



PEDIATRIC SURGERY *Update**

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Alvarado Score

Acute appendicitis is the most common surgical emergency in children with an estimated 6% lifetime event risk in the general population. More than 300,000 appendectomies are performed each year in the United States, and less than 10% result in the removal of a normal appendix. Appendicitis is thought to be caused by luminal obstruction from various etiologies, leading to increased mucus production and bacterial overgrowth resulting in wall tension, necrosis, and potential perforation.

The clinical diagnosis of appendicitis is based on symptoms, signs, and laboratory data. The differential diagnosis is extensive. Appendiceal perforation rates are higher in children and elderly patients. A variety of different approaches are recommended to decrease the negative appendectomy rate such as predictive scoring system, computer aided diagnosis, inflammatory markers, ultrasound, and CT scan.

The 2020 World Society of Emergency Surgery updated guidelines recommend the use of the Alvarado score to aid in the diagnosis of acute appendicitis in children, but it shows that the level of evidence is not high enough. The Alvarado score described in 1986 enables an early clinical diagnosis of acute appendicitis. The Alvarado score is a 10-point metric system composed of points for symptoms, clinical signs, and laboratory data.

For symptoms, there is 1 point each for migration of pain to right lower quadrant, anorexia, and nausea/vomiting. For clinical signs there are 2 points for tenderness in the right lower abdomen, 1 point for rebound tenderness, and 1 point for temperature greater than or equal to 37.3 C, and for laboratory data there are 2 points for leukocytosis and 1 point for neutrophils greater than or equal to 75%.

Once the score is reached, the total score is categorized as low (0-4), equivocal (4-6) and high (7-10) probability for acute appendicitis. With a low Alvarado score the child can be managed outpatient, with a score between 4 and 6 the child should undergo emergency department evaluation using initial ultrasound if available. Scores above 7 need surgical consultation or imaging with serial evaluation.

The Alvarado score metric favors specificity over sensitivity, with high positive predictive value and diagnostic accuracy for acute appendicitis. In a recent meta-analysis study involving 5985 children in 11 countries, the Alvarado score had a combined sensitivity of 76% and a combined specificity of 71% for the diagnosis of acute appendicitis in children.

From the combined results the accuracy of the Alvarado score in diagnosing acute appendicitis in children still needs to be improved, and it's not recommended to be used alone.

The Alvarado score is practical, simple, and reproducible being a reliable tool in two pediatric situations: when imaging is scarce, and when a child with suspected appendicitis has difficulty finding the appendix on ultrasound due to obesity. Also, the use of the Alvarado score for diagnosing appendicitis can reduce radiation exposure examination in children to a certain extent by using it several times to evaluate the condition and observe the progression of the child condition. Alvarado score combined with C-reactive protein can improve the diagnostic accuracy of appendicitis and also help in the exclusion diagnosis.

The Pediatric appendicitis score includes similar clinical findings in addition to a sign more relevant in children: right lower quadrant pain with coughing, hopping or percussion. The appendicitis inflammatory response score includes fewer symptoms than the Alvarado score but adds an inflammatory biomarker, C-reactive protein, and allows for different severity levels of rebound pain, leukocytosis, CRP and polymorphonucleocytes. CT Scan continues to be the most commonly utilized imaging study in the evaluation of suspected appendicitis in approximately more than 75% of cases, though ultrasound is recommended as the initial modality especially in children and pregnant women.

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