Critical Review Form
Diagnostic Test

Does the Presence of Crystal Arthritis Rule Out Septic Arthritis?
J Emerg Med 2007; 32: 23-26

Objective:

"To determine the incidence of concomitant septic arthritis and to determine the value, if any, of the synovial WBC count to diagnose septic arthritis in the presence of crystals". (p 23)

Methods:

Retrospective study at St. Luke's-Roosevelt Hospital (New York) of patients >18 yrs old with crystals in joint aspirate sent to the lab from 1996-2002. The authors do not report on how their medical record database was queried, who abstracted the data, whether data abstractors were blinded to the study hypothesis, or how data-abstraction accuracy was verified. Using a standardized data abstraction form patient demographics were recorded along with synovial fluid Gram stain, culture, and crystal results. Repeat joint aspirates from the same admission were excluded.

Guide		Comments
I.	**Are the results valid?**	
A.	**Did clinicians face diagnostic uncertainty?**	Yes, given the retrospective design the cultures were not available at the time of original clinician assessment.
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 all subjects had culture sent or if surrogate Gold standard were used. The authors fail to clearly state the Gold standard for septic arthritis, but it is probably synovial fluid culture.
C.	**Did the results of the test being evaluated influence the decision to perform the gold standard?** **(Ascertainment Bias)**	Uncertain, since authors don't state whether all had cultures sent.
II.	**What are the results?**	

A.	**What likelihood ratios were associated with the range of possible test results?**	• 265 synovial aspirates were included (excluded 80 repeat arthrocentesis and 20 with aspirate) with average age 65 and 2:1 male predominance. • Gout (69%) was more common then pseudogout (31%) and those with gout were younger (mean 63 yrs) than those with pseudogout (mean 76 yrs). • Gout had male predominance while pseudogout had female predominance. • The mean synovial WBC was 23,200 (95% CI 19,400 – 27,000) but the mean jWBC for those with septic arthritis was 113,000 (95% CI 72,700 – 153,200, p<0.01) and all four patients with concomitant septic and crystal arthritis had jWBC >50,000. • Four patients (1.5%, 95% CI 0-3%) had concomitant septic and crystalloid arthritis. All infections were Gram positives (two strep, two straph) and three were in pseudogout patients.
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?**	Yes, patients presenting to NY hospital with lab analysis for crystals and bacteria are likely similarly performed
B.	**Are the results applicable to the patients in my practice?**	No, patient demographics were provided, so uncertain about external validity.
C.	**Will the results change my management strategy?**	No. Presence of crystal arthritis and synovial WBC <50,000 already felt to represent a low risk patient subset.
D.	**Will patients be better off as a result of the test?**	Yes, if clinicians avoid costly hospitalizations, antibiotics and ortho consults in patients unlikely to have septic arthritis.

Limitations

1. **Underpowered (only 4 outcomes!) with insufficient chart review method description limiting the critical reader's ability to assess internal validity.**
2. **No patient demographics included limiting reader's ability to ascertain external validity.**
3. **No definition of septic arthritis or clear statement about how many had Gold standard testing or whether ascertainment bias was likely.**
4. **Failure to incorporate other synovial fluid parameters (gram stain, glucose, protein, others?) into the analysis.**

Bottom Line

Single center 7-yr retrospective review of crystal-positive synovial fluid aspirates suggests concomitant septic arthritis is rate (1.5% prevalence). Among those with synovial WBC > 50,000 the prevalence increases to 11% and for those with synovial WBC > 100,000 the prevalence is 22%. If all patients with synovial WBC > 50,000 were admitted for antimicrobial therapy pending culture results, NNT = 9 and none of the septic arthritis cases would have been missed.