**Critical Review Form**

# Diagnostic Test

# Spinal epidural abscess – experience with 46 patients and evaluation of prognostic factors, J Infection 2002; 45:76-81

**Objectives:** To review "our experience with SEA (spinal epidural abscess) over a 10-year period and describe the clinical characteristics and explore the potential prognostic factors for outcome." (p. 76)

**Methods:** Electronic medical record search of Chi-Mei Medical Center Taiwan for patients with SEA (ICD-9 code 324.1) from July 1991 to May 2000 including medical notes, lab/imaging data, and op notes. Inclusion criteria included either surgical identification of an abscess or radiological SEA (MR or CT myelography) with positive blood or abscess cultures. Exclusion criteria included spondylitis, paraspinal abscess without epidural involvement, and tuberculous SEA. Outcomes were assessed at the last clinic visit and were dichotomized as poor (no improvement in neurologic impairment or death or disease relapse) or good (all others = significant improvement in neurological deficit and pain relief). Variables with $p<0.2$ were entered into a multivariate model and then backward stepwise method was used to select the final model.

| Guide | | Comments |
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| **I.** | **Are the results valid?** | |
| **A.** | **Did clinicians face diagnostic uncertainty?** | Presumably so although the authors do not provide details about where patients presented (ED? Neurosurgery clinic?). Who evaluated them or what the initial clinicians diagnostic impressions were except "The initial diagnosis was in error in 34 patients (74%) and included sepsis of unknown origin (9 patients), spondylitis (9 patients), renal stone or abscess (4 patients), acute pyelonephritis (3 patients), degenerative joint disease of spine (2 patients), and deep neck infection (1 patient)." (p. 77) |
| **B.** | **Was there a blind comparison with an independent gold standard applied similarly to the treatment group and to the control group?** **(Confirmation Bias)** | No. There was no control group and not all SEA were diagnosed in the same way. Some used MRI, others CT-myelo and others were diagnosed operatively. Since disease-negative patients were not assessed we cannot evaluate specificity or LR's. Since different criterion standards were used and since the decision to perform MRI vs CT vs OR vs none of the above was undoubtedly influenced by the constellation of diagnostic variables being assessed, we cannot be assured that all cases of SEA were identified or that estimates of sensitivity are accurate. |
| **C.** | **Did the results of the test being evaluated influence the decision to perform the gold standard?** **(Ascertainment Bias)** | Yes, see above. |
| **II.** | **What are the results?** | |
| **A.** | **What likelihood ratios were associated with the range of possible test results?** | • 46 SEA patients were identified with 78% male and mean age 60 years with a median symptom duration 7 days (range 1-180 days) and the initial diagnosis was wrong in 74%.<br>• SEA were located in the cervical (20%) and thoracic (30%) spine less often than the lumbar spine (50%).<br>• Blood cultures were positive in 70% and staphylococcus aureus represented 39% of positive cultures (followed by strep viridans 6.5% strep agalactiae 8.6%, Klebsiella 4.3%, and Salmonella 4.3%. |

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| | | • Signs, symptoms and risk factors provided the following sensitivity for SEA.<br><br>Risk Factor/Sign/Symptom — Sensitivity (1%)<br>Spine pain 89<br>Fever/chills 67<br>Paralysis 80<br>Radicular pain 57<br>Local tenderness 48<br>Bowel/bladder dysfunction 37<br>Paresthesia 28<br>Neck stiffness 17<br>Confusion 7<br>DM 46<br>Chronic intravenous injection 35<br>Spine trauma 24<br>Spine surgery 22<br>Liver disease 11<br><br>• 54% had surgical management of SEA and the remainder had medical therapy alone.<br>• The median follow-up was 20 weeks and 72% had a good outcome.<br>• Platelet <100, ESR>110, and cervical spine involvement were entered into the logistic regression model but the only independent predictor of potential prognostic was low platelet count. |
| **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?** | Uncertain. There are too many unknowns. Do Taiwan patients differ from urban Americans in SEA prognostic fractures? Where did these patients present (ED? NGS Clinic?)? How were DM, intravenous injection, liver disease, etc. defined by clinicians who charted and data abstractors? What are the specificities of these prognostic factors? |
| **B.** | **Are the results applicable to the patients in my practice?** | Uncertain for the reasons questioned in III-A. |
| **C.** | **Will the results change my management strategy?** | Yes by recognizing the poor sensitivity of history, physical exam and labor for SEA in conjunction with the fact that specificity and LR's are completely unknown. Clinicians cannot be confident that these sensitivities accurately reflect their population (external validity) or that any of these diagnostic tests will change pretest probabilities significantly |

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| | | (since LR's cannot be computed). |
| **D.** | **Will patients be better off as a result of the test?** | Yes if clinicians recognize the inaccuracy of history, physical exam and labs to diagnose SEA. Unfortunately, this study design does not provide sufficiently conclusive diagnostic test results for clinicians to diagnose SEA without imaging or operation. This will translate into increasing MRI ordering rates to detect the rare SEA amongst large numbers of patients with back pain and fever. |

**Limitations:**

1. Insufficient details about
    a. Study setting – ED patients? Neurosurgery clinic? Referrals?
    b. Symptom duration.
    c. Frequency of various diagnostic strategies to diagnose SEA.
    d. Chart review methods (REF) 5?
2. No assessment of disease negative patients (i.e., those with clinically suspected SEA who do not have SEA) so unable to assess disease prevalence, specificity, or LR's. This methodology is substandard by STARD criteria and over-estimates sensitivity.
3. No CI's reported
4. No definitions provided. For example, what constituted "fever", "confusion", or "liver disease"? Without unequivocal definitions for subjective variables, significant variability will manifest between physicians (for chart reviewers) as far as who does or does not have these risk factors.
5. No assessment of combinations of history, physical exam and labs.

**Bottom Line:**

Diagnostic testing for SEA with definitive imaging (MRI) must be aggressively pursued if SEA is suspected since the sensitivity for history and physical exam are extremely low. Future research is needed to assess ED patients with and without SEA in order to understand the prevalence (pre-test probability), specificity, and LR's for these patients.