

Determining the Threshold for WBC Count & Differential in Predicting Failure After Reimplantation: A Multicenter Study



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BACKGROUND

- Two-stage exchange arthroplasty remains the most popular treatment option for chronic PJI in the United States.
- Although down trending serological and synovial markers are used to help guide timing of reimplantation, there remains a paucity of data in the literature on the ideal thresholds of these markers for determining infection control.
- The purpose of this multicenter study was to establish a cutoff for synovial cell count and differential in predicting failure following reimplantation.

METHODS

- This retrospective study identified all patients undergoing reimplantation with preoperative synovial fluid analysis between 2007 and 2021 at five institutions with minimum 1-year follow-up.
- Patients with an extended time to reimplantation (>1 year) and those who underwent spacer exchange during the interstage duration were excluded (n=34).
- Treatment failure was defined as reoperation due to infection or PJI-related mortality.
- ROC curves were used to determine the prognostic utility of synovial markers.

RESULTS

- 385 patients were included with a mean follow-up time of 4.6 +/- 2.5 years.
- Of these, 93 (24.2%) patients experienced treatment failure and 292 (75.8%) experienced treatment success.
- WBC/PMN% combination (AUC 0.651, sensitivity 44.2%, specificity 85.9%) demonstrated the highest prognostic utility followed by PMN% (AUC 0.644, sensitivity 47.8%, specificity 76.8%), and WBC count (AUC 0.571, sensitivity 36.6%, specificity 87.3%) .
- Using the Youden index, WBC ≥1,898 cells/μL and PMN% ≥68.0 were identified as the optimal cutoffs that predicted failure following reimplantation.

DISCUSSION & CONCLUSION

- To our knowledge, this is the largest study to date to identify cutoffs for WBC count and PMN% in predicting failure after reimplantation in a multicenter cohort of patients undergoing two-stage exchange.
- Although these tests could not predict treatment outcomes with definitive accuracy, the combination of WBC and PMN%, at cutoffs of 1,898 cells/μL and 68%, respectively, appears to have the best predictive value in identifying patients at risk of failure following completion of a two-stage protocol.

TABLE 1

Marker	Cutoff	AUC	Sensitivity	Specificity	PPV	NPV
WBC Count (cells/uL)	2,733	0.757	50.0	99.0	91.2	90.2
PMN (%)	66.7	0.723	66.1	78.4	39.8	91.5
WBC + PMN	-	0.706	41.9	99.3	92.9	88.9

FIGURE 1

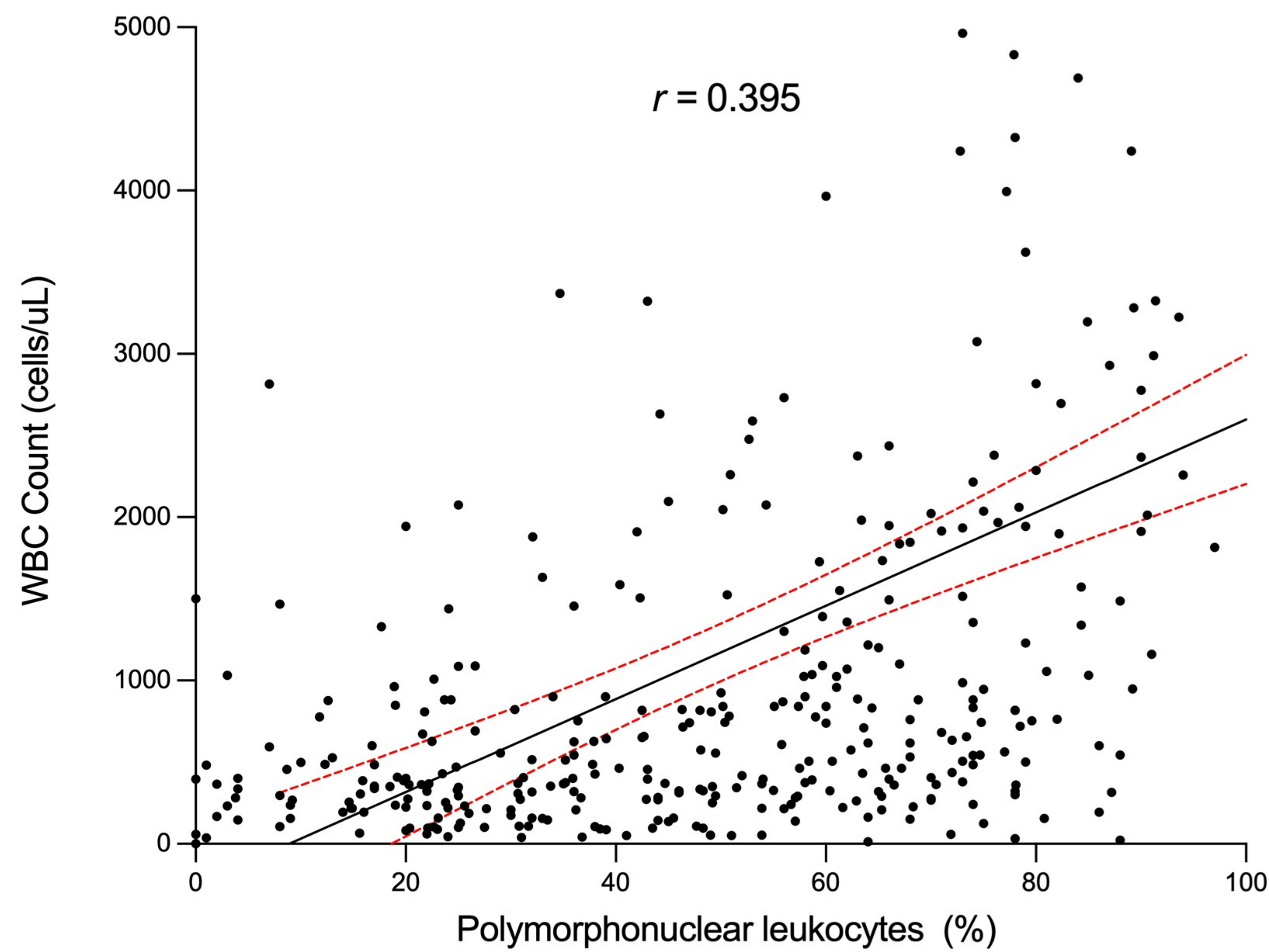


FIGURE 2

