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PULMONARY COMPLICATIONS OF LEPTOSPIROSIS IN A TERTIARY CARE CENTRE IN SOUTH INDIA

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Abstract

Introduction: Leptospira are motile microorganisms and are obligate aerobes with unique nutritional requirements for long-chain fatty acids. **Aim:** to study pulmonary complications of leptospirosis. **Methodology:** The study was designed as a prospective investigation focusing on patients admitted to the General Medicine Department and allied specialties at MOSC Medical College, Kolenchery, during the period from March 2012 to March 2013.The sample size for the study was set at 100 subjects. **Result:** Pulmonary Complications Occurred in 57% of patients, with a significant association observed with an increased respiratory rate ($p < 0.001$).Majority of patients were in the age group 41-50 years.68.4% of patients who developed pulmonary complications had platelet counts $\leq$ 1 lakh/mm^3 ($p < 0.001$). 59% of patients had serum creatinine levels > 1.4mg/dl, but no significant association with pulmonary complications was observed. our findings highlight the significance of respiratory rate and platelet count as potential indicators of pulmonary complications in leptospirosis patients. **Conclusion:** study underscores the importance of recognizing respiratory symptoms, ARDS, and other pulmonary complications in leptospirosis patients, as well as the critical role of tachypnea and thrombocytopenia as prognostic indicators, facilitating timely intervention and improved patient outcomes.

Keywords: ARDS, leptospirosis, pulmonary complications.

INTRODUCTION

Leptospira are motile microorganisms, 6 to 20 µm in length and 0.1 to 0.2 µm in diameter. They are obligate aerobes with unique nutritional requirements for long-chain fatty acids[1].There is a pathogenic (Leptospira interrogans) strain and a saprophytic (Leptospira biflexa) strain. The genus Leptospira includes 20 named species- 9 pathogenic, 5 intermediately pathogenic and 6 non-pathogenic. More than 250 serovars of the pathogenic and intermediately pathogenic Leptospira species cause disease in humans and animals. Virulence

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does not generally correlate with specific serovars, although serovar classifications can be useful epidemiologically to identify common-source outbreaks. The incidence of pulmonary involvement in leptospirosis ranges from 20% to 70%[2]. Leptospirosis has a mortality rate of about 5%,but ranges from 1 to 20%[3,4,5,6,7]. The mortality rate for Weil's disease is high. Death in severe leptospirosis often results from acute renal failure or pulmonary complications or from irreversible myocardial failure. Awareness about the infection among the public is scarce especially in the developing countries, as a consequence of which there is a delay in seeking treatment.A high index of suspicion prompting elicitation of detailed exposure history is critical and guides confirmatory testing. Turner's view in 1969 that "Laboratory investigations will rarely help the patient because they can seldom confirm the diagnosis in time to influence treatment" remains true even today 12 Leptospirosis should be suspected on the basis of an appropriate exposure history combined with any of the protean manifestations of leptospirosis. Failure to diagnose leptospirosis is particularly unfortunate. Severly ill patients often recover completely with prompt treatment, but if therapy is delayed or not given, complications or death are likely to ensue. As leptospirosis can be successfully treated by antimicrobial treatment, treating physicians should have high clinical suspicion of the disease especially in tropical countries like India.

Aim

To study pulmonary complications of leptospirosis

Methodology

The study was designed as a prospective investigation focusing on patients admitted to the General Medicine Department and allied specialties at MOSC Medical College, Kolenchery, during the period from March 2012 to March 2013. Written consent was obtained from all participating patients. The inclusion criteria comprised individuals aged between 17 and 90 years who met the Modified Faine's criteria for leptospirosis. However, certain exclusion criteria were applied, including patients with pre-existing lung diseases, those undergoing dialysis for renal failure, individuals co-infected with HIV, patients taking immunosuppressants or cytotoxic drugs, and those suffering from decompensated liver disease. The sample size for the study was set at 100 subjects

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Variable definition: Pulmonary complications are defined as the occurrence of respiratory symptoms and/or an abnormal chest X-ray. ARDS /ALI is diagnosed as per American European Consensus Conference (AECC) criteria. Respiratory rate is defined as increased if more than or equal to 17 /min. Hypotension is defined as systolic blood pressure less than or equal to 90mm Hg or diastolic blood pressure less than or equal to 60mm Hg. Thrombocytopenia is defined as platelet count less than or equal to 1 lakh/mm3. Normal total leucocyte count is defined as count between 4000 and 11,000/mm3. Acute renal failure is defined as serum creatinine more than 1.4mg/dl. Lepto IgM is taken as positive for values >80. .

American European Consensus Conference (AECC) criteria for ARDS/ALI

The diagnostic criteria for ARDS and ALI are as described below :

1) ALI

-Acute onset

- PaO2 /FiO2 less than or equal to 300 mm Hg (regardless of PEEP)

- Chest X-ray – Bilateral alveolar or interstitial infiltrates seen on chest radiograph

- Pulmonary capillary wedge pressure <= 18 mm Hg when measured or no clinical evidence of increased left atrial pressure.

2) ARDS

Same as ALI except: PaO2 / FiO2 less than or equal to 200 mmHg (regardless of PEEP level)

Result

In this study, the maximum numbers of patients were in the age group 41-50yrs. The mean age of the patients were 46.44yrs. In this study pulmonary complications were observed in 57% patients with leptospirosis. No pulmonary complications were observed in 43% patients.

Table 1. Pulmonary complications- distribution and frequency

Pulmonary complications	**Frequency**	**Percent**
Present	57	57
Absent	43	43

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Table 2. Pattern of pulmonary complications

Pulmonary complications	**Frequency**
Respiratory symptoms	22
ARDS /ALI	18
Pleural effusion	11
Consolidation	6
Pulmonary oedema	3
Haemoptysis	2

Table 4. Distribution of respiratory rate (/ min)

Respiratory rate (/min)	**Frequency**	**Percent**
12- 16	68	68
17 or more	32	32
Total	100	100

Table 5.Respiratory rate and pulmonary complications

Pulmonary complications	Respiratory rate	
	12 to 16	
	N	%
Present	31	45.6
Absent	37	54.4
Total	68	100

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$\chi 2 = 11.29$ df=1 $p < 0.001$

Out of the 32 patients with respiratory rate 17 /min or more, 86% (26 patients) developed pulmonary complications. We observed a statistically significant relation between increased respiratory rate and occurrence of pulmonary complications ($p < 0.001$) in this study.

Table 6.Blood pressure and pulmonary complications

In this study, 64 patients (64%) did not have have hypotension at the time of admission, while 36% of the patients were in hypotension.

BP	Pulmonary complications				Total	
	Present		Absent			
	N	%	N	%	N	%
With hypotension	22	38.6	13	30.2	35	35
Without hypotension	35	61.4	30	69.8	65	65
.Total	57	100	43	100	100	100

$\chi^2 = 0.75$ df=1 p= 0.46

No significant relation was observed between hypotension and pulmonary complications .

Table 7.Platelet count and pulmonary complications

Platelet count (/mm3)	Pulmonary complications				Total	
	Present		Absent			
	N	%	N	%	N	%
<= 1 lakh	39	68.4	14	32.6	53	53

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>1 lakh	18	31.6	29	67.4	47	47
Total	57	100	43	100	100	100

In this study, we observed that 68.4% of patients who developed pulmonary complications, had a platelet count less than or equal to 1 lakh/mm3, while 31.6% of patients who had pulmonary complications had platelet count > 1 lakh/mm3. The relation between thrombocytopenia and pulmonary complications was statistically significant (p <0.001).

Table 8.Serum creatinine and pulmonary complications

Serum creatinine (mg/dl)	Pulmonary complications				Total	
	Present		Absent			
	N	%	N	%	N	%
<= 1.4	19	33.3	22	51.2	41	41
>1.5	38	66.7	21	48.8	59	59
Total	57	100	82	100	100	100

$\chi 2 = 3.22$ df=1 p= 0.06

In this study, 59% of patients had serum creatinine > 1.4mg/dl.. No statistically significant relation between serum creatinine and pulmonary complications was observed.

Discussion

The incidence of pulmonary complications in leptospirosis in this study was 57%. The incidence of pulmonary complications in leptospirosis was found to be about 20% - 70%[2]. Of the 2447 cases of human leptospirosis reported from Rio de Janeiro, Brazil, pulmonary involvement was present in 248 (41.4%). Direct involvement of the organism[8], inflammatory mediators[9] and vasculitis[10] have, all been incriminated as the cause of pulmonary complications.

In this study, pulmonary complications in the decreasing order of frequency were respiratory symptoms (22%), ARDS/ALI (18%), pleural effusion (11%), consolidation (6%), pulmonary oedema (3%), and haemoptysis (2%). No complications were observed in 43% patients.

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The respiratory symptoms observed in the patients in this study were cough(37%), dyspnoea (14%), chest discomfort (7%), haemoptysis (2%).
In this study, the respiratory rate was high in 32% patients at the time of admission. We observed a statistically significant relation between increased respiratory rate and occurrence of pulmonary complications. We also could find a statistically significant relation between respiratory rate and ARDS/ ALI. Presence of dyspnoea has been implicated as a poor prognostic factor in leptospirosis[6].

Hypotension was present in 36 patients (36%) in this study, at the time of admission. No significant relation was observed between hypotension and pulmonary complications.

51% of the patients in this study had platelet count less than 1 lakh/mm3. Lowest platelet count recorded in this study was 10,000/mm3. In a study by Edward et al., thrombocytopenia (platelet count of < 1 lakh/mm3) was observed in more than 50% of cases and is a significant predictor for the development of ARF[11]. In this study we observed a statistically significant relation between thrombocytopenia and pulmonary complications. Thrombocytopenia was also found to be related to ARDS statistically. Therefore, thrombocytopenia could be considered as a predictor of pulmonary complications and ARDS. In a study by K Thammakumpee et al., patients with platelet count < 1 lakh/mm3, had a high risk for pulmonary involvement[12].

In most of the western studies, incidence of renal failure was from 80-90%. In the Madras study, acute renal failure was seen in 72%[13]. Some other studies show that ARF occurs in 16 to 40% of cases[14]. In this study we observed elevated serum creatinine (serum creatinine >1.4mg/dl) in 59 patients (59%), but no significant relation between serum creatinine and pulmonary complications was observed.

Conclusion

Incidence of pulmonary complications in leptospirosis was found to be 57% in our study. Among the pulmonary complications, respiratory symptoms were observed in 22%, ARDS in 18%, pleural effusion in 11%, consolidation in 6%, pulmonary oedema in 3%, and haemoptysis in 2%. Tachypnoea and

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thrombocytopenia is found to be associated with pulmonary complications and mortality. Identification of prognostic factors at the time of admission helps in early detection of complications and prompt treatment.

REFERENCES

1. Farrar WE. Leptospira species. In: Mandell GL, Douglas RG Jr, Bennett JE, editors. Principles and practice of infectious diseases. 2nd edition. New York: John Wiley and Sons. 1985;1338– 41.
2. O'Neil KM, Rickman LS, Lazarus AA. Pulmonary manifestations of leptospirosis. Rev.Infect.Dis.1991;13:705-9.
3. Edwards GA, Domm BM. Human leptospirosis . Medicine .1960;39:117–156.
4. Guidugli F, Castro AA, Atallah NA. Antibiotics for preventing leptospirosis (Cochrane Review). In: The Cochrane Library. Issue 3. Oxford: Update Software; 2001.
5. Dupont H, Dupont-Perdrizet D, Perie JL, Zehner-Hansen S, Jarrige B, Daijardin JB. Leptospirosis: prognostic factors associated with mortality. Clin Infect Dis 1997;25:720–4.
6. Levett PN. Leptospirosis. Clinical Microbiology Reviews 2001;14:296-326.
7. Muthusethupathi MA, Shivakumar S,Vijayakumar R,et al.Renal involvement in leptospirosis – our experience in Madras City. J Postgrad Med .1994;40:127-31.
8. Silva JJ, Dalston MO, Carvalho JE, Setubal S, Oliveira JM, Pereira MM. Clinicopathological and immunohistochemical features of the severe pulmonary form of leptospirosis. Rev Soc Bras Med Trop 2002;35:395–9.
9. Nally JE, Chantranuwat C,Wu XY, Fishbein MC, Pereira MM, Da Silva JJ,et al.Alveolar septal deposition of immunoglobulin and complement parallels pulmonary haemorrhage in a guinea pig model of severe pulmonary leptospirosis.Am J Pathol 2004;164:1115-27.
10. de Brito T, Bohm GM, Yasuda PH. Vascular damage in acute experimental leptospirosis of the guinea pig. J Pathol 1979;128:177– 82.
11. Edwards CN, Nicholson GD, and Everard COR. Thrombocytopenia in leptospirosis. Am. J. Trop. Med. Hyg. 1982;31:827–829.
12. Thammakumpee M, Silpapojakul K,Borrirak B. Leptospirosis and its pulmonary complications.Respirology 2005;10:656-659.

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13. Muthusethupathi MA, Shiva Kumar S, Rajendran S, Jaya Kumar M, Vijay Kumar R, Everard EOR and Carrington D.G. Leptospirosis in Madras a clinical and serological study.J. Assoc. Phys. Ind.1995;456-458.
14. Abdulkader RCRM. Acute renal failure in leptospirosis. Renal Fail.1997;19:191–198.