and about 6(11.3%) patients underwent VATS. All patients with intra operative persistent air leak was treated with pneumorrhaphy.

Of all study subjects, who were on follow up at our hospital during subsequent month, 2(3.8%) had complained no improvement, while 51(96.2%) had shown clinical and radiologic improvement.

Table 5: shows post op complications of decortication for empyema thoracis patients

BPF	Yes	5	9.4
	No	48	90.6
Bleeding	Yes	9	17
	No	44	83
Need for transfusion	Ye	18	34
	No	35	66
Transferred to ICU	Yes	3	5.7
	No	50	94.3

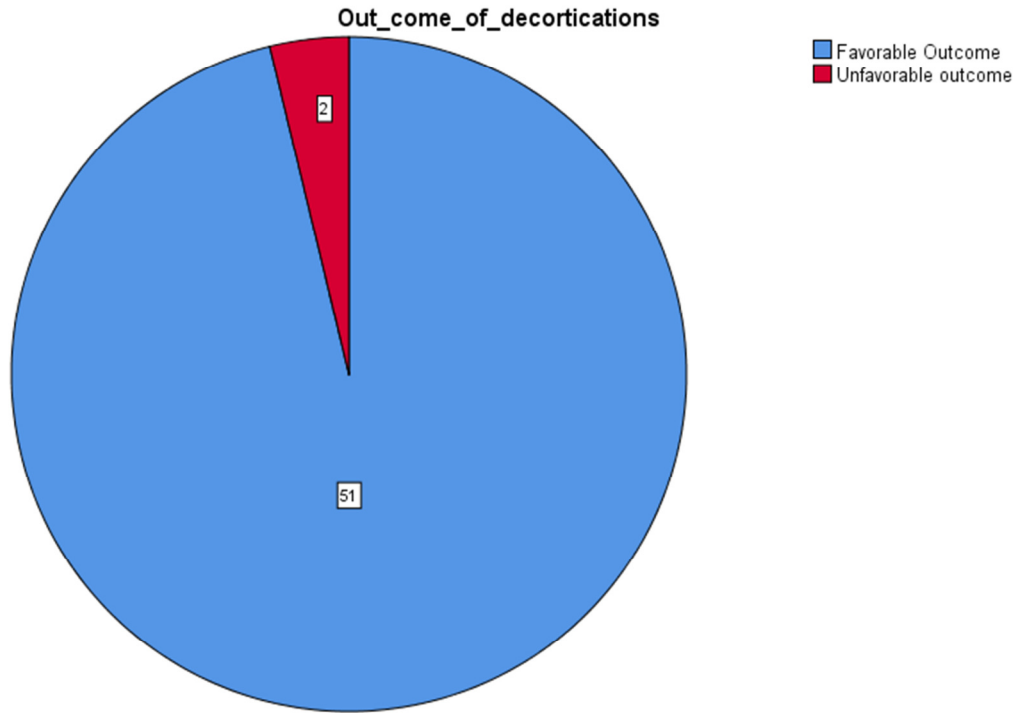


Figure 5:shows Surgical decortication outcome for patients with empyema thoracis, at addis Abeba, Ethiopia, 2015 E.C

7.1.5: Factors associated with surgical decortication outcome for empyema thoracis

In this study many factors were analyzed by using binary logistic regression was performed to determine how Age of the patients, duration of the illness, causes of empyema, stages of empyema, comorbidities, residence, address of the patients, substance uses, duration of the surgery, intraoperative blood loss, and affected sides of the chest affect surgical decortication for outcome for patients with empyema thoracis. A total of 53 patients were enrolled in the analysis. There is no multicollinearity among independent variables and no extreme outliers found. The model explained 32.5% of the variation in management outcome and correctly classified 80.5% of the cases, but the study found out that there were no variables, statistically significant predictors for adverse outcome of surgical decortication for empyema thoracis.

Table 6: shows Binary logistic regression Analysis of Associated Factors with surgical decortication outcome for empyema thoracis

Variable		Sig.	Exp(B) OR
Residence	Urban	1.000	807737421.426
	Rural	.989	
Comorbidities	HIV/ADIS	.999	807737421.426
	HTN/CVD	.880	1.250
	DM	.571	2.000
	ESRD	.989	
Etiology of Empyema	TB empyema	.993	1.008
	Pneumonic	.693	.743
	Traumatic	.999	1003781528.097
	Post-OP	.977	.205
Affected side of chest	Right	1.000	
	Left	1.000	72.241
	Bilateral	.998	8633119513050052600.000
Duration of illness in months		1.000	.781
Intraoperative_blood_loss_ml		.203	.990
Age		.596	1.028
sex	Male	1.000	
	Female	.431	3.184
Address	Addis -Ababa	1.000	
	Oromia	.942	.887
	Amhara	.999	.000
	SNNPR	.999	.000
Habitual substance uses	Alcoholic	.214	
	Smocking	.079	.054
	IV drug users	1.000	.000
Stages of Empyema	I	.392	3.734
	II	.614	2.149
	III	.928	1.155

7.2: Discussion

This A health facility based, cross sectional study design using record review, with the objective to determine the outcome of decortication and associated factors Among patients with empyema thoracis at A Tertiary Hospital, Addis Ababa, Ethiopia.

Many authors recommend conservative management for patient with empyema thoracis in developing countries regardless of the stages. A successful outcome is mostly dependent on a well-executed procedure that is used at the appropriate time, even if contemporary supportive care and antimicrobial medication are also vital(36). Evidence from this study indicated that 90.6% of patients were initially treated with either tube thoracotomy or antibiotics alone or with both at SPHMMC which finally underwent decortication due to failed management, similar study which was done at black lion hospital showed similar findings 95.2% implying decortication to be considered timely to minimize associated hospital stay and morbidity specially for early stages of empyema thoracis(28). Furthermore, in our study, majority of patients presented with stage III empyema covering 52.8% which might be due to delay in diagnosis or long waiting list for admission and management obligating VATS (11.3%) difficult and favoring OTD (88.7%)

Similar to other studies done in developing countries, our study also revealed TB as the most common cause of empyema covering 39.6% which is lower when compared with study done TASH.

In this study average hospital stay was 15 days ranging 4 to 60 days in contrast to similar study done at TASH where average hospital stay was 23days (7-70 days). These differences may be attributed to the time gap and that there could be improvements in health care access and utilization of health care services through time. Similarly, the difference could also be due to variation in preoperative management where almost all of their patients were managed with tube thoracotomy demanding additional hospital stays. Moreover, the overall average duration of symptoms before presenting to our hospital was 4.45 months raging, with significant variation when compared with similar study done at TASH which might emanated from majority of our study participants were from urbanized areas, having relatively better opportunity to access health care service information and practices.

Evidence from this study indicated that of all study subjects, who were on follow up at our hospital during subsequent month, 2(3.8%) had complained no improvement, while 51(96.2%) had shown clinical and radiologic improvement which is similar to the study done at TASH signaling impact of surgical decortication as part of management.

In our study, twenty six percent of patients developed intraoperative complications and no mortality which is low when compared with similar study done at TASH were fifty eight percent of intraoperative events and two deaths, however,

In contrast to other studies done previously At TASH which showed this study has not found any statistically significant association between the predictors and outcome of surgical decortications.

Chapter VIII: Conclusion and Recommendation

8.1 Conclusion

For the treatment of empyema, surgical decortication be it open or VATS is a well-established procedure founded on reliable surgical concepts.

Managing patients merely with tube thoracotomy and antibiotics, ended up with incomplete drainage of abscess demanding additional management and elevating morbidity and hospital stay. Hence consideration of decortication as part of initial management might improve final outcome even if it needs comparative studies to decide.

We have found majority of patients were managed by open thoracotomy and decortication with small number being managed with VATS which needs adequate sample size to compare their efficiency based on outcome.

Our study failed to detect any significant association between factors and adverse surgical outcome.

We also found that there is gap in data handling, majority of patients whether not investigated with culture and sensitivity or result was not documented.

Our study revealed Majority of our patients reported clinical and radiological improvement after decortication.

8.2 Recommendation

Based on the findings of this study, the following recommendations were made: -

- This study showed that significant proportion of patients underwent decortication after failed conservative management. Therefore, it would be better to consider as initial choice of procedure to enhance fast recovery.
- Majority of procedures are being done at few hospitals in the county, hence prolonging waiting list and time for intervention. So, it would be better to decentralize the service with provision of training for General surgeons
- Hospitals should have to produce guidelines when and how to manage patients with empyema thoracis

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8. Annex

8.1. Annex I: Information Sheet

Research Title: cross sectional study on Assessment of Decortication Outcome and associated factors among patients with empyema thoracic at a tertiary hospital, Addis Ababa, Ethiopia, from 2010 to 2015 E.C: A five-year retrospective study

Principal Investigator (PI): Tsedeke Tulicha (MD, General Surgery Resident)

Phone: +251-913190587

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Dr. Birhanu Hailemariam (MD, General and Cardiothoracic Surgeon, Assistant Prof. of Surgery)

Dr. Esubalew Tadesse (MD, General Surgeon, Assistant Prof. of Surgery)

Sponsor: St. Paul's Hospital Millennium Medical College

8.2 Annex II: data collection format

8.2.1 Socio-demographic and Clinical characteristics of a patient

S/No	Questions	Response and Coding	Skip/go
101	Code	_____	
102	Age	_____	
103	Sex	M/ F	
104	Marital status	1. Married 2. Single 3. Divorced 4. Widowed	
105	Address	1. Addis Abeba 2. Oromia 3. Amhara 4. SNNPR 5. Tigra 6. Afar 7. Other specify	
106	Residence	1. Urban 2. Rural	
107	Comorbidity	HIV/AIDS DM Hypertension COPD Arrhythmia Liver cirrhosis Cardiovascular disease Other specify _____	
108	ASA class		
	ECOG		
109	Affected sides of chest	RIGHT or left or Both	

110	Duration of illness in month		
111	Presenting complaints	1. Cough 2. Fever 3. Weight loss 4. Hemoptysis 5. List of more than one Other specify _____	
112	Habitual	Smocking Alcoholic IV drug abuse	
113	Mode of diagnosis	1. Based on history and physical examination 2. Pleural fluid analysis 3. Biopsy 4. Sputum 5. X-ray and sputum 6. CT -Scan/MRI 7. Other specify	Possible to select more than one answer
	Imaging findings	1. CT-Scan/MRI 2. X-ray	
	Biopsy results	_____	

8.2.2 Laboratory findings

201	Cbc	Wbc		
		HGB/hct		
		Platelet		
		ESR		
		CRP		
		ALBUMN		
202	RFT	Cr.		
		BUN		
203	LFT	ALT		
		AST		
		ALP		
204	Pleural fluid biochemical analysis and gross appearances	LDH		
		PH		
		Glucose		

		WBC count		
		Gross pus		
205	Microbiology of pleural fluid analysis			
	Gram stain result:	+ve or -ve	If yes types of bacteria?	
	Aerobic bacteria	Gram negative organisms	P. aeruginosa K. pneumoniae E. coli Others	
		Gram positive organisms	S. aureus Viridans streptococci S. pneumoniae S.pyogenes Enterococcus faecalis	
	Anaerobic bacteria	Gram +ve	Peptostreptococci Bacteroides sp Others	
		Gram -ve		
206	Culture and sensitivity	+ve or -VE	Type of organisms	
207	Tuberculosis	GeneXpert	+ve or -VE	
		AFB	+ve or -VE	
		Culture result	+ve or -VE	

8.2.3 Preoperative, Intraoperative features and types of surgical procedures

301	Etiology of empyema	parapneumonic TB Traumatic Post-operative Other specify	
302	If Etiology is TB did he/she take anti-TB	1. Yes 2. No	
303	If yes how long (in month)	1. 1 month 2. 2 months 3. 3months 4. 4 months 5. 5 months 6. 6 months	
304	Number of TB treatment	1. Once 2. Two times 3. Three times	

		4. MDR TB	
305	Preoperative Treatments	Chest tube drainage Thoracentesis Pigtail insertion Antibiotics Immediate operation Other specify	
306	Duration of chest tube in situ pre-operatively		
307	Stages of empyema	I II II	
308	Types of surgery	VATS OTD	
309	Need for transfusion	Yes No	
310	Is yes Number of units	_____	
311	Need for vasopressors	Yes No	
312	If yes for above question, Dose of vasopressors?	_____	
313	Intraoperative blood loss (ml)	_____	
314	Operation time (min)	_____	

8.2.4 Postoperative mortality

401	Re-expansion of the lung	1. Yes 2. No
402	Redo surgery (bleeding)	1. Yes 2. No
403	Postoperative air leak (days)	1. Yes 2. No
404	Reoperation resulting from treatment failure or recurrence	1. Yes 2. No
405	Additional postoperative drainage procedure?	1. Yes 2. No
406	If yes for above question what procedures were done?.....	
407	VATS to OTD Conversion	1. Yes 2. No

408	If yes for above question reason why?	
409	Was the patient transferred to ICU Postoperatively?	1. Yes 2. No
410	If yes for above the question, duration of ICU stays in days	_____
411	Postoperative length of stay (days)	_____
412	Duration of Chest tube in situ (days)	_____
413	Did the patient developed Postoperative respiratory failure?	1. Yes 2. No
414	If yes mention reasons?	
415	Postoperative pain	1. Yes 2. No
416	Total Length of Hospital stay in days	_____

8.2.5 Procedure related Complication

501	Was there any Procedure related Complication occurred?	1. Yes 2. No
502	If yes what are those complications? 1. Lung resection 2. Lobectomy 3. Pneumonectomy 4. Diaphragmatic injury 5. Phrenic nerve injury 6. BPF 7. Surgical wound infection 8. Bleeding 9. Recurrent empyema 10. Others	

Postoperative follow up status

601	Were pulmonary functions done?	If yes
602	If yes what are those testes and their findings?	
603	Were there follow up imaging?	If yes type of imaging and
604	Was there change in lung expansion?	

8.3. Annex III: Assurance of Investigator

I agree to accept all responsibilities for the scientific and ethical conduct of the research project. I will provide a timely progress report to my advisor and seek the necessary advice and approval from my primary advisors in the course of the research. I will communicate timely to my advisors and all stakeholders involved in the study including any source of funding for this research.

Name of the student: Tsedeke Tulicha, MD, General surgery resident

Signature: _____

Date: _____

Approval of the Primary Advisors

1. Name of advisor: Dr. Sisay, Bekele (MD, General and Cardiothoracic Surgeon, Assistant Prof. of Surgery)

Signature: _____

Date: _____

2. Name of the advisor: Dr. Birhanu Hailemariam (MD, General and Cardiothoracic Surgeon, Assistant Prof. of Surgery)

Signature: _____

Date: _____

3. Name of advisor: Dr Esubalew Tadesse (MD, General Surgeon, Assistant Prof. of Surgery)

Signature: _____

Date: _____