M O N D O: MONitoring Dialysis Outcomes

Relationship between trends in neutrophil and lymphocyte counts and mortality in incident hemodialysis patients

Background

Elevated white blood cell (WBC) count associates with an increased mortality risk in hemodialysis (HD) patients [Hsu et al, 2010]. The prognostic value of trends (increase or decrease) of neutrophil and lymphocyte count is unclear. We aimed to analyze the relationship of changes in neutrophil and lymphocyte count and mortality in HD patients.

Methods

Incident HD patients treated in RRI clinics who had their first in-center treatment between 1/2000 and 12/2010 and survived a minimum of 12 months were included. Slopes of neutrophil and of lymphocyte counts (as proportions of WBC) were computed for each patient using linear regression of all available values between months 4 and 12 from the start of treatment. Patients were then stratified based on (a) the average rate of change in neutrophil percent (declined: <-7 percentage points/year; stable: -7 to 7 percentage points/year; increased: >7 percentage points/year) and (b) the average rate of change in lymphocyte percent (declined: <-5.5 percentage points/year; stable: -5.5 to 5.5 percentage points/year; increased: >5.5 percentage points/year); which resulted in 9 groups. Survival was then analyzed in months 13 to 18 following HD initiation using a Cox proportional hazards model adjusted for age, gender, race, ethnicity, diabetic status, access type, BMI, albumin, SBP, body temperature, nPCR, eKt/V, interdialytic weight gain, urea distribution volume, and slope of neutrophils and lymphocytes.

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Figure 1: Adjusted hazards ratio for all-cause mortality for each of 9 categories
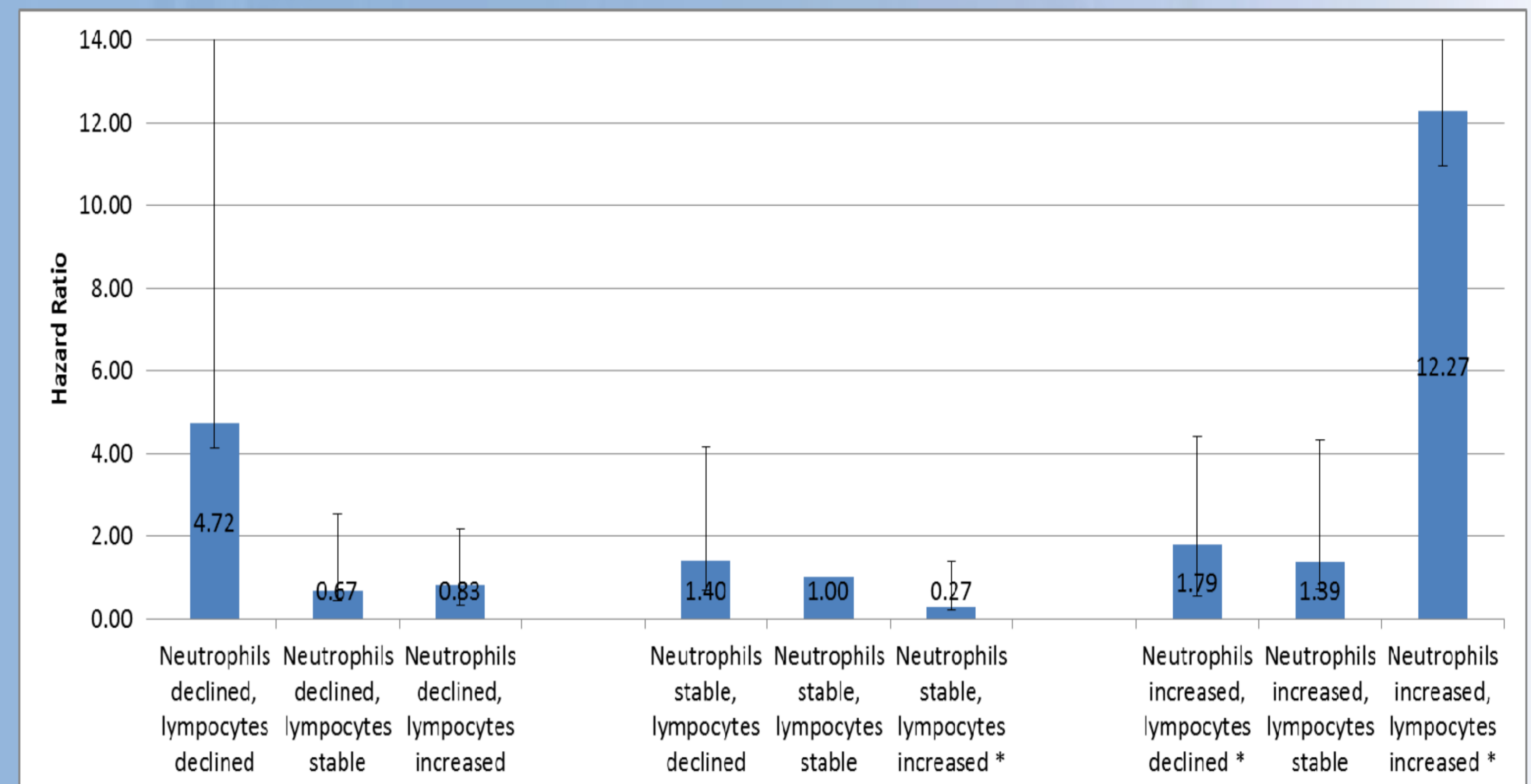
Results

A total of 2809 patients were studied. The median (IQR) age at the start of dialysis was 62.9 (51.7-72.7) years, 55.1% were male, 44.7% were white and 46.5% of patients were black. The Cox Proportional Hazards model showed that simultaneous increases in neutrophil and lymphocyte counts (HR=12.3; 95% CI=1.3-113.5, P=0.03) or decrease of neutrophil and lymphocyte counts (HR=4.7; 95% CI=0.6-38.4, P=0.14) were associated with an increased risk of mortality as compared to reference group (stable neutrophil and stable lymphocyte) [Figure 1]. Declines in lymphocyte count and increases in neutrophil count were at increased death risk (HR=1.8; 95% CI=1.2-2.6, P=0.003) whereas increase in lymphocyte count with stable or decrease neutrophil count exert a protective effect on survival (HR=0.3; 95% CI=0.07-1.13, P=0.07 and HR=0.8; 95% CI =0.5-1.3, respectively).

Conclusion

Our results shows survival advantage for patients with stable neutrophil and lymphocyte counts. HD patients with high neutrophil count and low lymphocyte count are associated with increased mortality risk. This relationship may be partially explained by the presence of protein-energy malnutrition and acute inflammation. Further studies are required to understand the roles of neutrophil and lymphocyte counts, their temporal trends and the prognostic significance of these trends.

Reference: Ching-Wei Hsu, Ja-Liang Lin, Dan-Tzu Lin-Tan, et al. White Blood Cell Count Predicts All-Cause, Cardiovascular Disease-Cause and Infection-Cause One-Year Mortality of Maintenance Hemodialysis Patients. Therapeutic Apheresis and Dialysis 14(6):552–559.