

# Diagnostic dilemma in acute appendicitis USG versus clinical findings

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## Abstract

**Objectives:** To study Diagnostic dilemma in Acute Appendicitis for USG and Clinical findings. **Methodology:** This was cross-sectional study in all the patients with the symptoms of Appendicitis at the Surgery department of tertiary health care center during January 2015 to January 2016. There were total 90 patients who need surgical treatment as per the decision of the Operating surgeon. All the patients were evaluated by Alvarado Clinical system for the diagnosis of Appendicitis and Ultrasonographical investigations was done as per indications and advise of the surgeon so out 90 patients USG was done in 80 patients later on all the operated specimen of Appendix was sent to histopathological confirmation. For Alvarado and Ultrasonography Sensitivity, Specificity, Positive Predictive Value, Negative Predictive Value etc. was calculated and compared. **Results:** Alvarado clinical system was having Sensitivity 95.12% and Specificity 75.00%, Positive Predictive Value 97.50 % and Negative Predictive Value 60.00 % and USG was having Sensitivity -94.59%, Specificity- 83.33 %, Positive Predictive Value-98.59%, Negative Predictive Value-55.56 %. **Conclusion:** Alvarado was having highest sensitivity and Specificity as compared to USG so the usefulness of clinical system should not be underestimated in with the diagnosis of USG.


**Keywords:** Appendicitis, Alvarado Score, USG and Appendicitis.

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## INTRODUCTION

Since Reginald H. Filz, anatomopathologist at Harvard, first described the disease and first introduced the term appendicitis in 1886<sup>1</sup>, acute appendicitis remained the most common general surgical emergency seen in most hospitals<sup>2</sup> and the most common cause of acute abdomen requiring surgical intervention<sup>3</sup>. In industrialized countries, individuals have a 7% lifetime risk of developing appendicitis, with the highest frequency occurring at ages from 10 to 30 years. The risk gradually decreases until age 50, when it stabilizes<sup>4</sup>. Typical uncomplicated cases of acute appendicitis are easy to

diagnose and treat. Typical cases present classically with para-umbilical pain (visceral pain) migrating to the right lower quadrant of the abdomen (RLQ). Pain usually is associated with nausea, vomiting and low-grade fever. Localized irritation and inflammation of the peritoneum results in pain with cough (Dunphy's sign), tenderness and muscle guarding on palpation in the RLQ over McBurney's point and rebound tenderness elicited by deep palpation with quick release (Blumberg sign). Unfortunately, 20-33% of the patients suspected of having acute appendicitis present with atypical findings<sup>5-7</sup>. Accurate and timely diagnosis of atypical cases remains clinically challenging and one of the most commonly missed problems in the emergency departments. Precaution appendectomy or misdiagnosis of presumed appendicitis is an adverse outcome that leads to unnecessary surgery<sup>8</sup>. Statistics reported that 1 of 5 cases of appendicitis is misdiagnosed; however, a normal appendix is found in 15-35% of patients who have emergency appendectomy<sup>10-12</sup>. Variation in the position of the appendix, age of the patient and degree of inflammation make the clinical presentation of appendicitis inconsistent. Females during childbearing age present diagnostic difficulty and the incidence of

misdiagnosis is increased for women of the reproductive age<sup>13</sup>. Despite technologic advances, the diagnosis of appendicitis is still based primarily on the patient's history and the physical examination<sup>14</sup>. It has been estimated that the accuracy of the clinical diagnosis of acute appendicitis is lying between 76% and 92%, with values correlating with the surgeon's experience<sup>15</sup>. Over the years various clinical scoring systems (some of them computer assisted) have been used, and, although their clinical benefits have varied, most reports describe some improvement in clinical performance with their use. The greatest beneficiaries may be junior staff, whose diagnostic accuracy increases from 58% to 71%<sup>16</sup>. Alvarado scoring system is the most famous scoring system used to help with the clinical diagnosis of acute appendicitis and is very easy to apply<sup>17</sup>.

### MATERIAL AND METHODS

This was cross-sectional study in all the patients with the symptoms of Appendicitis at the Surgery department of tertiary health care center during January 2015 to January 2016. There were total 90 patients who need surgical treatment as per the decision of the Operating surgeon. All the patients were evaluated by Alvarado Clinical system for the diagnosis of Appendicitis and Ultrasonographical investigations was done as per indications and advise of the surgeon so out 90 patients USG was done in 80 patients later on all the operated specimen of Appendix was sent to histopathological confirmation. For Alvarado and Ultrasonography Sensitivity, Specificity, Positive Predictive Value, Negative Predictive Value etc. was calculated and compared.

### RESULTS

**Table 1:** Distribution of the Patients as per the Alvarado Score and Histopathological diagnosis

Histopathology	Alvarado Score Positive	Alvarado Score Negative	Total
HP Positive	78	2	84
HP Negative	4	6	6
<b>Total</b>	<b>82</b>	<b>8</b>	<b>90</b>

For Alvarado Score the Sensitivity was 95.12% and Specificity 75.00 %, Positive Predictive Value 97.50 % and Negative Predictive Value 60.00 %.

**Table 2:** Distribution of the Patients of the Patients as per the USG and Histopathological diagnosis

Histopathology	Positive USG Findings	Negative USG Findings	Total
HP Positive	70	1	71
HP Negative	4	5	9
<b>Total</b>	<b>74</b>	<b>6</b>	<b>80</b>

Sensitivity -94.59%, Specificity-83.33 %, Positive Predictive Value -98.59%, Negative Predictive Value - 55.56 %.

### DISCUSSION

Application of Alvarado scoring system in diagnosis of acute appendicitis can provide a high degree of positive predictive value and thus diagnostic accuracy. The positive predictive value of Alvarado score is reported as high as 85.3%, 87.5% and 87.4% in many studies<sup>17,18</sup>. The accuracy of clinical diagnosis of suspected cases of acute appendicitis can further be improved by repeated clinical examination and adoption of what is called active observation. Patients under active observation are kept fasting and re-evaluated for progression or regression of their symptoms and signs by repeated clinical examination every 2-3 hours (preferably by the same physician) and repeated estimation of white blood count and C-reactive protein. Active observation confirms intraperitoneal pathology which requires surgical intervention or further investigation in a small group of patients. It also excludes those found to have medical illness, e.g., UTI. In 30-40% of patients, a firm diagnosis is not possible; those patients can benefit from a further period of active observation with or without further investigation depending on whether the symptoms are persisting or improving. Active observation results in a substantial fall in negative appendectomy rate (9) and is widely considered as safe and effective approach to the management of patients with equivocal features of acute appendicitis<sup>19</sup>. The rate of unnecessary laparotomies is still high: to balance an acceptable positive laparotomy rate with minimal delayed or missed diagnoses, the clinician must take into account all the available historical and physical findings, laboratory data, and appropriate imaging method. In fact, following significant advances in accuracy, imaging is an important part of the modern work-up of appendicitis, that remains a high-risk disease for delayed or missed diagnosis in the emergency department<sup>20,21</sup>. Among imaging methods currently used in the clinical practice, Ultrasound (US) is a valuable tool. It was first introduced by Puylaert in 1986, who described the "graded compression" technique apt to better visualize the inflamed appendix<sup>22</sup>; by using the graded compression technique, a linear high-frequency transducer is placed on the right lower quadrant and pressure is applied gradually while imaging, displacing overlying gas-filled loops of bowel. Moreover, this noninvasive option is repeatable, avoids the exposure to nonionizing radiation and can be less expensive as compared to Computed Tomography (CT) costs. At US, findings suggestive of appendicitis include, a thickened wall, a noncompressible lumen, outer appendiceal diameter greater than 6 mm, absence of gas

in the lumen, appendicoliths, echogenic inflammatory periappendiceal fat change, and increased blood flow in the appendiceal wall. If compared to other diagnostic tests, US is inferior to CT as to sensitivity; due to its low negative predictive value for appendicitis, it may not be as useful for excluding appendicitis. More recently, color and power Doppler examination of the appendix have proven to be a useful adjunct to improve the sensitivity by demonstrating increased flow in an inflamed appendix<sup>23,24</sup>. Indeed, US is not accepted worldwide to rule out an acutely inflamed appendix: the quality of the ultrasound examination improves with operator experience and skill another limitation of ultrasound in the diagnosis of acute appendicitis is the fact that patients cannot be safely be sent home after a negative result unless there are good clinical grounds for their discharge<sup>2</sup>. In our study, for Alvarado Clinical diagnosis the Sensitivity was 95.12% and Specificity 75.00 %, Positive Predictive Value 97.50 % and Negative Predictive Value 60.00 %. This was similar to Memon ZA *et al*<sup>25</sup>, who found sensitivity and specificity of the Alvarado scoring system were found to be 93.5% and 80.6% respectively. Positive and negative predictive values were 92.3% and 83.3%, respectively, and accuracy was 89.8%. And for the USG Sensitivity was 94.59%, Specificity-83.33 %, Positive Predictive Value -98.59%, Negative Predictive Value - 55.56 % this was similar to Fabio Pinto *et al*<sup>26</sup> but they have variation in the range of Sensitivity and specificity i.e. acute appendicitis (sensitivity range from 44% to 100%; specificity range from 47% to 99% ). This is due to many reasons, including lack of operator skill, increased bowel gas content, obesity, anatomic variants, and limitations to explore patients with previous laparotomies.

## CONCLUSION

Alvarado was having highest sensitivity and Specificity as compared to USG so the usefulness of clinical system should not be underestimated in with the diagnosis of USG.

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