Current Best Evidence: Translating Best Evidence into Best Care

EDITOR'S NOTE: Studies for this issue were identified using alerts from *Archives of Disease in Childhood-Education and Practice, Archives of Disease in Childhood-Fetal and Neonatal, Archives of Disease in Childhood, British Medical Journal, Journal of the American Medical Association, New England Journal of Medicine, Pediatric Infectious Disease Journal, Pediatrics, The Journal of Pediatrics,* and *The Lancet*. Search terms were "paediatrics" [All Fields] OR "pediatrics" [All Fields] OR "pediatrics" [MeSH Terms]. In addition, studies also were identified using the Clinical Queries feature of PubMed. Cleo Pappas, MLIS, Library of the Health Sciences, University of Illinois at Chicago, contributed to the review and selection of this month's abstracts.

—Jordan Hupert, MD

EVIDENCE-BASED MEDICINE PEARL: VERY HIGH SENSITIVITY AND SPECIFICITY: Very high sensitivity implies few or no false negatives; very high specificity implies few or no false positives. The clinical implications of very high sensitivity and specificity are that they rule out and rule in a diagnosis when the results are negative and positive, respectively. Mnemonics for these rule-out and rule-in "rules" are "Snout" (very high Sensitivity, a Negative test result rules OUT the disease) and "Spin" (very high Specificity, a Positive test result rules IN the diagnosis) (Sackett et al; In: Evidence-based medicine, New York: Churchill Livingstone; 1997. pp. 121-2). Of course, "very high" is relative. One needs to weigh the consequences of a "few" false negatives (or positives) with the consequences of providing (or not providing) treatment. A specificity of 95% is considered a "Spin" for a rapid strep test and treatment is started. This would not be the case for diagnosing a malignancy and starting chemotherapy. See the review of the article by Mittal et al (see piece by Taylor on page 672 regarding article Mittal et al; *Acad Emerg Med* 2013;20:297-702), for a possible "Spin" when using ultrasound to diagnose appendicitis.

—Jordan Hupert, MD

EVIDENCE-BASED MEDICINE LIBRARIAN PEARL: POINT-OF-CARE TOOLS: A point-of-care tool (POCT) synthesizes current medical knowledge. The best POCTs provide critically-appraised information and quality-rated recommendations. Some of the more popular POCTs are UpToDate, DynaMed, Database of Abstracts of Reviews of Effects, Essential Evidence Plus, and the Trip Database. Check the online descriptions of these POCTs to assess their quality. Many of the most popular POCTs require a subscription. The variety of topics covered varies by POCT. Your choice may be influenced by your personal format preferences (eg, DynaMed offers a bulleted format, UpToDate offers a narrative style). Also, remember to look for a resource that is updated frequently.

—Cleo Pappas, MLIS

Abdominal ultrasound is specific but insufficiently sensitive in diagnosing appendicitis

Mittal MK, Dayan PS, Macias CG, Bachur RG, Bennett J, Dudley NC, et al. Performance of ultrasound in the diagnosis of appendicitis in children in a multicenter cohort. *Acad Emerg Med* 2013;20:697-702.

Question Among children with acute abdominal pain concerning for appendicitis, what is the diagnostic accuracy of abdominal ultrasound (US), compared with pathology, operative reports, or telephone follow-up, in diagnosing appendicitis?

Design Secondary analysis of a prospective, observational study.

Setting 10 pediatric emergency departments across the United States.

Participants Children, ages 3 to 18 years, with acute abdominal pain concerning for appendicitis.

Intervention Abdominal US obtained by clinicians at their discretion.

Outcomes Final diagnosis of appendicitis was determined by pathology, operative reports, or telephone follow-up.

Main Results US had an overall sensitivity of 72.5% (95% CI, 58.8% to 86.3%) and specificity of 97.0% (95% CI = 96.2% to 97.9%), positive likelihood ratio (+LR) of 24.5 (95% CI, 15.6 to 38.3), and negative likelihood ratio (–LR) of 0.28 (95% CI, 0.24 to 0.34), in diagnosing appendicitis. US sensitivity was 77.7% at the three sites (combined) that used it in 90% of cases, 51.6% at a site that used it in 50% of cases, and 35% at the four remaining sites (combined) that used it in 9% of cases. US retained a high specificity of 96% to 99% at all sites. Of the 469 (48.6%) cases across sites where the appendix was clearly visualized on US, its sensitivity was 97.9% (95% CI, 95.2% to 99.9%), with a specificity of 91.7% (95% CI, 86.7% to 96.7%), +LR 11.8 (95% CI, 7.7 to 18.2), and –LR 0.02 (95% CI, 0.009 to 0.05).

Conclusions US sensitivity and the rate of visualization of the appendix on US varied across sites and appeared to improve with more frequent use. US had universally high sensitivity and specificity when the appendix was clearly identified.

Commentary The diagnosis of appendicitis in children continues to be a challenging endeavor, despite advances in laboratory and imaging diagnosis. There is increasing concern for life-time radiation-induced malignancy risk associated with the use of computed tomography (CT). The study by Mittal et al provides both good and bad news about the use of US as the primary imaging modality for the diagnosis of suspected appendicitis. The good news in this multicenter observational study is that US had a specificity rate of >96% across all centers studied. The bad news is that the sensitivity was only 77% at the clinical sites with the highest utilization, and as low as 35% in those sites with the lowest use. This study makes clear that, regarding US for appendicitis, practice makes "better," but not "perfect." Thus, increasing a center's experience with US will only go so far in improving diagnosis. Fortunately, there are several studies showing that US followed by CT in patients with nondiagnostic US studies is an efficient and effective approach.[1] Used together with validated decision support rules, the high specificity of US for appendicitis eliminates the need for many CT scans while preserving overall diagnostic accuracy in the clinical environment.[2] Early studies also point to a potential role for MRI as a substitute for CT in diagnostic protocols.[3]

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Bracing reduces progression of high-risk curves in idiopathic scoliosis

Weinstein SL, Dolan LA, Wright JG, Dobbs MB. Effects of bracing in adolescents with idiopathic scoliosis. *N Engl J Med* 2013;369:1512-21.

Question Among adolescents with idiopathic scoliosis, what is the therapeutic efficacy of bracing, compared with no bracing, in prevent progression of spinal curvature to surgical-intervention levels?

Design Randomized controlled trial (RCT) and preference cohort trial.

Setting 25 institutions across the United States and Canada.

Participants Patients, ages 10-15 years, with skeletal immaturity and a Cobb angle for the largest curve of 20-40 degrees.

Intervention Rigid thoracolumbosacral orthosis or not.

Outcomes The primary outcomes were curve progression to ≥ 50 degrees (treatment failure) and skeletal maturity without this degree of curve progression (treatment success).

Main Results The trial was stopped early owing to the efficacy of bracing. In an analysis that included both the randomized and preference cohorts, the rate of treatment success was 72% after bracing, compared with 48% after observation (propensity-score-adjusted odds ratio for treatment success, 1.93; 95% CI, 1.08 to 3.46). In the intention-to-treat analysis, the rate of treatment success was 75% among patients randomly assigned to bracing, as compared with 42% among those randomly assigned to observation (number not treated 3, 95% CI 2 to 7). There was a significant positive association between hours of brace wear and rate of treatment success ($P<.001$).

Conclusions Bracing significantly decreased the progression of high-risk curves to the threshold for surgery in patients with adolescent idiopathic scoliosis. The benefit increased with longer hours of brace wear.

Commentary The best prior evidence for scoliosis bracing was a 1995 intercenter comparative study.[1] However, it had important weaknesses including using a 6° increase as a surrogate for failure, no compliance monitoring, and a poor maturity measurement (potentially confounding cohort comparability). The study by Weinstein et al addresses these issues by defining failure as progression to a recognized surgical range, compliance monitoring, and an RCT design. However, a preference arm was added because randomization willingness was lower than preliminary inidications.[2] The study shows clearly that bracing can prevent progression to a surgical range, that increased compliance is correlated to increased success, and that current bracing indication standards lead to overtreatment. Hopefully, further analysis will help identify patients unlikely to benefit from bracing.

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