

Original Research Article


A study comparing modified Alvarado score and Tzanakis score for diagnosing acute appendicitis

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Abstract

Background: Acute appendicitis is one of the most common causes of Abdominal surgical emergencies with a lifetime prevalence of approximately 1 in 7 worldwide. It is associated with high morbidity and occasional mortality related to the failure of making an early diagnosis.

Aim of the study: To compare the efficacy of Modified Alvarado Score and Tzanakis Score in Diagnosing Acute Appendicitis.

Materials and methods: The study was conducted in the year 2018. Totally 100 patients between the age of 12 to 75 who presented to the General Surgery department of Govt. Royapettah Hospital with a clinical diagnosis of acute appendicitis and underwent emergency open appendicectomy were included in the study. Both Modified Alvarado Score and Zanakis score were done for all the patients at the time of admission and prior to surgery. Even the patients with scores below the cutoff values were subjected to surgery based on clinical assessment and judgment. Patients were either subjected to emergency laparotomy at the time of admission or after few hours of conservative management. Emergency appendicectomy was done by the open method under spinal or general anesthesia in all cases.

Results: The mean age of patients was 22.93 years with a standard deviation of 6.86 years. 83% of patients had histologically proven appendicitis. Overall negative appendicectomy rate was 17%. The sensitivity and specificity of Modified Alvarado Score was 95.81% and 94.11% with a positive predictive value of 98.75% and the negative predictive value of 80%. The positive likely hood ratio was 16.18 and the negative likelihood ratio was 0.05. The sensitivity and specificity of Tzanakis score was 97.59% and 94.11% respectively with a positive predictive value of 98.78% and negative

predictive value of 88.88%. The positive likelihood ratio was 16.59 and negative likelihood ratio was 0.03.

Conclusion: This study shows that Tzanakis scoring system can be used as an effective modality in the establishment of accuracy in the diagnosis of acute appendicitis. There is increased sensitivity and diagnostic accuracy in Tzanakis scoring when compared to the modified Alvarado score.

Key words

Tzanakis score, Alvarado score, Appendicitis, Emergency appendicectomy.

Introduction

Acute appendicitis is one of the most common causes of Abdominal surgical emergencies with a lifetime prevalence of approximately 1 in 7 worldwide. It is associated with high morbidity and occasional mortality related to the failure of making an early diagnosis. Acute appendicitis is still a clinical diagnosis [1]. Abdominal pain is the most common symptom. In the classic presentation, the patient describes the pain as beginning in the periumbilical or epigastric region and then migrating to right iliac fossa. This is associated with fever, anorexia, nausea, and vomiting [2]. The clinical presentation of acute appendicitis varies widely owing to a variable degree of involvement by the inflammatory process, different positions of the appendix and varying age of the patient. The inconsistent clinical presentation often leads to misdiagnoses of acute appendicitis in 1 out of 5 cases and negative appendicectomy rates in the range of 15-40% [3]. Adding to this the “classic” symptomatology only occurs in 50-60% of cases making the diagnosis difficult. Difficulties in diagnosis especially arise in very young, elderly patients and females of reproductive age because they are more likely to have an atypical presentation, and many other conditions may mimic acute appendicitis in these patients [4]. Many surgeons advocate early surgical intervention for the treatment of acute appendicitis to avoid perforation, accepting a negative appendectomy rate of about 15-20% [5]. Removing normal appendix is an economic burden on both patients and health resources. Misdiagnosis and delay in surgery can lead to complications like perforation and finally peritonitis [6]. Many scoring systems for the

diagnosis of acute appendicitis have been tried. The Modified Alvarado Score is an easy, simple and cheap diagnostic tool for supporting the diagnosis of acute appendicitis. Tzanakis score is another scoring is a combination of clinical evaluation, inflammatory markers, and ultrasound [7].

Materials and methods

The study conducted in the year 2018. Totally 100 patients between the age of 12 to 75 who presented to the General Surgery Department of Govt. Royapettah Hospital with a clinical diagnosis of acute appendicitis and underwent emergency open appendicectomy were included in the study. Both Modified Alvarado Score and Zanakis score are done for all the patients at the time of admission and prior to surgery. Even the patients with scores below the cutoff values were subjected to surgery based on clinical assessment and judgment. Patients were either subjected to emergency laparotomy at the time of admission or after few hours of conservative management. Emergency appendicectomy was done by the open method under spinal or general anesthesia in all cases.

Inclusion criteria

- Patients aged more than 12 of both genders.
- Patients with suspected acute appendicitis based on history and clinical examination.

Exclusion criteria

- Patients with an age of less than 12 and more than 75.
- Patient with alternate diagnosis during surgery with or without an inflamed

appendix.

- Those with appendicular abscess, appendicular mass, generalized peritonitis.

Procedure

All cases had undergone a thorough history and detailed clinical examination at the time of admission as part of routine management. Total and differential leucocyte count was measured using an autoanalyzer. As USG is technician dependent, only those patient who underwent abdominal USG by Consultant Radiologist were included in the study to exclude observer bias. He is blinded to the results of physical examination and blood report of the patients. Well established ultrasonographic criteria were applied to discriminate an acutely inflamed appendix from a normal one. Those with radiologist's opinion of findings suggestive of acute appendicitis, based on these criteria were taken as USG positive. Both Modified Alvarado Score and Zanakis score are done for all the patients at the time of admission and prior to surgery. Even the patients with scores below the cutoff values were subjected to surgery based on clinical assessment and judgment. Patients were either subjected to emergency laparotomy at the time of admission or after few hours of conservative management. Emergency appendicectomy was done by the open method under spinal or general anesthesia in all cases [8, 9].

Statistical analysis

Data was collected on predesigned proforma for each individual case. Descriptive statistics were done for all data. Suitable statistical tests of comparison were done. The data was analyzed using SPSS version 16 was used for statistical analysis. Categorical variables were analyzed with the Chi-Square Test.

Results

Table - 1 shows Alvarado score of less than 7 was in 10 males and 10 females. More than 7 were in 30 female patients and 50 male patients. When

compared to females, the male preponderance of ALVARDO score was more.

Table – 1: Alvarado score.

Alvarado score	Sex		Total
	Female	Male	
Less than 7	10	10	20
More than 7	30	50	80
Total	40	60	100

Table – 2: Tzanakis score.

Tzanakis score	Sex		Total
	Female	Male	
Less than 8	8	10	18
More than 8	32	50	82
Total	40	60	100

Table - 2 shows Tzanakis score less than 8 was in 10 males and 8 females. More than 8 was in 32 female patients and 50 male patients. When compared to females, the male preponderance of Tzanakis score was more.

The sensitivity and specificity of Modified Alvarado Score was 95.81% and 94.11% with a positive predictive value of 98.75% and negative predictive value of 80% (**Graph – 1**). The positive likely hood ratio was 16.18 and the negative likelihood ratio was 0.05. The sensitivity and specificity of Tzanakis score was 97.59% and 94.11% respectively with a positive predictive value of 98.78% and negative predictive value of 88.88%. The positive likely hood ratio was 16.59 and negative likelihood ratio was 0.03. The diagnostic accuracy of the Alvarado score was 95% and that of Tzanakis score was 97%.

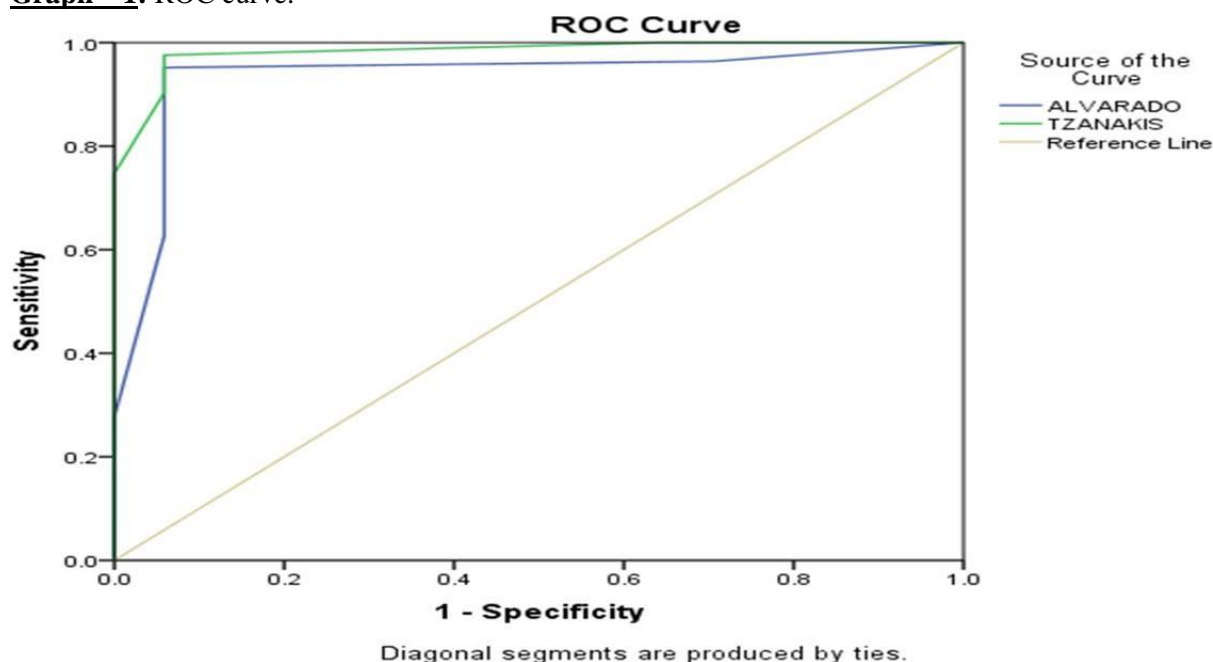
Discussion

AA is the most common surgical emergency. Though it is commonly a clinical diagnosis, is always a difficult task for a surgeon to accurately exclude other causes that may mimic appendicitis, leading to a high negative appendicectomy rate [10]. Despite the advances in the diagnostic field, the diagnosis of acute appendicitis remains an enigma for the attendant surgeon. Many investigative modalities like CT

and MRI are not easily available at many centers and are costly [11]. With this background, many eminent surgeons and physicians have been adopting different scoring systems in order to decrease negative appendectomy rates. Many diagnostic scores have been advocated, but most are complex and difficult to implement in a clinical situation [12]. Schwerk WB, et al. have reported that its scoring system had sensitivity and specificity of 95.4% and 97.4% respectively. This is comparable to our study with sensitivity and specificity of 97.59 and 94.11 respectively [13]. Sigdel GS, et al. reported sensitivity and specificity of 91.48% and 66.66% respectively. They maintained that low specificity was due to a low sensitivity rate of USG (63.82%) due to individual bias. Ultrasound examination is operator dependent and has variable levels of sensitivity and specificity (75-90% and 86-100%) [14]. Stephens PL et al also observed positive and negative predictive values of 97.27% and 33.33% respectively while the same were

98.78% and 88.88% respectively in our study [15]. The high negative predictive value is again due to the reduction of observer bias of radiology in our study. The higher PPV in our study is due to larger sample size as against 45 in the study done by Townsend CM, et al. Sensitivity (95%) of Modified Alvarado score in our study is little lower than that reported by but the difference is not significant [16]. A negative appendectomy rate of 20-40% has been reported in the literature and many surgeons advocate early surgical intervention for the treatment of acute appendicitis to avoid perforation, accepting a negative appendectomy rate of about 15-20% [17]. Overall negative appendectomy rate in our study was 17% which is comparable to various studies reported in the literature. Negative appendectomy rate among females was higher than in males. The discrepancy is due to high chances of alternate diagnosis in females of reproductive age group [18].

Graph – 1: ROC curve.



Conclusion

Acute appendicitis is a common surgical emergency. Good clinical judgment aided by investigation scoring system can help to reduce the negative appendectomy rate. Ultrasound scan

has now become easily available, even in developing countries and it can immensely aid the surgeon in diagnosis. This study shows that Tzanakis scoring system can be used as an effective modality in the establishment of accuracy in the diagnosis of acute appendicitis.

There is increased sensitivity and diagnostic accuracy in Tzanakis scoring when compared to the modified Alvarado score.

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