Critical Review Form
Diagnostic Test

Diagnostic Utility of Laboratory Tests in Septic Arthritis *Emerg Med J* 2007; 24: 75-77

Objective:

"To examine the diagnostic utility of these three tests (WBC, ESR, synovial WBC) in patients with septic arthritis, using LRs and ROC curves". (p. 75)

Methods:

Retrospective chart review of adult and pediatric patients who had undergone arthrocentesis presenting from January 1998 to October 2004. The authors do not elaborate on how they identified these patients, but chart reviewers were trained prior to data collection and data abstraction was confirmed for 26% of charts. Patients with a "dry tap" were excluded. Leukocytosis was defined as WBC>11, elevated ESR as >20 mm/h, and synovial fluid WBC elevation (jWBC) as > 50,000 cells/mm^3. Septic arthritis was defined as a positive arthrocentesis culture or "operative findings consistent with septic arthritis (frank pus)". (p. 75)

Guide		Comments
I.	**Are the results valid?**	
A.	**Did clinicians face diagnostic uncertainty?**	Yes, cultures/operative results were not available at the time of arthrocentesis.
B.	**Was there a blind comparison with an independent gold standard applied similarly to the treatment group and to the control group? (Confirmation Bias)**	Uncertain whether data analysis investigators were blinded to the Gold standards (culture or operative results).
C.	**Did the results of the test being evaluated influence the decision to perform the gold standard? (Ascertainment Bias)**	No, presumably all 156 patients had either synovial culture or operative intervention, although the authors do not clearly state this fact.
II.	**What are the results?**	

A.	**What likelihood ratios were associated with the range of possible test results?**	• 188 patients had arthrocentesis attempted but only 156 had fluid obtained. • Of the 156 included in this analysis, mean age was 53 years, 56% were male, and 13% were pediatric. • The prevalence of septic arthritis was 10% (16/156) with the remaining documented diagnoses gout (33%), osteoarthritis (9%), traumatic effusion (6%) and pseudogout (5%). • 33% of subjects did not have ESR obtained. Test Sen AUC Spec LR^+ (95% CI) LR^- (95%CI) WBC>11 0.75 0.69 0.55 1.7(1.2-2.3) 0.46 (0.19-1.1) ESR>20 0.75 0.55 0.11 0.84 (0.6-1.2) 2.4 (0.76-7.4) jWBC>50 0.50 0.75 0.88 4.0 (1.9-8.6) 0.57 (0.32-1.0) jWBC >17,500 0.83 0.67 2.5 (1.8-3.6) 0.25 (0.07-0.89)
III.	**How can I apply the results to patient care?**	
A.	**Will the reproducibility of the test result and its interpretation be satisfactory in my clinical setting?**	Probably. Patients presenting with suspected septic arthritis and lab analysis of CBC, ESR and jWBC probably do not differ substantially from institution to institution.
B.	**Are the results applicable to the patients in my practice?**	Yes – we see these patients everyday.
C.	**Will the results change my management strategy?**	No. I already doubted the internal validity of these tests and the current study supports my skepticism.
D.	**Will patients be better off as a result of the test?**	Yes, if false-negative discharges home or needlessly long ED length of stay can be avoided by better understudying the test characteristics of these tests.

Limitations

1. **Insufficient description of patient demographics. Co-morbidities? Pre arthrocentesis antibiotics?**
2. **Insufficient description of patient outcomes. Who was admitted? How many had operative interventions?**
3. **Insufficient description of how authors identified the arthrocentesis population.**
4. **Insufficient description of microbiology of septic arthritis cases.**
5. **Insufficient description of WBC/ESR/jWBC test characteristics for gout/pseudogout/osteoarthritis subsets.**
6. **No Kappa analysis of chart abstraction accuracy.**
7. **No assessment of Ortho test interpretation or use of serial values of ESR or WBC in clinical decision making.**
8. **No assessment of ROC curve for optimal cut-point for WBC or ESR.**

Bottom Line

WBC, synovial WBC, and ESR cannot exclude septic arthritis. The single best laboratory test to rule-out septic arthritis is synovial WBC <17,500 with LR^- = 0.25 (95% CI 0.07-0.89) which would reduce a pre-test probability of 10% to 2.7% (95% CI 0.8% - 9%).