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Title
Association Between Neutrophil-Lymphocyte Ratio, Platelet-Lymphocyte Ratio, and Survival in Undifferentiated Pleomorphic Sarcoma

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Background
Cancer-related inflammation has been shown to be a driver of tumor growth and progression, and there has been a recent focus on identifying markers of the inflammatory tumor microenvironment. Neutrophil-lymphocyte ratio (NLR) and platelet-lymphocyte ratio (PLR) are inflammatory indices that have been identified as prognostic biomarkers in various malignancies. However, there is limited and conflicting data regarding their prognostic value in soft tissue sarcoma (STS) and specifically in undifferentiated pleomorphic sarcoma (UPS).

Purposes
The purposes of this investigation were to determine an optimal cutoff value for NLR and PLR to predict overall survival (OS) and to examine the association between these biomarkers and OS in UPS patients.

Patients and Methods
This was a retrospective review of patients who underwent surgical treatment for primary UPS from 1993 to 2021. NLR and PLR were calculated using blood counts at time of diagnosis. The optimal cutoff values for NLR and PLR were determined by receiver operating curve analysis, with OS as the end point. Associations between OS and both high NLR and high PLR were analyzed with Kaplan-Meier curves and log-rank testing. Cox proportional hazards regression analysis was used to determine independent prognostic factors.

Results
Ninety-five patients who underwent surgical resection of primary UPS and had available laboratory data at or near time of diagnosis were reviewed. The optimal cutoff value to predict OS was 3.4 for NLR and 189 for PLR. High NLR (≥3.4) and high PLR (≥189) were significantly associated with tumor size greater than five centimeters (p=0.018 and p=0.019 respectively). Both high NLR (hazard ratio 2.18; 95% confidence interval 1.20-3.96; p=0.008) and high PLR (hazard ratio 2.24; 95% confidence interval 1.25-4.04, p=0.005) were associated with decreased OS on log-rank testing. On multivariate analysis, metastasis at presentation and radiotherapy were independently predictive of OS, but high NLR (hazard ratio 1.50; 95% confidence interval 0.73-3.07; p=0.27) and high PLR (hazard ratio 1.71; 95% confidence interval 0.85-3.43; p=0.13) were not predictive of survival.

Conclusions
High pre-treatment NLR and PLR were associated with decreased overall survival but were not independent predictors of survival in patients undergoing resection for UPS. Until additional prospective studies can be done, survival outcomes are best predicted using previously established patient- and tumor-specific factors.
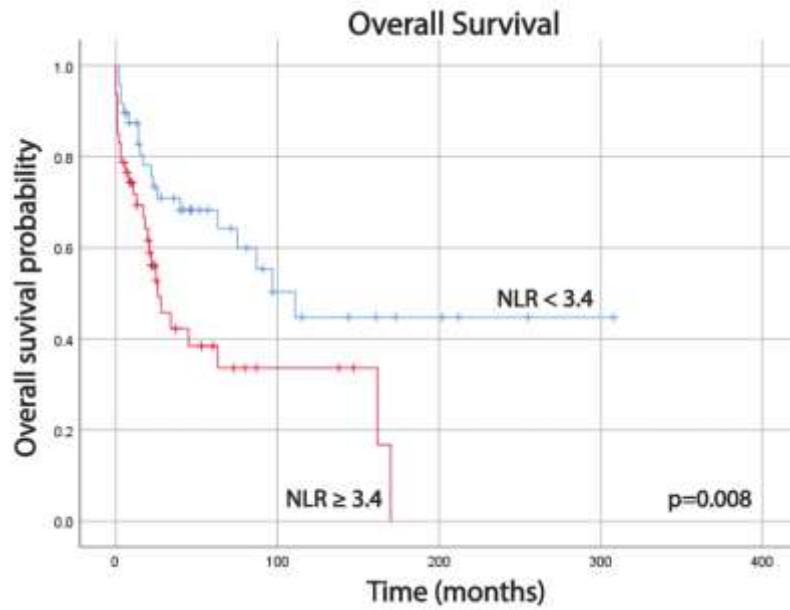
Figure 1. Kaplan-Meier curves for overall survival of patients with undifferentiated pleomorphic sarcoma stratified by low vs high neutrophil-lymphocyte ratio (NLR). NLR ≥ 3.4 is associated with worse overall survival (p = 0.008)
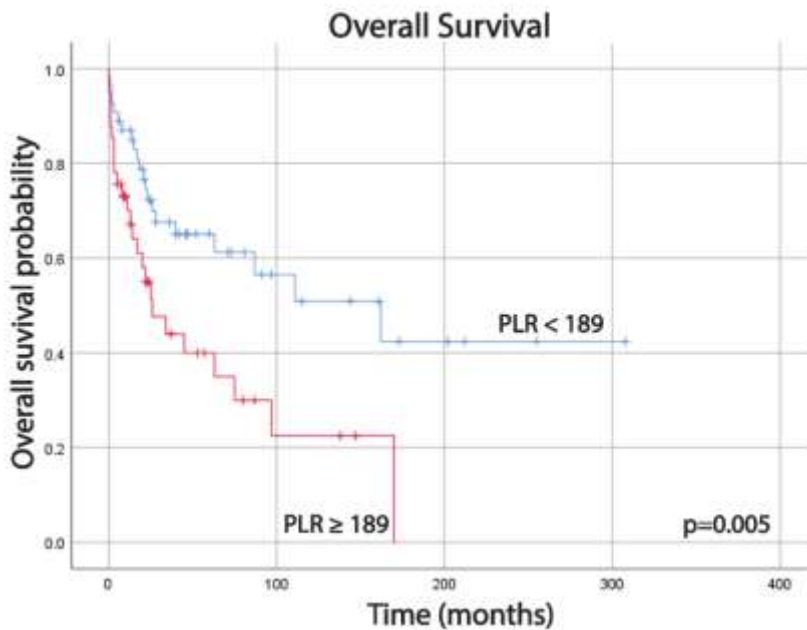

Figure 2. Kaplan-Meier curves for overall survival of patients with undifferentiated pleomorphic sarcoma stratified by low vs high platelet-lymphocyte ratio (PLR). PLR ≥ 189 is associated with worse overall survival (p = 0.005)