

Neutrophil-lymphocyte ratio as a marker of inflammation and predictor of mortality in haemodialysis patients

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Aim: To examine the value of neutrophil-lymphocyte ratio (NLR) as a marker of inflammation and predictor of all-cause mortality in haemodialysis patients.

Background: NLR is a marker of systemic inflammation that has been shown to correlate with vascular calcification¹ and predict mortality in patients with malignancies² and coronary³ and peripheral artery disease⁴. In contrast to albumin, NLR is unlikely to be affected by nutritional status. Its prognostic value in haemodialysis patients is unclear.

Methods: We retrospectively reviewed all consecutive haemodialysis patients between January 2007 and December 2011 at a single centre. We recorded patient's full blood count and other biochemistry three months after commencement of dialysis. Correlations between NLR and other metabolic and inflammatory markers were evaluated using Pearson's *r* coefficient. The prognostic value of NLR was tested using Kaplan Meier, univariate and multivariate Cox analyses adjusted for Australian and New Zealand Dialysis and Transplant Registry data.

Results: 140 haemodialysis patients were included with median follow-up of 36 months and overall mortality of 41% (58 patients). Neutrophil-lymphocyte ratio was positively correlated with C-reactive protein ($r = 0.48, P < 0.001$) and negatively correlated with haemoglobin ($r = -0.32, P < 0.001$) and albumin ($r = -0.40, P < 0.001$). In Kaplan Meier analysis, NLR (stratified into tertiles) was associated with all-cause mortality (log-rank, $P = 0.002$). In multivariate Cox analysis, NLR was independently associated with all-cause mortality (HR 1.18, 95% CI 1.09– 1.28 $P < 0.001$). Other predictors of all-cause mortality in multivariate analysis were age, (HR 1.04, $P = 0.03$), low albumin (HR 0.90, $P < 0.001$) and history of cardiovascular disease (HR 2.27, $P = 0.013$).

Conclusions: Neutrophil-lymphocyte ratio correlates with other markers of systemic inflammation in haemodialysis patients and is associated with poor survival. The extent to which other confounding factors affect these results is unknown.

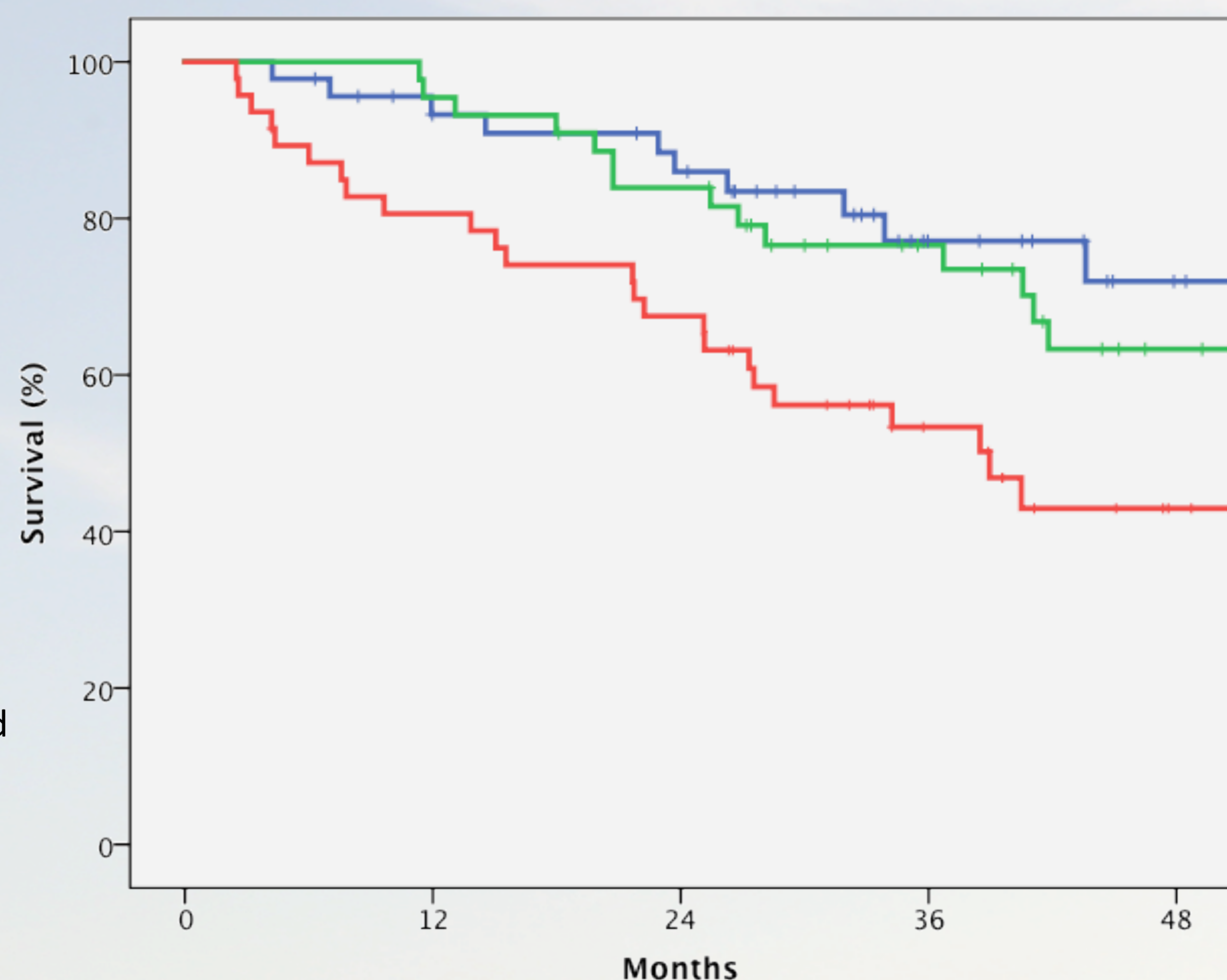


Figure 1. Kaplan Meier analysis of all-cause mortality rates stratified by neutrophil lymphocyte ratio tertiles (blue < 2.68, green = NLR 2.68 < 3.76, red = NLR > 3.76)

References

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Table 1. Unadjusted and adjusted Cox analysis of risk factors for all-cause mortality

Variables	Unadjusted Cox analysis		Adjusted Cox analysis	
	p-value	Hazards ratio (95% CI)	p-value	Hazards ratio (95% CI)
Age	0.033	1.03 (1.00-1.05)	0.03	1.04 (1.00-1.07)
BMI	0.043	0.95 (0.91-1.00)	---	---
Catheter at 1 st HD	0.005	2.15 (1.26-3.67)	---	---
Late referral	0.039	1.77 (1.03-3.04)	---	---
Corrected calcium	0.023	0.38 (0.16-0.87)	---	---
Albumin	<0.001	0.089 (0.86-0.93)	<0.001	0.90 (0.85-0.95)
Cardiovascular disease	0.003	2.36 (1.35-4.11)	0.013	2.27 (1.19-4.33)
NLR	<0.001	1.18 (1.11-1.26)	<0.001	1.18 (1.09-1.28)