Scientific Research Publishing

Open Journal of Respiratory Diseases, 2022, 12, 37-43
https://www.scirp.org/journal/ojrd
ISSN Online: 2163-9418
ISSN Print: 2163-940X

Destroyed Lung Syndrome: A Review of 31 Published Cases

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How to cite this paper: Osarenkhoe, J., Aiwuyo, H., Aisosa, O. and Ejiroghene, U. (2022) Destroyed Lung Syndrome: A Review of 31 Published Cases. *Open Journal of Respiratory Diseases*, **12**, 37-43.
https://doi.org/10.4236/ojrd.2022.122003

Received: January 18, 2022
Accepted: April 12, 2022
Published: April 15, 2022

Abstract

Background: Destroyed lung is a lung condition commonly caused by tuberculosis. Other causes include bronchiectasis, aspergilloma, emphysema, etc. It is characterized by extensive lung destruction and reduced lung function. Chest X-ray, chest CT, bronchography, and ventilation-perfusion ratio scan are the commonest radiologic diagnostic tools. Treatment of choice may include pneumonectomy. The study aims to highlight the common causes of destroyed lung and the major presenting complaints based on age, sex and affected lungs. **Method:** Published cases from English medical journals were evaluated and analyzed. **Results:** 31 published cases on destroyed lung were reviewed. 58.1% showed that the left lung was the most commonly affected lung. The condition was more common in males (71%). Based on our review, the commonest causes are pneumonia and tuberculosis at 25.9% and 22.8%, respectively. **Conclusion:** Pneumonia and Tuberculosis seem to be the commonest causes of destroyed lung based on our review, with left sided affectation being more predominant.

Keywords

Destroyed Lung, Tuberculosis, Bronchiectasis, Aspergilloma, Emphysema

1. Introduction

Destroyed lung is a term used to describe extensive destruction of the lungs [1]. Usually noted in radiological studies and characterized by markedly reduced ventilation to perfusion ratio [2]. Destroyed lung is often caused by inflammatory diseases; the commonest being tuberculosis [2] [3]. Other causes include bron-

chiectasis, emphysema, aspergilloma, and pneumonia [2]. Complications of destroyed lungs often include irreversible respiratory insufficiency, massive hemoptysis, empyema, secondary fungal infections, septicaemia and left-right shunt [1] [3] [4]. The contralateral lungs may show hyperinflation [4]. Chest X-ray, chest CT, bronchography, and ventilation-perfusion ratio scan are the commonest radiologic diagnostic tools [5]. Chest X-ray findings in affected lungs show, diffuse opacity with multiple cavities or a large single cavity [1] [6]. Although, a high-risk procedure, pneumonectomy may be indicated in the management of destroyed lungs to either resolve or prevent complications [2] [3].

2. Methods and Materials

We reviewed 31 published case reports of destroyed lung retrieved from PubMed and Google Scholar databases. For the purpose of our study, we examined cases whom a diagnosis of destructive lung was made by authors using radiologic criteria.

The major presenting complaint for destroyed lung was noted, however, we focused on respiratory failure and hemoptysis in our analysis because of its potential prognostic implications. Distribution of destroyed lung cases were noted across, sex and age groups.

Destroyed lung was classified according to which lung (s) was/were affected. For the purpose of the study: right lung, left lung or bilateral. The underlying conditions implicated in destroyed lung and how its association with the lung affected was also noted.

Statistical analysis was done using IBM SPSS version 26 and Chi-square test of independence as well as Goodness of Fit test was used to evaluate the level of significance (P-value). Significant result was set at P-value < 0.05.

3. Results

Table 1 shows that the most commonly affected side in destroyed lung is the left (n = 18, 58.1%), followed by the right (n = 11, 35.5%). 2 (6.5%) of cases had bilateral lung affectation.

Table 2 showed that more men (n = 22, 71.0%) than women (n = 9, 29.0%) had destroyed lungs. Even though statistical test showed no age predilection for destroyed lung (P = 0.07), it was more common among those less than 40 years (n = 16, 51.6%). Mean age = 38.29 ± 23.43.

Table 1. Distribution of affected lungs in destroyed lungs.

		n (%)	P-value
Affected lungs N = 31	Right	11 (35.5)	0.002
	Left	18 (58.1)	
	Bilateral	2 (6.5)	

P-value in Table 1 compares any significance difference between the prevalence of destroyed lung in the right lung, left lung or both (bilateral).

Table 3 shows the causes of destroyed lung with tuberculosis and pneumonia being the commonest at 25.8% and 22.9%, respectively. P = 0.05.

Table 4 showed that there was no significant association between affected lungs and the cause. However, bilateral affectation only occurred in cases caused by pneumonia (n = 2, 100%).

Table 5 shows that 82.8% of cases presented with respiratory failure while 24.1% of cases had a history of hemoptysis.

Table 6 shows that most of the cases presented with complaints of respiratory failure across sex, age category and affected lungs.

4. Discussion

Destroyed lung is a condition that describes a non-functional lung usually associated with recurrent or chronic lung infections [3] [4]. The commonest affected

Table 2. Distribution of destroyed lungs by sex and age category.

		n (%) N = 31	P-value
Sex of patient	Female	9 (29.0)	0.02
	Male	22 (71.0)	
Age category	<40 years	16 (51.6)	0.07
	40 - 65 years	9 (29.0)	
	>60 years	6 (19.4)	
Mean Age ± SD = 38.29 ± 23.43			

P-value in Table 2 compares any significance difference between the prevalence of destroyed lung between males and females, as well as the different age groups.

Table 3. Causes of destroyed lungs.

		n (%) N = 31	P-value
Underlying condition	Pneumonia	8 (25.8)	0.05
	Tuberculosis	7 (22.9)	
	Aspergillosis	4 (12.9)	
	Sepsis	2 (6.5)	
	Silicosis	1 (3.2)	
	BOS	1 (3.2)	
	Foreign body	1 (3.2)	
	Lung Ca	3 (9.7)	
	Emphysema	2 (6.5)	
	Tracheo/bronchooesophageal fistula	1 (3.2)	
	Mucormycosis	1 (3.2)	

P-value in Table 3 compares any statistically significant difference in at least two causes of destroyed lung.

Table 4. Association between affected lungs and causes lungs.

		Affected lungs					
		Right		Left		Bilateral	
		freq	%	freq	%	freq	%
Underlying condition	Pneumonia	2	18.18%	4	22.22%	2	100.00%
	Tuberculosis	3	27.27%	4	22.22%	0	0.00%
	Aspergillosis	1	9.09%	3	16.67%	0	0.00%
	Sepsis	1	9.09%	1	5.56%	0	0.00%
	Silicosis	0	0.00%	1	5.56%	0	0.00%
	BOS	0	0.00%	1	5.56%	0	0.00%
	Foreign body	0	0.00%	1	5.56%	0	0.00%
	Lung Ca	2	18.18%	1	5.56%	0	0.00%
	Emphysema	0	0.00%	2	11.11%	0	0.00%
	Tracheo/bronchooesophageal fistula	1	9.09%	0	0.00%	0	0.00%
	Mucormycosis	1	9.09%	0	0.00%	0	0.00%

($X^2 = 14.592$; df = 20; P = 0.799).

Table 5. Distribution of complaints at time of presentation.

		Presenting complaints	
		Hemoptysis n (%)	Resp failure n (%)
Sex of patient	Female (N = 9)	2 (22.2)	8 (88.9)
	Male (N = 22)	5 (22.7)	16 (72.7)
Age Category	<40 (N = 16)	5 (31.3)	12 (75.0)
	40 - 65 (N = 9)	2 (22.2)	7 (77.8)
	>65 (N = 6)	0 (0.0)	5 (83.3)
Affected lungs	Right (N = 11)	2 (18.2)	8 (34.8)
	Left (N = 18)	5 (27.8)	14 (77.8)
	Bilateral (N = 2)	0 (0.0)	2 (100.0)

Table 6. Distribution of presenting complaints across sex, age category and affected lungs.

		Responses		Percent of Cases
		N	Percent	
Presenting complaints[a]	Respiratory failure	24	77.4%	82.8%
	Hemoptysis	7	22.6%	24.1%
Total		31	100.0%	106.9%

side as stated by a number of literatures is the left lung [2] [7]. Our review showed a higher percentage (58.1%) affected the left lung than the right lung (35.5%). Whereas, 6.5% involved both lungs. More significant differences are

noted in other studies: Mısırlıoğlu AK *et al*. showed 74.4% affectation and Rajasekaran S showed 81.8% left lung affectation [2] [7].

Our review showed significant difference between male (71%) and female (29%) distribution of destroyed lung; P = 0.002, which corresponded to another study with significant sex predilection with male to female ratio at 70.5% to 29.5% [7]. Other studies showed no sex predilection in destroyed lung [2] [3].

Variability was noted in the mean age of cases with destroyed lung across different studies. The mean (±SD) ranged from 31.7 (±10.8) to 65.6 (±0.5) [3] [8] [9] [10] [11]. Our review showed a mean age of 38.29 ± 23.43. The variability in mean age seen across different studies could be as a result of the underlying cause of destroyed lung.

Some studies mention tuberculosis as the commonest cause of destroyed lung [2] [3]. However, bronchiectasis has been implicated in some research as the most common underlying condition leading to destroyed lung. Sayir F. *et al*. implicated bronchiectasis in 62.5% of cases and tuberculosis in 28.1% of cases [8]. Mısırlıoğlu AK *et al*. implicated bronchiectasis and tuberculosis in 51% and 34% of cases, respectively [2]. Halezeroglu S. *et al*. and Eren Ş. *et al*., also had bronchiectasis as the most common underlying disease in destroyed lung [5] [12]. Other commonly implicated underlying conditions include, pulmonary hypoplasia, necrotizing lung disease, aspergillosis, and foreign body aspiration [2] [3] [5] [8]. From our review, the commonest underlying condition was pneumonia (25.8%) and tuberculosis (22.9%). Aspergillosis and lung cancer were also implicated in 12.9% and 6.5% of cases, respectively. 1 case of foreign body aspiration was noted.

Hemoptysis and respiratory failure has been a recurring entity in destroyed lung, across studies [10] [11]. Moreso, respiratory failure, as it can be used to predict prognosis [10].

5. Conclusion

Overall, destroyed lung is generally caused by chronic lung infection, the commonest cause being tuberculosis and pneumonia. Affectation of the left lung is more common compared to the right, and occurs more in males, according to our study. Respiratory failure seems to be a more common presentation compared to hemoptysis. Although clinically, age predilection is noted in the disease, there is no statistically significant age predilection noted in the disease as well as the presenting complaints.

Recommendations

There is need to do similar studies using larger sample size.

Limitations of This Study

The sample size was highly limited because there are not a lot of individual published cases of destroyed lung on journals.

Acknowledgements

I hereby acknowledge Dr. Bassey, Aniekeme for his role in picking the appropriate statistical tool to analyse the collected data. He also played a role in proofreading and organising the content of this article.

Competing Interests

There is no competing interest.

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