Predictors of Mortality Among Leptospirosis Patients with Renal Involvement: A Retrospective Cohort Study

S. J. A. Capucion-Quebec, MD[1]; R.A. Danguilan MD[2]; M.I. Arakama MD[3] ; E. Chua MD[4]

NATIONAL KIDNEY AND TRANSPLANT INSTITUTE, PHILIPPINES

Introduction

Leptospirosis is a zoonosis transmitted through contact with water or soil contaminated by urine from animal reservoirs. Large outbreaks are often associated with increased rainfall and flooding which presumably increased the risk of exposure to contaminated water. The clinical spectrum of leptospirosis varies from mild to severe, or even life-threatening. Up to 10% of Leptospirosis infections may induce acute kidney injury (AKI) and is associated with significant morbidity and mortality. Early evaluation of disease severity might be useful in improving prognosis.

This study aimed to determine the significant predictors of mortality among leptospirosis patients with renal involvement.

Methods

A retrospective cohort design was employed through review of records of suspected or confirmed cases leptospirosis patients with renal involvement admitted in National Kidney and Transplant Institute (NKTI), Philippines from January 2013 to December 2018. Baseline characteristics were extracted and compared among those who survived or died. Logistic regression was employed to determine the significant predictors.

Inclusion Criteria

1. Patients above 18 years old with suspected or confirmed with moderate to severe leptospirosis based on clinical manifestations according to 2009
2. Leptospirosis Clinical Practice Guidelines Guidelines on the Diagnosis, Management and Prevention of Leptospirosis who were admitted within the study period.

Exclusion Criteria

1. Patients who had a history of chronic kidney disease requiring renal replacement therapy.
2. Patients diagnosed with mild leptospirosis without renal involvement.
3. Patients who died with 24 hours of admission.

Results

Out of the 751 cases with renal involvement that were included in the study, 622 survived with their renal function recovered while 2 survived but were not able to recover their renal function. There was 16.9% (95% CI: 14.2%-19.6%) mortality among patients with moderate to severe leptospirosis. Test of association using simple logistic regression showed that presence of diabetes, other comorbidities (i.e. heart disease, tuberculosis, asthma, hypothyroidism), conjunctival suffusion, jaundice, dyspnea, leukocytosis, thrombocytopenia, hypophosphatemia, pulmonary infiltrates on chest x-ray, metabolic acidosis, respiratory acidosis, oliguria, anuria, and need for respiratory support were associated with mortality. Multivariate analysis showed that diabetes, jaundice, oliguria, anuria, and the need for non-invasive and invasive respiratory support were also significant independent predictors of mortality. Patients who required mechanical ventilation had a mortality of 81.7%.

Results of the multiple logistic regression for the final predictor model.

Predictor	Adjusted Odds Ratio (95% CI)	p-value
Diabetes		
Absent	Reference	p<0.001
Present	3.00 (1.53-5.88)	
Jaundice		
Absent	Reference	
Present	1.99 (1.09-3.63)	0.025
Respiratory Support		
Without	Reference	
Non-invasive	3.95 (2.16-7.22)	p<0.001
Invasive	34.47 (15.92-74.62)	p<0.001
Urine Output		
Normal	Reference	
Oliguric	2.26 (1.26-4.03)	0.006
Anuric	2.57 (1.08-6.10)	0.031

Conclusions

In summary, the mortality of leptospirosis with renal involvement remains high despite improvements in patient care. Identification of significant predictors may help in triaging patients in the event of another leptospirosis outbreak. The effects of intensive monitoring and early symptomatic treatment on the prognosis of high-risk patients remain to be evaluated in prospective studies.

References

1. Visith S, Kearkiat P: Nephropathy in leptospirosis (Symposium). J Postgrad Med 2005; 51:184–188.
2. Pasamba EM, Arakama MI, Danguilan RA, and Mendoza MT: Outcomes of Adults with Leptospirosis and Renal Failure Treated with Pulse Immunosuppression. K Kidney 2018, Vol 4(1): 161.
3. Silva Junior GB, Abreu KL, Mota RM, Barreto AG, Araujo SM, Rocha HA, et al. RIFLE and Acute Kidney Injury Network classification predict mortality in leptospirosis-associated acute kidney injury.
4. Abgueguen P, Delbos V, Blanvillain J, Chennebault JM, Cottin J, Fanello S, et al. Clinical aspects and prognostic factors of leptospirosis in adults. Retrospective study in France. Journal of Infection.
5. Hua-Kung, et. al, Factors associated with severity and mortality in patients with confirmed leptospirosis at a regional hospital in northern Taiwan.
6. Covic A, David J. A. Goldsmith DJA, Gusbeth-Tatomir P, Seica A, Covic M. A retrospective 5-year study in Moldova of acute renal failure due to leptospirosis: 58 cases and a review of the literature. Nephrol Dial Transplant.