



EVALUATING ALVARADO VERSUS TZANAKI SCORES IN DIAGNOSING ACUTE APPENDICITIS: A PROSPECTIVE COMPARATIVE STUDY

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ABSTRACT

Background: Acute appendicitis is a frequent cause of emergency abdominal surgery. Timely diagnosis remains critical to reducing complications and avoiding unnecessary procedures. Scoring systems such as the Alvarado and Tzanakis scores are designed to aid clinicians in this task. **Aim:** To compare the diagnostic performance of the Alvarado and Tzanakis scores in patients presenting with suspected acute appendicitis. **Methods:** A prospective study was conducted on 100 patients. Clinical parameters were used to compute Alvarado and Tzanakis scores before surgery. Postoperative histopathological results were used as the standard of comparison. Sensitivity and positive predictive value (PPV) were calculated for both scores. **Results:** The Alvarado score showed a sensitivity of 94.7% and a PPV of 94.7%, while the Tzanakis score had a sensitivity of 89.5% and a PPV of 94.4%. Among the cases, 70% underwent laparoscopic appendectomy. Histological confirmation was seen in 90% of cases. **Conclusion:** Both scoring systems demonstrated good diagnostic utility. However, the Alvarado score had a slight edge in terms of sensitivity. It remains a valuable tool, particularly in settings lacking immediate imaging support.

KEYWORDS

Acute appendicitis, Alvarado score, Tzanakis score, diagnostic tools, clinical scoring systems

INTRODUCTION

Acute appendicitis remains one of the most common causes of emergency abdominal surgery worldwide, with a lifetime risk of approximately 8.6% in males and 6.7% in females [1]. Despite advancements in imaging modalities, atypical presentations and limited access to ultrasonography or CT in many settings contribute to a negative appendectomy rate reported between 15% and 25% historically [11]. Clinical scoring systems have therefore been developed to standardize assessment, improve diagnostic accuracy, and minimize unnecessary operations.

The Alvarado score, first introduced by Alvarado in 1986, combines eight easily obtainable parameters: symptoms (migratory right iliac fossa pain, anorexia, nausea/vomiting), signs (tenderness in the right lower quadrant, rebound tenderness, elevated temperature), and laboratory findings (leukocytosis, left shift) [2]. Each is assigned 1–2 points for a total score ranging from 0 to 10. A score ≥ 7 typically indicates a high probability of appendicitis, guiding the decision for surgical intervention, while 5–6 suggests equivocal findings that may warrant further observation or imaging.

In contrast, the Tzanakis score—proposed by Tzanakis et al. in 2005—integrates clinical signs (RLQ tenderness and rebound tenderness), leukocyte count ($>12,000/\text{mm}^3$), and ultrasonographic findings (appendiceal diameter >6 mm, lack of compressibility, peri-appendiceal fluid) [3]. Points are allocated to each domain for a maximum score of 15, with a cut-off ≥ 8 yielding high specificity and positive predictive value. Although the addition of ultrasound data enhances specificity, operator dependence and variable imaging availability can limit its universal applicability [6].

This study aims to prospectively compare the diagnostic performance of the Alvarado and Tzanakis scoring systems in patients presenting with suspected acute appendicitis, using histopathology as the gold-standard reference.

METHODOLOGY

Study Design: Prospective observational study [8]

Sample Size: 100 patients

Inclusion Criteria: Patients presenting with signs and symptoms suggestive of acute appendicitis.

Exclusion Criteria: Pregnant women, patients with generalized peritonitis, or those with prior abdominal surgery.

Procedure: Alvarado and Tzanakis scores were calculated for each patient [2,3]. Surgical intervention (laparoscopic or open appendectomy) was performed based on clinical judgment. Histopathological examination of the resected appendix served as the gold standard for diagnosis.

Statistical Analysis: Sensitivity, PPV, and diagnostic agreement were calculated. Specificity and NPV were not assessed due to the absence of a non-appendicitis comparator group [10].

- **Alvarado Score:** Assessed via eight clinical and laboratory criteria.
- **Tzanakis Score:** Combined clinical findings, leukocyte count, and ultrasonographic results.
- Surgical intervention (laparoscopic or open) was performed depending on patient condition and surgeon discretion.
- Histopathology reports served as the definitive diagnostic reference.

RESULTS

Table 1: Diagnostic Accuracy Of Scoring Systems

Scoring System	Sensitivity	PPV
Alvarado Score	94.7%	94.7%
Tzanaki Score	89.5%	94.4%

Table 2: Surgical Approach And Histological Outcomes

Surgical Type	Number of Patients
Laparoscopic Appendectomy	70
Open Appendectomy	30
Histopathological Diagnosis	Percentage
Acute Appendicitis	60%
Acute on Chronic Appendicitis	30%
Appendicitis with Fibrous Obliteration	2%
Other/Non-specific	3%

The analysis of the results from this prospective study involving 100 patients with suspected acute appendicitis highlights the comparative diagnostic performance of the Alvarado and Tzanakis scores. The Alvarado score demonstrated a slightly higher sensitivity, accurately identifying 94.7% of the true positive cases (90 out of 95), alongside a positive predictive value (PPV) of 94.7%. In comparison, the Tzanakis score exhibited a sensitivity of 89.5% (85 out of 95) and a PPV of 94.4%. These figures indicate that both scoring systems are highly effective in diagnosing appendicitis, although the Alvarado score displayed a marginally superior ability to detect true positive cases.

All enrolled patients underwent surgical intervention—70% were managed laparoscopically while 30% underwent open appendectomy. Surgical choices were determined based on clinical judgment, patient stability, and the availability of resources. Histopathological examination of the excised appendices revealed that 60 patients (60%) had acute appendicitis, 30 patients (30%) presented with acute-on-chronic inflammation, and 2 patients (2%) had fibrous obliteration. In three cases (3%), other intra-abdominal pathologies were identified, while the remaining 5% had non-definitive or atypical findings not fitting the classic spectrum of appendicitis. Notably, there were no cases of histologically normal appendices, reflecting the high preoperative diagnostic accuracy facilitated by these scoring systems.

Overall, the data underscores the utility of both Alvarado and Tzanaki scores in guiding clinical decision-making, with Alvarado slightly favored due to its simplicity and higher sensitivity—particularly useful in settings with limited access to ultrasonography.

DISCUSSION

The findings of this study are consistent with previous literature. Alvarado's simplicity and reliance on clinical signs make it suitable for resource-limited settings [4,5]. The Tzanakis score, by incorporating ultrasonography, offers improved specificity but may be limited by operator dependency [6,7].

A study by Kumar et al. reported Tzanakis sensitivity of 79.6% and specificity of 83.3%, outperforming Alvarado in specificity but not in sensitivity [8]. Bharath et al. found Tzanakis to be more reliable at a cut-off score ≥ 8 , with specificity of 92.3% [9].

Despite the slightly lower sensitivity, the Tzanakis score may reduce negative appendectomy rates, especially in equivocal cases [10]. However, in emergency settings where imaging is not immediately available, the Alvarado score remains a valuable tool [11,12].

CONCLUSION

In this comparative study, both Alvarado and Tzanakis scoring systems offered strong diagnostic support in suspected cases of acute appendicitis. The Alvarado score's slight advantage in sensitivity, alongside its ease of use, reinforces its relevance in primary and emergency care settings. Further multicenter studies may strengthen these observations and help develop integrated diagnostic models.

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