Prospective Comparison of the Alvarado Score and CT Scan in the Evaluation of Suspected Appendicitis: A Proposed Algorithm to Guide CT Use

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BACKGROUND: Although computed tomography (CT) has reduced negative appendectomy rates, its radiation risk remains a concern. We compared the performance statistics of the Alvarado Score (AS) with those of CT scan in the evaluation of suspected appendicitis, with the aim of identifying a subset of patients who will benefit from CT evaluation.

STUDY DESIGN: We performed prospective data collection on 350 consecutive patients with suspected appendicitis who were evaluated with CT scans. The AS for each patient was scored at admission and correlated with eventual histology and CT findings. The sensitivity, specificity, and positive likelihood ratios were determined for various AS and for CT scan. The AS ranges that benefitted most from CT evaluation were determined by comparing the positive likelihood ratios of CT scan with each of the AS cutoff values.

RESULTS: The study included 134 males (38.3%) and 216 females (61.7%). The overall prevalence of appendicitis was 44.3% in the total study population; 37.5% in females and 55.2% in males. There were 168 patients (48%) who underwent surgery, with a negative appendectomy rate of 7.7%. Positive likelihood ratio of disease was significantly greater than 1 only in patients with an AS of 4 and above. An AS of 7 and above in males and 9 and above in females has a positive likelihood ratio comparable to that of CT scan.

CONCLUSIONS: Evaluation by CT is beneficial mainly in patients with AS of 6 and below in males and 8 and below in females. We propose an objective management algorithm with the AS guiding subsequent evaluation. (J Am Coll Surg 2015;220:218–224. © 2015 by the American College of Surgeons. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license [http://creativecommons.org/licenses/by-nc-nd/3.0/].)

Acute appendicitis is one of the most common causes of acute abdominal pain requiring surgical intervention, with a lifetime risk of 8.6% for males and 6.7% for females.[1,2] Historically, negative appendectomy rates of more than 20% were considered the norm. However, this is no longer acceptable because even though complication rates in the setting of negative appendectomy are low, conditions such as incisional hernias, intestinal obstruction secondary to adhesions, and stump leakages can result in significant morbidity.

Computed tomography (CT) scan has emerged as the dominant imaging modality for evaluation of suspected appendicitis in adults.[3] It has decreased negative appendectomy rates to less than 10%.[4-6] However, the radiation exposure with CT poses a concern, particularly in appendicitis, which occurs predominantly in young patients most susceptible to the adverse effects of radiation.[7,8] Available literature has estimated that at least 25% of CT scans are not clinically warranted and may pose more harm than benefit.[9] Rules for clinical decisions guiding CT use are therefore essential to minimize unnecessary CT scans.[9] We previously proposed a management algorithm for suspected appendicitis with the Alvarado

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