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Original Article

Critical Conditions Leading to Empyema Thoracis Among Patients in Thoracic Surgery Ward, Lady Reading Hospital Peshawar

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Abstract

Background: Emphysema Thoracis, an infectious condition is a historically recognized clinical problem with annual incidence of up to 80,000 cases worldwide. Despite the advent of effective antibiotics it has considerably high morbidity and mortality in the population especially in low resource settings.
Objective: To determine underlying critical conditions leading to empyema thorasic among the patients admitted in Thoracic surgery ward, Peshawar.
Study type settings & duration: This cross-sectional descriptive study was conducted in Department of Cardiothoracic Surgery, Lady Reading Hospital, Peshawar from June 2019 to December 2019.
Methodology: Convenient sampling was done. After taking the informed consent, 112 patients fulfilling the inclusion criteria were included in the study. Data was entered and analyzed using SPSS version 20.
Results: Mean age of study participants was 52±6.72 years, while mean duration of disease was 5±1.64 years. Majority of the patients 62 (55.35%) belonged to age group 46-60 years while 50 (44.64%) patients were in age group of 18-45 years. Males were more frequently affected with 77 (68.75%) cases while 35 (31.25%) patients were female. As per common conditions, 74 (66.07%) patients had diabetes, 15 (13.39%) patients had HCV, 06 (5.35%) patients had renal failure, 10 (8.92%) patients had neoplasia and 07 (6.25%) patients had history of immunosuppressive drugs.
Conclusion: This study has detected several conditions that lead to the emphysema thoracis in our setup; however the most common among them is diabetes. To be more conclusive, multi-centered cohort study is required.
Key words: Empyema thoracis, thoracis surgery, underlying risk conditions.

Introduction

Pleural infection is among the important clinical problems with new cases of around 80,000/year world wide.[1] Around 20% of the people with this infection die and the similar proportion of the people require operative procedures to recover and then another year for complete elimination of infection.[2] Even though the antibiotics are there but still pneumonia is a threat for the infections like this.[3]

With prolonged delay in accurate treatment on later stages these effusions linked with the morbidities by the Para pneumonic effucions.[4]

For Para pneumonic effusion, antibiotics according to culture and sensitivity will suffice. In some cases at where there is a complication with Para pneumonic effusion,empyema intervention in the form of thoracentesis, tube thoracotomy, thoracoscopic intervention, surgery will be needed accordingly.[5]

In the pleural area the inflammation caused due by specified reasons is termed as Empyema thoracis (ET) or pyothorax. It is further responsible for the accumulation of exudation material in the pleural space.[6]

Commonly the Empyema thoracic in child's and adults population is due to Pleural Effusion and

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Authors Contribution

TA conceptualized the project. AB did the data collection. Literature search was done by AB*. AK & MA did the statistical analysis. AK, MA & AAS did the drafting, revision and writing of the manuscript.

later on requires surgeries and those surgeries then develop some complications.[7] The new cases of ET are continuously on the rise.[8]

Among several studies conducted in the cases of empyema, one study reported the 67% diabetes and 11.9% HIV among them.[9] Similarly, another study had reported that 37% patients had neoplasia and other serious issues like alcohol abuse.[10]

In our setup at Lady reading hospital, Peshawar number of cases of empyema thoracis being managed in thoracic surgical ward, however limited data is available on the underlying conditions and risk factors so as to make evidence based decision makings to work on modifiable risk factors, hence to reduce the morbidity and mortality in our population. These all factors impelled us to conduct a study to understand the critical factors/conditions responsible to lead empyema thoracis among the ward cases of Lady reading hospital.

Methodology

The cross sectional descriptive study was conducted in the thoracic surgery ward of the surgical department of Lady Reading Hospital, Peshawar. This study of six months duration was conducted from June 2019 to December 2019.

Sample size was calculated using WHO calculator taking 11.9%[9] frequency of Empyema Thoracis at 95% CI and 5% margin of error. Total calculated sample size was 112. Non-probability consecutive sampling technique was used.

Empyema Thoracis patients of both genders suffering with first ever episode of empyema between 18-60 years of age were included.

While patients with other concomitant site of infection in study (on physical examination) and patients with history of antibiotics intake in the last 48 hours and intervention in the thoracic cavity in 30 days before were excluded from the study.

Informed consent was taken from Empyema Thoracis patients prior to the start of the study. After the consent only cases that fullfil of inclusion criteria were enrolled.

The data was collected on pre-designed questionnaire which include data both on demographics and clinical parameters. Data was entered and analyzed using SPSS ver 20.

The ethical approval was taken for the study from the ethical review board of the Lady Reading Hospital, Peshawar.

Results

Mean age of enrolled patients was 52±6.72 years. Mean duration of disease was 5±1.64 years. Majority of the patients 62 (55.35%) belong to age group 46-60 years while 50 (44.64%) patients were in age group of 18-45 years. 77 (68.75%) patients were males while 35 (31.25%) patients were female patients.

As per critical underlying risk conditions statistically significant patients i.e. 74 (66.07%) had diabetes (p =0.001), 15 (13.39%) patients had HCV, 06 (5.35%) patients had renal failure, 10 (8.92%) patients had neoplasia and 07 (6.25%) patients had history of immunosuppressive drugs (Table-1).

Table 1: Frequencies of the different critical conditions among enrolled patients of empyema thoracis.

Critical factors	*F*	*%*	*p-value*
Diabetes	74	66.07	
HCV	15	13.39	
Renal issues	06	5.35	0.001
Neoplasia	10	8.92	
Immunosuppressive Drugs intake	07	6.25	
Total	112	100	

Identified underlying “Critical conditions” were compared with age, gender, socio economic status. With respect to the age group in co-relation with critical factors, diabetes was found to be the critical factor with 46 (41.71%) patients falling into the age group of 46-80 followed by 8 (7.14%)HCV in the age group of 18-45 years (Table-2).

Table 2: Distribution of critical factors among different age groups of empyema thoracis patients.

Critical factors		*Age Groups*		*p-value*
		18-45 Years	*46-60 Years*	
Diabetes	Yes	34	40	0.698
	No	16	22	
HCV	Yes	08	07	0.466
	No	42	55	
Renal issues	Yes	02	04	0.566
	No	48	58	
Neoplasia	Yes	04	06	0.756
	No	46	56	
Immunosuppressive	Yes	03	04	0.921
Drugs intake	No	47	58	

With respect to gender in co-relation with empyema, the diabetes was again found to be dominant critical factor leading to empyema thoracis and 47 (66.07%) males were mainly affected as compared to 27 (24.10%) females (Table-3).

With respect to socio-economic status, among the diabetic group, cases mostly 47 (41.96%) belonged to the poor socioeconomic class. Further details are given in Table-4.

Table 3: Comparison of different critical factors among both genders in patients of empyema thoracis.

Critical Factors		*Gender Groups*		*p-value*
		Male	*Female*	
Diabetes	Yes	47	27	0.095
	No	30	08	
HCV	Yes	11	04	0.680
	No	66	31	
Renal issues	Yes	05	01	0.428
	No	72	34	
Neoplasia	Yes	07	03	0.928
	No	70	32	
Immunosuppressive	Yes	02	05	0.017
Drugs intake	No	75	30	

Table 4: Distribution of critical factors among different socio economic groups of empyema thoracis.

Common Factors		*Socio Economic Status*			***p-value***
		Poor	*Middle*	*Rich*	
Diabetes	Yes	47	10	17	0.297
	No	19	09	10	
HCV	Yes	05	04	06	0.095
	No	61	15	21	
Renal issues	Yes	04	01	01	0.900
	No	62	18	26	
Neoplasia	Yes	08	01	01	0.359
	No	58	18	26	
Immunosuppressi	Yes	05	01	02	0.940
-ve Drugs intake	No	61	18	25	

Discussion

In this study, mean age of the affected patients with empyema thoracis were 52±6.72 years while mean duration of disease was 5±1.64 years. This finding is not in line with earlier study in which mean age was 55.4±20 years among the enrolled cases.[10]

Out of 112 patients, 62 (55.35%) patients were in age groups of 46-60 years age which is similar to the findings from another study.[11]

In one study the common critical factor found among enrolled patients of Empyema Thoracis was diabetes 74 (66.07%) which was in agreement with the finding from other study.[12] In addition to that, 15 (13.39%) patients had HCV, 06 (5.35%) patients had renal failure, 10 (8.92%) patients had neoplastic and 07 (6.25%) patients had history of immunosuppressive drugs. These findings are in line with another study in which 28 (66.7%) patients of Empyema Thoracis were diabetic, 5 (11.9%) were HCV positive and 7 (16.7%) had renal failure.[9] While a study conducted at Pakistan Institute of Medical Sciences that 37% of empyema thoracis patients had neoplasia, 15% were on treatment with immunosuppressive medication and 15% had history of alcohol use [9] which was contrary to our findings.

With respect to the socio-economic status of the patients in our study the majority of the cases belonged to poor socioeconomic group i.e. 47 (41.96%) and among them most common factor was diabetes which leads to the empyema thoracis. Findings of this study are in line with another study reporting 59 (83.9%) cases from poor socio-economic group.[13]

The empyema thoracis in this study was stratified by the age groups in co-relation with co-morbidities. In this study the 46 (41.71%) diabetics were mainly affected and they belonged to the age group of 18-45 age groups and this value was similar to another study.[14]

Furthermore among diabetic males, 47 (66.0%) had empyema thoracis which is similar to the findings of another study conducted in Taiwan.[14]

The most important intervention to prevent morbidity or mortality is the prevention of disease progression and adequate aggressive treatment.[8]

We conclude that diabetes increases the risk of developing empyema thoracis manifold. Further to be more constructive larger studies with larger nationally representative sample size should be conducted.

Conflict of interest: None declared.

References

1. Taylor MD, Kozower BD. Surgical spectrum in the management of empyemas. Thorac Surg Clin 2012; 22: 431-40.
2. Ferreiro L, San Jose ME, Valdes L. Management of parapneumonic pleural effusion in adults. Arch Bronconeumol 2015; 51: 637-46.
3. Tsai CH, Lai YC, Chang SC, Chang CY, Wang WS, Yuan MK, et al. Video-assisted thoracoscopic surgical decortication in the elderly with thoracic empyema:five years' experience. J Chin Med Assoc 2016; 79: 25-8.
4. Zumar NP, Sridhar R, Banurekha VV, Jawahar MS, Nutman TB, Babu S. Expansion of pathogenspecific T-helper 1 and T-helper 17 cells in pulmonary tuberculosis with coincident type 2 diabetes mellitus. J Infect Dis 2013; 208(5): 739-48.
5. Wilkosz S, Edwards LA, Bielsa S, Hyams C, Taylor A, Davies RJ, et al. Characterization of a new mouse model of empyema and the mechanisms of pleural invasion by Streptococcus pneumoniae. Am J Respir Cell Mol Biol 2012; 46: 180-7.

6. Elemraid MA, Sails AD, Eltringham GJ, Perry JD, Rushton SP, Spencer DA, et al. Aetiology of paediatric pneumonia after the introduction of pneumococcal conjugate vaccine. Eur Respir J 2013; 42: 1595–603.
7. Falguera M, Carratalà J, Bielsa S. Predictive factors, microbiology and outcome of patients with parapneumonic effusion. Eur Respir J 2011; 38: 1173-9.
8. Torbic H, Glasser N, Rostas SE. Intrapleural antimicrobial irrigation for postpneumonectomy empyema in patients with lung cancer. J Pharm Pract 2015; 28:469-72.
9. Tareen S, Yaseen M, Iqbal Z, Masoom A. Analysis of 42 consecutive cases of empyema thoracis. Ann Pak Inst Med Sci 2010; 6(4): 205-9.
10. Tsai YM, Gamper N, Huang TW, Lee SC, Chang H. Predictors and Clinical Outcomes in Empyema Thoracis Patients Presenting to the Emergency Department Undergoing Video-Assisted Thoracoscopic Surgery. J Clin Med 2019; 8: 1612.
11. Basil V, Manish J. Analysis Of 112 Consecutive Cases Of Thoracic Empyema Over A 19-Year Period. CHEST Journal. 2005; 128.
12. Zablockis R, Petruskeviciene R, Nargela RV. Causes and risk factors of pleural empyemaand complicated parapneumonic pleural effusion. Medicina Kaunas 2010; 46(2): 113.
13. *Ghaffar S, Khan IA, Asif S, Zia ur Rahman*: Empyema thoracis: management outcome.JAMC 2010; 22(3): 12-4.
14. Lai SW, Lin CL, Liao KF. Population-based cohort study investigating the correlation of diabetes mellitus with pleural empyema in adults in Taiwan: Medicine (Baltimore) 2017; 96(36): e7763.