Developing a New Scoring System for Diagnosis of Acute Appendicitis

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Since the first description of appendicitis and an early surgical removal of the appendix was advocated by Reginald Fitz in 1886, acute appendicitis has been recognized as one of the most common causes of acute abdominal pain and surgical emergencies worldwide. In the United States, 250,000 cases of appendicitis are reported annually, occurring mostly in the second and third decades of life. The incidence is highest in the teenage group, in which it is about 233/100,000 of the teenager population. In Asian and African countries, incidence of acute appendicitis is lower [1, 2]

Appendicitis may occur for several reasons, most important of which is the obstruction of the appendiceal lumen. If left untreated, appendicitis can cause severe complications including appendiceal perforation, sepsis, and even death. The diagnosis of appendicitis is often a clinical challenge as appendicitis can mimic several abdominal conditions [3]. No single clinical feature or diagnostic test accurately confirms the diagnosis of appendicitis in all the cases. The classic history of anorexia and periumbilical pain followed by nausea, right lower quadrant pain, and vomiting occurs only in 50% of the cases.

The medical history, physical examination, and laboratory studies can often lead an experienced clinician to the correct diagnosis of appendicitis without further imaging. The diagnostic accuracy of the clinical examination depends on the experience of examining clinician. Performed by an experienced clinician, the diagnostic accuracy of clinical evaluation is 75-90% [4, 5] Several scoring systems have been proposed to standardize the correlation of clinical and laboratory variables with appendicitis, with a diagnostic sensitivity of 53-99% and specificity of 30-99% [6]. Among these scoring systems, the modified Alvarado score is probably the most widely used system to diagnose acute appendicitis [7]. While addition of these diagnostic aids to clinical judgment has the potential to lower false-positive rates in diagnosis of acute appendicitis, these decision aids cannot completely exclude the possibility of appendicitis. Use of imaging modalities, such as ultrasonography or computed tomography (CT) in the diagnosis of acute appendicitis can decrease the rate of negative appendectomies [8]. A simple scoring system that also incorporates imaging data is needed.

In the current issue of the journal, Siddiqui *et al* [9] has presented a simple scoring system incorporating ultrasound examination with clinical and laboratory data for improving diagnostic accuracy of acute appendicitis. Furthermore, they have also evaluated the performance of their scoring system compared with other scoring systems. Ultrasound is an economical and reliable test for confirming the diagnosis of acute appendicitis but has high false-negative rates. Quick availability of results, lack of radiation exposure, and minimal pre-procedure preparation are other key advantages. On the other hand, ultrasound is not as accurate as CT scan and is less likely to reveal alternative diagnosis. In this study, authors combined ultrasound findings with clinical and laboratory finding to generate a score and report 95.4% sensitivity and 97.4% specificity, and 96.5% accuracy when compared to other scoring systems [9].

Despite the high sensitivity and specificity, this new scoring system does have some limitations. First, the accuracy of ultrasound is operator dependent and it may be difficult to image patients with a large body physique or those who have a large amount of overlying bowel gas. Secondly, authors have not explained how they decided to include each variable in the scoring system and how were they able to assign a score to each variable. The process of selecting and weighing variables for diagnostic scoring systems is usually done by using a multivariable logistic regression model. Third, authors have not validated their score in an independent sample of patients; for obvious reasons, a scoring system developed from a

dataset is likely to get a higher score than other scoring systems when used to predict outcomes in the same dataset. Fourth, unless there is an external validation of this score by independent investigators in an independent dataset, this score cannot be used for clinical decision making.

As appendectomy remains the only curative treatment of appendicitis, a surgeon's goal is to minimize the negative appendectomy rate

without increasing the incidence of perforation.

Moreover, an emergency department clinician must evaluate a larger group of patients with abdominal pain of all etiologies with the goal of approaching 100% sensitivity for the diagnosis in a time, cost, and consultation efficient manner. Any tool that helps a physician in making an accurate diagnosis will be of immense help.

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