Section: General Surgery

Original Research Article

A COMPARATIVE STUDY BETWEEN THE EFFICACY OF TZANAKIS SCORE AND ALVARADO SCORE IN DIAGNOSING ACUTE APPENDICITIS

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ABSTRACT

Background: Acute appendicitis (AA) is a common cause of abdominal surgical emergencies, with a lifetime incidence rate of nearly 1 in 7 cases globally (1). Delayed diagnosis is related to a high incidence of morbidity and mortality. The objective is to compare the efficacy of Tzanakis and Alvarado scoring system in diagnosing acute appendicitis.

Materials and Methods: This Prospective comparative observational study was conducted from October 2022 to October 2023 at SDM College of Medical Sciences and Hospital. It included 85 patients who was underwent open/laparoscopic appendectomy with the diagnosis of acute appendicitis. At admission, both Alvarado score and Tzanakis score was given. The final diagnosis was made based on histopathological report.

Results: The sensitivity & specificity of the Alvarado Score was 23.06% & 58.33% respectively with a PPV of 38.45% & NPV of 44.09% with a p-value of 0.265. With a PPV of 84.82% and an NPV of 92.41%, the Tzanakis "score's sensitivity and specificity were, respectively, 93.15% and 83.33%. With a p-value less than 0.001, the diagnostic accuracy of the Tzanakis score was 91.7% The sensitivity of USG is 91.78%, and its specificity is 75.0% with a diagnostic accuracy of 89.41%.

Conclusion: According to this study, the Tzanakis scoring system is a useful tool for the diagnosis of acute appendicitis.

Keywords: Tzanakis Score, Alvarado Score, Diagnosis of Acute Appendicitis

INTRODUCTION

Abdominal pain is the most prevalent symptom of AA, which is still diagnosed clinically. In a typical presentation, the patient states that the abdomen pain started in the epigastric or periumbilical area and moved to the right iliac fossa associated with vomiting, nausea, fever, and anorexia.

Depends on the age of patient, the appendix location, and the degree of inflammatory process involvement, the clinical presentation of AA can vary greatly.

For males, the lifetime probability of suffering appendicitis is 8.6%, whereas for females it is 6.7percent. The highest occurrence was observed in individuals aged between 20 and 29 years.[1-3]

Usually, the history along with the physical examination have been the mainstays in the diagnosis of AA. The clinical assessment of individuals who may have acute appendicitis can, however, occasionally become complicated. In order to lower the risk of complications "like appendicular abscess, appendicular perforation, and phlegmon development—all of which have been linked to higher rates of morbidity and death—a prompt as well as accurate diagnosis is imperative. Due to their poor localizing ability, patients in the extreme age group have a higher perforation rate and with the

greater risk of intraperitoneal infection spread.[4,5] AA is among the most frequent causes of laparotomy emergencies. For men and women, respectively, "the lifetime risk of an appendectomy is 12 percent & 23 percent.[1-3] The overall population has a higher negative appendectomy rate of 15%-20%, but the rate among females who are of reproductive age is up to 22%. However, there is also a concern for perforation as a result of delayed diagnosis, that could led to longer stays in the hospital as well as higher rates of morbidity & mortality.[1]

This is especially concerning because of the much longer hospital stays, high fatality rates, increased incidence of infectious complications, as well as unnecessary hospital expenses. Improving diagnostic accuracy should lead to a reduction in both the perforation rate as well as the rate of negative appendectomy.

Diagnoses can be particularly challenging in extremely young, elderly, and female patients who are fertile since these patients are more prone to appear atypically and have various diseases that can mimic AA.

There are many scoring systems that are helpful in diagnosing AA. The Alvarado score and Tzanakis score are one among many.

Alvarado score is easy, and simple, based on clinical assessment and laboratory values. Alvarado described the scoring system in 1986. It uses 8 parameters, a total score of 10. A score of 7 or above is regarded as AA needing emergent surgery.[6]

In our study, the diagnostic accuracy of the Alvarado and Tzanakis scores for instances of acute appendicitis is compared.

MATERIALS AND METHODS

The Prospective comparative observational study includes patients who underwent surgery for acute appendicitis (AA) after presenting to the General Surgery Department of the SDM College of Medical Sciences and Hospital in Sattur, Dharwad. The study was conducted over a year at SDMCMSH in Dharwad between October 2022 to October 2023.

Instead of relying only on the scores, the operating surgeon used their overall clinical judgment to decide whether to perform surgery. The information gathered was employed to compute the Alvarado and Tzanaki scores. The results of the histology were monitored after the appendectomy.

Sample Size: 85

Inclusion Criteria-

- Patients aged 15 and above diagnosed with acute appendicitis undergoing open/laparoscopic appendectomy in SDMCMSH during the study period
- Patient willing to participate and give consent for the research

Exclusion Criteria-

- The patient is not willing for surgery.
- Appendicular mass.
- Peritonitis secondary to appendicular perforation

Ethical clearance: Ethical clearance was obtained from SDM Instituitional Ethic Committee on 27/07/2022, reference number- SDMIEC/2022/273

Methods:

- Informed consent was taken prior to the study
- At the time of admission, each patient had undergone a comprehensive history and a thorough clinical examination and recorded on preformed profoma.
- Relevant investigations were done
- USG Abdomen and pelvis done on admission.
- Prior to surgery and at the time of admission, each patient was given both the Tzanaki Score and the Alvarado Score.
- Surgery was performed on patients whose scores were below the cutoff points based on clinical judgment and assessment.
- Patients underwent either an emergency open or laparoscopic appendectomy, or they received conservative management.
- The final diagnosis was validated by the pathologist's histopathological examination of the specimen.
- The data was compared between the two score systems' diagnostic accuracy for acute appendicitis.

Sonographic Criteria for Appendicitis

- Appendix noncompressible with AP diameter greater than 6 mm
- Hyperechoic thickened appendix wall > 2 mm—target sign.
- Appendicolith Presence.
- Discontinuity of the submucosal layer.
- Peri-appendicular" fluid.

Statistical Analysis: Excel and SPSS software version 21 are used for data analysis. A frequency table is used to present categorical variables. The form for continuous variables is Mean ± SD/Median (Min, Max). The applicability "of the Tzanakis score, and Alvarado score to predict acute appendicitis is checked by Logistic regression and Receiver Operating Characteristic (ROC) curves. By simultaneously maximizing the sensitivity and specificity, cutoff values are determined. Statistical significance is indicated by a P-value of" 0.05 or less.

RESULTS

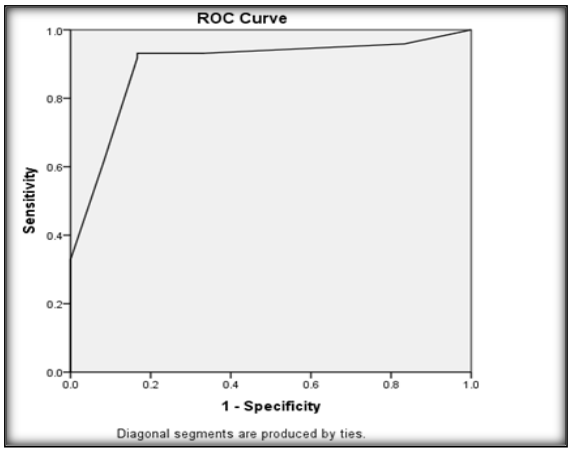

Figure 1: ROC curve of Tzanakis scores for predicting Acute Appendicitis.

Data contains measurements of 85 subjects with acute appendicitis whose age ranges from 15 – 73 years. Out of 85 subjects, 40 (47.1%) were female and 45 (52.9%) were male.

Out of 85 (100%) subjects, 85 (100%) had Right lower quadrant tenderness, 27 (31.8%) had Rebound tenderness, 22 (25.9%) had Migratory right lower quadrant pain, 56 (65.9%) had Nausea/vomiting, 23 (27.1%) had Anorexia, 37 (43.5%) had Fever, 49 (57.6%) had Leucocytosis, 12 (14.1%) had Shift to left, 85 (100%) had Right lower quadrant tenderness, 26 (30.6%) had Rebound tenderness, 50 (58.8%) had Leucocytosis and 70 (82.4%) had USG positive findings.

It can be observed that USG detected appendicular inflammation in 67 (78.8%) subjects. 3 (3.5%) were not detected positive in USG.

Table 1: Distribution of subjects according to Tzanakis score and histopathological findings

Tzanaki score	Histopatholical findings		Total
	Positive	Negative	
>8	68 (80%) (TP)	2 (2.4%) (FP)	70 (82.4%)
<8	5 (5.9%) (FN)	10 (11.7%) (TN)	15 (17.6%)
Total	73 (97.6%)	12 (14.1%)	85 (100%)

It can be observed that, based on Tzanakis scores, out of 85 subjects 68 (80%) were found to have HP acute appendicitis

Table 2: Diagnostic analysis of Tzanakis scores for Acute Appendicitis.

	Value (95% CI)
Cut off	8
Sensitivity (95% CI)	93.15% (84.74%, 97.74%)
Specificity (95% CI)	83.33% (51.59%, 97.91%)
PPV (95% CI)	84.82% (61.16%, 95.20%)
NPV (95% CI)	92.41% (83.42%, 96.71%
Accuracy	91.7%(83.77% to 96.62%)
AUC	0.894
p-value	<0.001

The AU-ROC for Tzanakis scores is 0.894 at cutoff < 8 with 93.15% sensitivity and 83.33% specificity in predicting Acute Appendicitis. From logistic regression, we notice that Tzanakis scores are significantly predicting Acute appendicitis (p-value = <0.001).

Table 3: Distribution of subjects according to Alvarado score and histopathological findings

Alvarado score	Histopatholical findings		Total
	Positive	Negative	
>7	19 (22.4%) (TP)	5 (5.9%) (FP)	24 (50.3%)
<7	54 (63.5%) (FN)	7 (8.2%) (TN)	61 (71.7%)
Total	73 (85.9%)	12 (14.1%)	85 (100%)

It can be observed that, based on Alvarado scores, out of 85 subjects 54 (63.5%) were found to have acute appendicitis

Table 4: Diagnostic analysis of Alvarado score for Acute Appendicitis

	Value (95% CI)
Cut off	7
Sensitivity (95% CI)	26.03% (16.45%, 37.62%)
Specificity (95% CI)	58.33% (27.67%, 84.83%)
PPV (95% CI)	38.45% (22.38%, 57.51%)
NPV (95% CI)	44.09% (32.42%, 56.46%)
AUC	0.473
p-value	0.265

The AU-ROC for Alvarado scores is 0.473 at cutoff < 7 with 26.03% sensitivity and 58.33% specificity in predicting Acute Appendicitis. From logistic regression, we observe that Alvarado score is not significant in predicting Acute Appendicitis (p-value= 0.265)

Table 5: Comparison between Alvarado and Tzanakis scoring sytem.

	Tzanakis score(>8)	Alvarado score (>7)
Sensitivity	93.15%	26.03%
Specificity	83.33%	58.33%
PPV	84.82%	38.45%
NPV	92.41%	44.09%
p-value	<0.001	0.265

DISCUSSION

One of the common surgical emergency is acute appendicitis. In order to reduce morbidity and mortality and improve management, prompt and accurate diagnosis and intervention are essential. Several grading methods were created in an effort to improve diagnosis accuracy and lower the rate of negative appendectomy. The Tzanaki's scoring system uses clinical, laboratory, and radiological criteria. Alvarado score uses clinical and laboratory criteria.

Since the idea of clinical scoring systems was first proposed, a great deal of research has been done to try and determine which clinical score would be most useful in diagnosing acute appendicitis and be the most sensitive, specific, and diagnostically accurate. Since its debut in 1986, Alvarado has become one of the most well-known and extensively studied scores for Acute Appendicitis. 7 And is among the more ancient scores that are still in use. Since this grading system is the most widely utilized and popular, here, the newer scoring system-Tzanaki's scoring system has been compared with the Alvarado score, and its effectiveness in relation to various parameters, such as diagnostic accuracy, specificity, and sensitivity.

Table 6: comparison of status of USG in tzanakis score of patients of the present study with other studies

STUDY	USG Accuracy rate %
Caren Dsouza, et al,[8]	85
Mohamed Samir et al,[9]	83
Present study	89.41

In this table, the present study is closely related to the Caren Dsouza, et al investigation.

In the current study out of 85 subjects, 70(82.4%) were found to have features of acute appendicitis on the USG abdomen and pelvis. Of these, 67 (78.8%) has AA on Histopathological report. The sensitivity of USG is 91.78%, and its specificity is 75.0% with a diagnostic accuracy of 89.41%

Table 7: Comparison of sensitivity, specificity, positive predictive value and negative predictive value of alvarado score of patients of the present study with other studies

Study	Sensitivity	Specificity	PPV	NPV
Shashikal V et al10	79.62	89.3%	97.2%	37.5%
Anupriya R11	36.21%	66.67%	84%	17.18
Sidgel GS et al12	81.91%	66.66%	97.46%	19.04%
Present study	23.6%,	58.33%,	38.45%	44.09%

Patients having an Alvarado score greater than 8 were diagnosed with acute appendicitis, as per the Alvarado scoring system.

In the present study, 19 individuals, or 22.4%, had an acute appendicitis diagnosis on HPE based on the Alvarado score. The Sensitivity, Specificity, PPV, and NPV of Alvarado's score were 23.6%, 58.33%, 38.45%, and 44.09%.

Table 8: Comparison of sensitivity, specificity, positive predictive value, and negative predictive value of tzanaki's score of patients of the present study with other studies

Study	Sensitivity	Specificity	PPV	NPV
Shashikala V et al10	59.09%	33.33%	86.6%	10%
Anupriya R11	62.52%	100%	100%	37.5%
Sidgel GS et al12	91.48%	66.66%	97.72%	33.33%
Present study	93.15%,	83.33	84.82	992.41

According to the Tzanaki scoring system, which requires a Tzanaki score greater than 8, 68 individuals, or 80%, had an AA diagnosis.

The Sensitivity, Specificity, PPV & NPV of Tzanaki's score was 93.15%, 83.33%, 84.82%, and 92.41% with diagnostic Accuracy of 91.7%.

CONCLUSION

The Alvarado and Tzanaki scores are compared in this study to see which is better for diagnosing acute appendicitis. Regarding sensitivity, PPV, NPV, and diagnostic accuracy, Tzanaki's score was better. To improve clinical judgment in the precise diagnosis of acute appendicitis and to reduce the morbidity, this research supports the use of Tzanaki's scoring
Tzanakis scored higher than Alvarado in the current study. With a significant P value, the Tzanakis score fared better than the Alvarado score, showing superior sensitivity and specificity.
According to this study, the Tzanakis scoring system is a useful tool for the diagnosis of acute appendicitis.

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