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Clinical profile of patients with leptospirosis requiring hemodialysis and intensive care

Dr. Dayamani B.[1], Dr. Manjunath J.[2], Dr.Sayyed Mohammed[3]
[1](Final year Postgraduate, Department of Medicine, Father Muller Medical College, India)
[2](Associate Professor, Department of Medicine, Father Muller Medical College, India)
[3](Associate Professor, Department of Medicine, Father Muller Medical College, India)
Corresponding Author: Dr. Dayamani B

Abstract: *Leptospirosis is a zoonotic condition with high morbidity. The aim of this study was to assess clinical predictive factors for intensive care admission and hemodialysis among patients with severe leptospirosis. This was an observational longitudinal study in which all patients with severe leptospirosis admitted to a tertiary hospital and receiving intensive care and hemodialysis owing to kidney injury were included in the study. 104 patients were included in the study. Mean age of the patients was 33 ± 9.8 years, of which 53% were males and the remaining 47% were females. Most common predictors for ICU care were hypotension, tachypnoea, impaired LFT and coagulation parameters and oliguria (acute kidney injury).*
Conclusions: Predictive factors for ICU admission in leptospirosis include oliguria, impaired coagulation profile and liver function tests, tachypnoea and hypotension.
Keywords - *Leptospirosis, intensive care, acute kidney injury, haemodialysis*

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I. Introduction

Leptospirosis is a zoonosis caused by a gram negative spirochaete, in which man is the accidental host.[1] The initial symptoms seen in the affected patients are fever with chills, malaise, muscle pain, headache, nausea, vomiting and diarrhoea which develop within 3-14 days.[2]

The clinical diagnosis is usually difficult, and involves a differential diagnosis of dengue, viral or bacterial meningitis, viral hepatitis and malaria. Definitive diagnosis is made by detection of IgM antibodies by use of enzyme immunoassay (ELISA).[3]

Atleast 7-10% of the patients are seen to progress to the severe form of the disease known as Weil' s disease.[4] This includes hepatic dysfunction leading to jaundice and multi-organ involvement including pulmonary hemorrhage, adult respiratory distress syndrome and acute kidney injury (AKI).

Treatment after onset of severe disease includes intensive care support.[5]

Renal involvement in leptospirosis can vary from mild proteinuria to severe AKI. Urinary sediments may be observed comprising leukocytes, red blood cells and rarely biliary pigments and granular casts. Proteinuria, if present, is usually lesser than 1g in a 24 hour sample.[6]

In leptospirosis patients, acute kidney injury usually presents with rapidly elevated levels of serum urea and creatinine. If associated with hyperbilirubinemia, acute kidney injury results in oliguria-anuria.[7] Oliguric AKI is often associated with continued sodium and volume loss.[8]

In leptospirosis, the prognosis is usually favorable, unless complicated by multiple organ involvement. Mortality ranges from 12% to 36% depending on complications such as pulmonary complications, hyperbilirubinemia, diarrhea, hyperkalemia, renal failure, geriatric age group, and underlying comorbidities.[9-12]

Other factors leading to higher morbidity and mortality include leucocytosis, thrombocytopenia, and abnormal ECG findings.[13-15]

A study conducted in Brazil, among 42 patients with leptospirosis found that 66% developed AKI, and had a mortality of 55%. The risk factors for death in this study were oliguria, cardiac arrhythmia and pulmonary complications.[9]

II. Objectives:

1. To make a clinical profile of leptospirosis cases.
2. To investigate predictive factors for intensive care unit (ICU) admission among patients with severe leptospirosis.

III. Material And Methods

3.1 SOURCE OF DATA: Patients admitted at Father Muller Medical College Hospital, Mangalore, aged more than 18 years, diagnosed with leptospirosis.

3.2 STUDY DESIGN: This was an observational longitudinal study on 104 patients over a period of 6 months from December 2017 to May 2018, at Father Muller Medical College Mangalore.

Informed consent was taken from the individuals prior to including them in the study. Demographic data and data on clinical history, physical examination at the time of ICU admission, initial and follow-up laboratory values, diagnostic tests used to confirm leptospirosis and treatment provided were documented and analyzed.

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Sample size was calculated as 104 using the formula $N = Z^2 p(1-p) /d^2$ (Where: Z= z score=$(Z (1-\alpha/2))^2=(1.96)^2$, σ=population standard deviation=1, α= confidence interval (0.05), p= 0.1927 [16] and d=error= 0.05

3.3 INCLUSION CRITERIA: Clinically confirmed cases of leptospirosis belonging to age group 18 years and above.

3.4 EXCLUSION CRITERIA: Patients with pre-existing renal disease, pregnant patients

3.5 STATISTICAL ANALYSIS: Data collected was tabulated and analyzed using SPSS software Version 15.0. Baseline characteristics were assessed using Chi Square or Fisher' s exact test for categorical data and unpaired t-test for continuous variables. Significance was determined at $p<0.05$

IV. Results:

Among the 104 patients included in the study 55 were males and 49 were females. The distribution based on age group is as shown in Table 1.Mean age of the study participants was 33 ± 9.8 years.

The main signs and symptoms at presentation are as shown in Table 2. Most common among these was fever (39.42%), followed by myalgia (32.69%)

The signs at time of admission to ICU are as shown in Table 3. Impaired Liver functions were noted in a majority (47.11%) of the patients and this was the major predictor for admission to intensive care unit and initiation of transfusion of blood and its products.

Treatment involved intravenous antibiotics, fluids, blood transfusion and blood component transfusion, haemodialysis and supportive care. Average duration of ICU stay was 6 days with minimum of 4.5 days and maximum of 9 days.

V. Tables And Charts:

TABLE 1: Demographic profile of study subjects

Demographic categories	Characteristics	N	(%)	P value
Age group	18-30 yrs	26	25	p=0.06
	31-40 yrs	29	27.88	
	41-50 yrs	28	26.92	
	>50 yrs	21	20.19	
Gender	Male	55	52.88	p=0.9
	Female	49	47.11	
Total		**104**	**100**	

TABLE 2: SYMPTOMS AT PRESENTATION TO THE HOSPITAL

Duration	Frequency	Percentage (%)
Fever	41	39.42
Myalgia	34	32.69
Jaundice	15	14.42
Hematuria	12	11.53
Oliguria	2	1.92
Total	**104**	**100**

TABLE 3: INDICATIONS FOR ICU ADMISSION

Duration	**Frequency**	**Percentage (%)**
Impaired LFT	49	47.11
Impaired coagulation profile	23	22.11
Hypotension	15	14.42
Impaired RFT	14	13.46
Tachypnoea	3	2.88
Total	**104**	**100**

TABLE 4: LABORATORY PARAMETERS

Type	**Mean value (n)**
Hemoglobin (Hb)(g/dL)	9.2±2.3
Total WBC counts (cells/cumm)	10900±1200
Platelet count (cells/cumm)	86000±23000
Hematocrit value	26.7±12.98
S.Urea (mg/dL)	78±43
S.Creatinine(mg/dL)	4.5±2.3
Prothrombin Time	13.7±4.7
INR	1.57±0.98
S. Total Bilirubin	16±13.1
Total	**104**

VI. Discussion:

Leptospirosis is a significant public health problem in India, with high prevalence. The disease can have severe manifestations and high rates of mortality if not managed well.

Among the 104 patients included in the study 55 were males and 49 were females. Mean age of the study participants was 33 ± 9.8 years. This was unlike the findings of most other studies such as the one conducted by Goswami RP et al where they have found older age to be an indicator for disease severity and mortality.[17]

The main signs and symptoms at presentation in our study were fever (39.42%), followed by myalgia (32.69%) Oliguria was also found to be a common feature among our study subjects. This can be attributed to several hemodynamic changes such as elevation of aldosterone, systemic vasodilation, renal vasoconstriction and dehydration secondary to fever and vomiting.[18,19]

In a study conducted in France in leptospirosis patients, bilirubinemia and jaundice were found to be predictive factors of severity. In our study too, we found that leptospirosis patients presented with high levels of total, direct and indirect serum bilirubin. [20]

In our study we found that the main predictors for ICU admission among patients with leptospirosis were impaired liver function parameters, onset of acute kidney injury, tachypnea and hypotension.

Studies have shown that early initiation of dialysis in patients with leptospirosis-associated kidney injury reduces mortality and is therefore beneficial.[21,22] Treatment in our subjects involved intravenous antibiotics, fluids, blood transfusion and blood component transfusion, haemodialysis and supportive care.

Average duration of ICU stay was 6 days with minimum of 4.5 days and maximum of 9 days with no mortality.

VII. Conclusion:

Acute kidney injury, tachypnoea, sepsis and hypotension were found to be the earliest predictors for ICU admission among patients with leptospirosis. Early diagnosis and initiation of appropriate therapy are the most important points in managing leptospirosis. A detailed clinical profile of patients, eliciting risk factors and treatment modalities employed, and the prognosis of patients can help make a clear consensus to aid better management and prevent adverse events and mortality.

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