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LETTER TO THE EDITOR

Ultrasonography for diagnosis of appendicitis in children

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Dear Editor

We read with great interest the article by Held et al. about "The non-visualized appendix and secondary signs on ultrasound for pediatric appendicitis in the community hospital setting. Pediatr Surg Int. 2018 Dec; 34(12):1287–1292" [1]. Graded compression ultrasound is considered diagnostic of appendicitis if it demonstrates a non-compressible, blind-ending structure in the right lower quadrant (RLQ) that is greater than 6 mm in diameter [2]. Failure to visualize the appendix or a non-visualized appendix (NVA) occurs with 20–60% of right lower quadrant US performed in children [1, 3]. Held et al. stated that "Secondary signs of inflammation including free fluid, ileus, fat stranding, abscess, and lymphadenopathy attributable to appendicitis on ultrasound may aid with diagnosis in the setting of a NVA. Six hundred and seventeen ultrasounds were reviewed; 470 of these had a NVA. Of NVAs, 47 (10%) patients were diagnosed with appendicitis. According to Held et al., sensitivity and specificity of having at least one secondary sign were 38.3% and 80%, respectively; while positive and negative predictive values of having at least one were 17.3% and 92%, respectively. Their data suggest that the absence of secondary signs has a strong negative predictive value (> 89%) for appendicitis [1]. Our retrospective clinical study included 42 girls and 58 boys who were operated for appendicitis. Their histopathological reports and pre-operative ultrasonography (USG) results were compared. Our patients' ages ranged from 3 to 7 years and mean age was 11.3 ± 3.7 years. Diagnosis of appendicitis was made histopathologically in 72% patients, while USG revealed non-compressible, blind-ending structure in the RLQ that is greater than 6 mm in only 57 patients (57%). In addition, 42% periappendiceal fluid collection, 25% periappendiceal fat inflammation, and 14% appendicolith were detected ultrasonographically. In 18 of the 28 patients without appendicitis histopathologically, ultrasonographic signs were also absent (64.3%). Moreover, ultrasonographic diagnosis was reached in 47 (65.3%) of the 72 patients with pathologically confirmed appendicitis ($p = 0.007$) [5]. In cases of pathologically unconfirmed appendicitis, periappendiceal fluid collection was negative in 17 (60.7%) and positive in 11 (39.3%) by USG. In these unconfirmed cases, periappendiceal fat inflammation was not present in 26 (92.9%) and present in 2 (7.1%); while appendicolith was not present in 26 (92.9%) but present in 2 (7.1%). In cases of pathologically confirmed appendicitis, periappendiceal fluid collection was negative in 41 (56.9%) and positive in 31 (43.1%) ($p = 0.732$) by USG. In these confirmed cases, periappendiceal fat inflammation was not present in 49 (68.1%) and present in 23 (31.9%) ($p = 0.01$); while appendicolith was not present in 60 (83.3%) but present in 12 (16.7%) ($p = 0.218$). The accuracy of pediatric USG in the literature varies from 44 to 94% and specificity from 47 to 95% [4]. In our study, the sensitivity and specificity of USG were found as 66.6% (48/72) and 64.28% (18/28), respectively. Furthermore, the incidence of negative laparotomy was 28% in our study, and the positivity of ultrasonography was below that of clinical examination by giving us 57% positive results. However, USG provided higher rates (64.3%) of findings that supported the diagnosis in cases that did not receive appendicitis diagnosis pathologically. Similarly, 47 of the pathologically confirmed cases of appendicitis had 65.3% supportive findings of appendicitis on USG. What was interesting in our study is that the association of the absence of appendicolith and periappendiceal fat inflammation and the absence of pathologically confirmed appendicitis was 92.9%. The relatively low rate of accuracy, specificity, and sensitivity of USG in our study could be attributed to the absence of clinical experience and the fact that the results were evaluated by a different radiologist every day [5]. Clinical observation and frequent examination are still the most effective methods in the diagnosis of acute appendicitis. USG must be assessed correlatively

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with clinical examination and appendicitis not supported by USG must be considered more reliable in cases that are not clinically considered as appendicitis.

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Compliance with ethical standards

Conflict of interest The authors have no conflict of interest to disclose.

Ethical approval This article does not contain any studies with human participants or animals performed by any of the authors.

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