

DIAGNOSTIC ACCURACY OF VARIOUS TEST METHODS FOR ACUTE SEPTIC ARTHRITIS IN ADULTS: 10-year analysis of 801 suspected native-joint episodes

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Aim

No universally accepted criteria incorporating currently available diagnostic tests exist for native joint septic arthritis (NJSA). This study evaluated clinical findings, serum and synovial fluid parameters, conventional and molecular microbiology, and histopathology to derive proposed evidence-based diagnostic criteria for NJSA in adults.

Methods

Consecutive episodes of suspected NJSA in adults undergoing diagnostic aspiration at a tertiary musculoskeletal infection centre between 2015 and 2024 were retrospectively assessed. Of 801 episodes, 267 (33.3%) were classified as NJSA and 534 (66.7%) as aseptic using a predefined institutional reference standard. Diagnostic accuracy was calculated for confirming and excluding NJSA. To minimize incorporation bias, the index test was removed from the reference standard for its own analysis.

801 episodes	267 NJSA	534 aseptic	2015-2024 study period
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Results

Several parameters demonstrated high specificity for the diagnosis of NJSA: the presence of a sinus tract (99.8%), a synovial fluid white blood cell count $\geq 50,000$ cells/ μL (96.0%), a synovial fluid PMN percentage $\geq 95\%$ (92.8%), ≥ 2 cultures yielding the same microorganism (97.7%), a single culture yielding a high-virulence microorganism (93.2%), and mPCR (93.2%). Among the investigated parameters, histopathology showed the strongest overall diagnostic performance, with a sensitivity of 91.8%, a specificity of 100%, and an AUC of 0.96.

SF-WBC $\leq 10,000$ cells/ μL and SF-PMN $\leq 75\%$ were specific for an aseptic diagnosis (94.4% and 98.3%, respectively). Serum inflammatory markers did not reliably confirm or exclude NJSA. Based on these findings, diagnostic criteria were developed to categorize NJSA as unlikely, probable, or confirmed (Table 1).

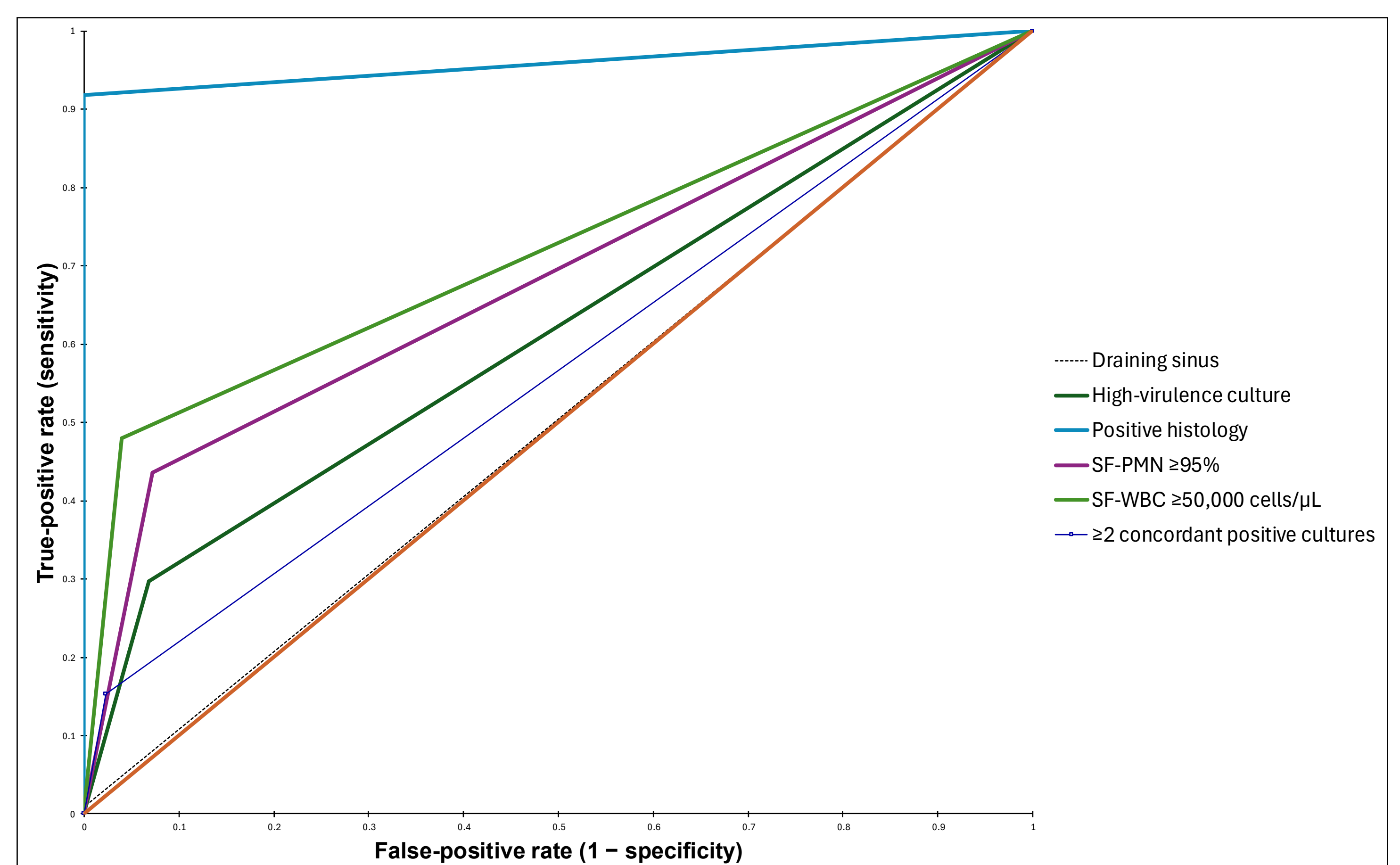


Figure 1. Receiver operating characteristic (ROC) curves for parameters considered confirmatory criteria for the diagnosis of native joint septic arthritis based on their high specificity.

Conclusion

The proposed criteria combine established and more recent diagnostic methods within a standardized framework for native joint infections in adults and require prospective validation in external cohorts.

Proposed Diagnostic Criteria for Native Joint Septic Arthritis (NJSA)

NJSA UNLIKELY	PROBABLE NJSA	CONFIRMED NJSA
No confirmatory or suggestive criteria and a plausible alternative diagnosis	≥ 2 suggestive criteria from different diagnostic domains	≥ 1 confirmatory criterion
- SF-WBC $\leq 10,000$ cells/μL - SF-PMN $\leq 75\%$ - All available cultures negative - Negative histology	- Clinical or imaging findings - SF-WBC $> 10,000$ to $< 50,000$ - SF-PMN $> 75\%$ to $< 95\%$ - Positive mPCR/bsPCR, - Single positive Culture - Positive blood culture with a clinically compatible pathogen	- Draining sinus communicating with the joint - SF-WBC $\geq 50,000$ cells/μL - SF-PMN $\geq 95\%$ ≥ 1 high-virulence culture ≥ 2 concordant positive cultures - Positive histology

Table 1. Proposed diagnostic criteria for native joint septic arthritis (NJSA)