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Review Article

A Case Series and Review of Severe Leptospirosis

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ABSTRACT

Background: The purpose of this retrospective case review was to identify the different patterns of clinical presentation of severe leptospirosis, and to find out any correlation between organ specific complications and outcome of the patients. **Method**: Leptospirosis patients who were admitted to the ICU of General Medicine Department of HIMS, Hassan during July 2021 – September 2021 were included. Organ specific involvement in 6 organs namely heart, lung, kidney, liver, vascular, brain and spinal cord was recorded. One score was given to each organ involvement. Score was recorded on admission and discharge. Outcome of the patients were recorded as either discharged or died. **Result**: Renal, hepatic, hematological involvement was found in all patients. One out of 13 patients died and 12 patients were discharged without any sequele. All patients except one had 3 organ involvements and one had involvement of 4 organs. All patients who had 3 organs involved were discharged without any sequel after an average admission period of 5 days. **Conclusion**: Outcome of severe leptospirosis was not determined by the involvement of renal, hepatic and hematological systems. 4 or more organ involvement was associated with increased mortality. Combination of respiratory system involvement with neurological involvement was associated with a bad outcome. Seeking critical care management at 3 organ involvement stage would improve the outcome of the patients.

Key Words: *Leptospirosis, Organ involvement, Critical care management, Mortality, Retrospective case review*

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INTRODUCTION

Leptospirosis, an infectious disease that affects humans and animals is considered the most common zoonosis in the world[1], it is a wide spread and prevalent zoonotic disease.it occurs both in tropical and temperate regions. A systematic review and modeling exercise estimated that there were 1.03 million cases world wide annually with 58,900 deaths associated with loss of 2.9 million disability- adjusted life years[2,3]. A multicentre study in India showed that leptospirosis accounts for about 12.7% cases of acute febrile illness responsible for attendance at hospitals[4]. The disease was first recognized as an occupational disease of sewer workers in 1883. Outbreaks of leptospirosis have increasingly been reported in kerala ,gujurat, tamilnadu, and Karnataka, and sporadic cases have been reported in goa, Andhra Pradesh and assam[5]. In 1886, Weil described the clinical manifestations in 4 men who had severe jaundice, fever and hemorrhage with renal Involvement. Leptospirosis is caused by pathogenic spiral bacteria that belong to the genus Leptospira, family Leptospiraceae and order Spirochetae.

The most vulnerable groups to leptospirosis in Hassan are farmers.Exposure may occur through either direct contact with an infected animal or through indirect contact via soil or water contaminated with urine from an infected animal. Individuals with occupations at risk for direct contact with potentially infected animals include veterinarians, abattoir workers, farm workers (particularly in dairy milking situations), hunters and trappers, animal shelter workers, scientists, and technologists handling animals in laboratories or during fieldwork. The magnitude of the risk depends on the local prevalence of leptospiral carriage and the degree and frequency of exposure. Most of these infections are preventable by the use of appropriate personal protective equipment such as rubber boots, gloves, and protective eyewear[6]. In addition to the risks associated with outdoor work listed above, sewer work, military exercises, and farming in high rainfall tropical regions are recognized; the latter is by far the most important numerically. Agricultural workers at risk for leptospirosis include rice field workers, taro farmers, banana farmers, and sugar cane and pineapple field harvester[7]. The development of severe leptospirosis could be accompanied by symptoms which include jaundice, pulmonary haemorrhage, hepatic and kidney failure[8].

Of the complications that arise from leptospiral infection, severe pulmonary haemorrhage syndrome (SPHS) and Weil's syndrome (combination of acute renal insufficiency, haemorrhage and jaundice), are among the well-known forms of severe leptospirosis. Notably, mortality recorded in Weil's disease and severe pulmonary haemorrhage

syndrome (SPHS) are >10% and 50%, respectively[9,10]. During the 2007–2018 observation period, morbidity rates increased beginning in May, remained at high levels in August and September and decreased after November[11].

Aims and Objectives

- To identify different patterns of clinical presentation of severe leptospirosis.
- To find out any correlation between organ specific involvement and outcome of the patients in order

To identify severe leptospirosis early and to provide critical care management.

Materials and Methods

We conducted a retrospective review of Leptospira patients admitted to wards and afterwards transferred to HIMS, Hassan's ICU. During the period of July 2021 to September 2021, 13 cases of leptospirosis were admitted to the ICU and patient department of the General Medicine Department of HIMS, Hassan.

Inclusion criteria

All patients who were suspected of having leptospirosis on clinical grounds and/or investigations including antibody levels.

Following features were used to identify the organ involvement and presence of at least one feature indicated the involvement of the organ.

- Respiratory – $PaO_2 : FiO_2 < 300$, abnormal chest radiography.
- . Renal – Oliguria, anuria, serum creatinine more than 110 mmol/L.
- Hepatic – Icterus, hepatomegaly, serum bilirubin > 20mmol/L.
- Cardiac – Systolic Blood Pressure < 90mmHg, requirement of ionotropic or vassopressor agent, arrhythmia, 2D echocardiographic evidence of myocarditis.
- Nervous system – Seizures, GCS < 15
- Hematological – Bleeding manifestations, platelets < 1Lakh/mm^3, INR > 1.5.

Outcome was measured as either discharged or died in the ICU. Confidentiality of the patients information was strictly maintained and patients management was not affected by the study.

Results

13 cases of leptospirosis were admitted to the ICU and in patient department of General Medicine Department of HIMS, Hassan, during the period of July 2021 – September 2021. Two patients were aged more than 60 years and rest were less than 60 years. Cases were followed up for 3 months.

Out of the 13 patients, 10 were males (76.9%) and 3 were females (23.1%). Farmers were the most commonly affected (84.6%), 11 out of 13. Predominant symptoms of the patients were fever and yellowish discolouration of eyes. Amongst the male patients, alcoholism and smoking were the most commonly observed habits. Thrombocytopenia (Platelets < 1Lakh/mm^3) and some bleeding manifestations were recorded in all patients. Altered coagulation profile was found in none of the patients. Spontaneous bleeding was observed in 3 patients with a platelet count of more than 20,000/mm^3. Hepatic involvement was found in all patients and transaminase levels never exceeded above 500 IU/L in any of the patients except for one. SGOT and SGPT have varying relationships among the study group. All except 2 cases had evidence of renal impairment found on admission.

Eleven patients had kidney failure according to RIFLE classification. None of them underwent hemodialysis in the due course of treatment.

Hypotension was noted in one patient at the time of presentation and the patient died. Low saturation was noticed in one patient (80% in RA), and was put on NIV(Non invasive Ventilation) and later intubated. Central nervous system was affected in one of the patients and the patient died. One patient died and 12 patients were discharged. The patient who died had 6organ involvement. All those who have recovered were having less than or equal to 4 organ involvement. 4 organs (except CNS and RS) were involved in all the 12 patients and has been discharged without any sequele. All patients were treated with i.v crystalline penicillin 1 Megaunit 6^{th} hourly and tab. Doxycycline 100mg BD for 7 days.

DISCUSSION

According to this case series, 85% of patients had a preceding history of exposure to paddy fields, which indicates the vulnerability of farmers to the disease.

Bleeding manifestations were found even with the platelet count of more than 20,000/mm^3 probably due to thrombasthenia associated with the illness. In this case series, we have transfused platelets to keep the levels at least more

than 50,000/mm^3. 11 out of 13 patients were having icterus in the case series. Jaundice indicates severe form of the disease, otherwise known as Weil's disease[2]. Hepatic necrosis is one of the features in Weil's syndrome. Modest rise in hepatic transaminase levels < 500 IU/L (except one) was noted in this review and SGOT and SGPT had varying relationships among the cases. Altered coagulation profile is not seen in any of the patients. 100% of patients had kidney failure according to the RIFLE classification. Complete recovery of renal functions (according to serum creatinine) was evident in patients who were discharged. Hyperkalemia was noted in 3 patients and was corrected by hemodialytic measures.

Congestive cardiac failure, myocarditis and pericarditis may occur in severe leptospirosis[2]. In this case series cardiac involvement was seen in only one patient and was evident by hypotension.

Pulmonary manifestations, diffuse ill defined ground glass pattern in chest radiograph with saturation drop of 80% in RA was seen in one patient whose final outcome was death. Pulmonary involvement is the main cause of death due to leptospirosis, usually as a result of pulmonary hemorrhage or ARDS[2,3]. Indeed, severe pulmonary form of leptospirosis (SPFL) is considered to be one of the major causes of death in patients with severe leptospirosis[2]. Diffuse ill defined ground glass pattern was found in the patient who had pulmonary involvement in this case series(4) whose final outcome was death (CNS was also involved). Meningeal symptoms developed in none of the patients. Impaired level of consciousness was noted in one of the patients. Involvement of renal, hepatic, hematological systems did not determine the outcome of patients in this case series as all 3 organs were affected in all patients. Patients who got 4 organ involvements (except CNS/RS) got discharged. 92% patients were having 4 organ involvement (except CNS/RS) and survived. This indicates the importance of seeking critical care management in leptospirosis patients with the involvement of 3 organs.

CONCLUSION

According to this case series, involvement of 5 or more organs was associated with increased mortality. Furthermore, a combination of cardiac, respiratory and CNS involvement was associated with increased mortality. Diagnosis of leptospirosis was based on symptomatology and investigations including the presence of antibodies but not on detecting spirochetes in body fluids in this case series. The patient, who did not survive, died within 1 week of admission.

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