Research Article

Evaluation of Accuracy and Predictability of Tzanakis score in Diagnosis of Acute Appendicitis

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Abstract

The Tzanakis scoring system is a thorough method that integrates clinical assessment, ultrasonography, and laboratory indicators of inflammatory response. It serves as a reliable tool for accurately diagnosing acute appendicitis. The main objective of this study was to assess the effectiveness of the Tzanakis scoring system in the preoperative diagnosis of acute appendicitis and compare its accuracy with histopathological examination (HPE). This study was conducted in the Department of General Surgery, at a tertiary care center in North India. All patients with a clinical diagnosis of acute appendicitis were included in the study. Following a thorough clinical assessment, as well as radiological and laboratory tests, the score of Tzanaki was calculated, and the final diagnosis was confirmed through the HPE report. There are four variables of Tzanakis score (right lower quadrant tenderness-4 points, rebound tenderness-3 points, total leucocyte count more than 12000-2 points, positive ultrasound finding-6 points). 50 patients, clinically diagnosed as cases of acute appendicitis in the study were histopathologically examined, 39 cases were acute appendicitis, 07 were chronic appendicitis and 04 were normal. The Sensitivity, Specificity, negative predictive value, and positive predictive value are 86.5%, 75%, 33.33%, and 97.56%. The overall diagnostic accuracy of Tzanakis score is 86%. The Tzanakis scoring system is an effective modality to establish the accurate diagnosis of acute appendicitis which requires surgery, especially in low-resource areas and helps in reducing the rates of negative appendicectomy

Keywords: Acute Appendicitis; Tzanakis score; Diagnostic accuracy; Senstivity; Specificity

Introduction

Appendicitis is the most common acute condition manifesting as pain abdomen in the Emergency room. The most commonly affected age group is the second to fourth decades of life. Both sexes are affected, with a slight male to female predominance, about 1.2-1.3:1 [1]. Acute appendicitis is one of the most common surgical emergency, with a lifetime prevalence rate of approximately one in seven. The incidence is 1.5 - 1.9 per 1000 and is approximately 1.4 times greater in men than in women [2,3]. Abdominal pain and anorexia are invariably present in 100% of the cases, nausea in 90%, vomiting in 75%, and pain migration in 50% of the cases [4]. History and clinical examination both remain the most effective and practical diagnostic modalities [5]. As a result of the overlapping symptoms, the rate of negative appendectomy, where the appendix is removed despite not being inflamed, has been reported to range from 20% to 40% [6]. Tzanakis scoring systems

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have been developed to aid in the preoperative diagnosis of acute appendicitis. Tzanakis scoring system which was proposed in 2005 by Nikolas E.Tzanakis [7] is a combination of 4 variables i.e right lower abdominal tenderness (4 points), rebound tenderness (3 points), presence of Total leucocyte count greater than 12000/mm3 (2 points) and positive ultrasound scan finding for appendicitis(6 points) with a total of 15 points and a score of 8 or more is diagnostic for appendicitis requiring surgery. This scoring system has sensitivity, specificity, and diagnostic accuracy of 95.4%, 97.4%, and 96.5% respectively [7].

Materials and Methods

A prospective observational study was conducted in the Department of General Surgery, at a tertiary care center in North India, after obtaining approval from the Institutional Ethical Committee. Patients with a clinical diagnosis of Acute Appendicitis and undergoing surgery and willing to participate were included in the study. Patients with Generalized peritonitis, Appendicular abscess, Appendicular lump, Blunt trauma abdomen, and Recurrent appendicitis were excluded from the study. Patient data (demographic, disease, treatment, outcome, and follow-up) was collected on the predesigned performa attached and the observations obtained were tabulated and analyzed using appropriate statistical methods. After complete clinical examination, and radiological and laboratory investigations Tzanakis score was calculated and patients with a score of 8 or >8 underwent appendicectomy, There are four variables of the Tzanakis score (right lower quadrant tenderness-4 points, rebound tenderness-3 points, total leucocyte count more than 12000-2 points, positive ultrasound finding-6 points) operative findings were noted, the sample was sent for histopathological examination and histopathological examination results was analyzed. Even when the new score was less than 8, if clinical suspension was high patients were subjected to appendicectomy. If the patient was not operated on and discharged, negative appendicitis was confirmed during a follow-up visit or by phone call to see if the patient got operated elsewhere. Operative notes and histopathology reports were reviewed and correlated with the Tzanakis score. Sensitivity, specificity, negative predictive value, and positive predictive value were calculated. A p-value below 0.05 was considered as significant.

Data analysis: Data was collected and analysed using SPSS v16 software, Frequency, percentage, mean and p value were calculated, Significance of (P value) the results was tested by using the ANOVA test, chi-square test. Senstivity, Specificity, Negative Predictive Value, Positive Predictive Value were calculated. P-value of less than 0.05 was considered as significant.
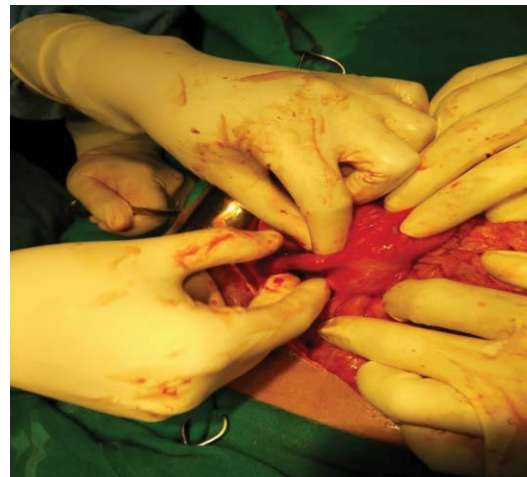
Figure 1: Intraoperative picture showing Hyperemic, Inflammed appendix adherent with cecum and lateral pelvic wall.

Figure 2: Intraoperative picture showing Elongated and swollen appendix with acute inflammation.

Figure 3: Picture showing Thick walled appendix with Perforation at body of appendix.

Results

A total of 50 patients were assessed in this study. There were 64% of patients with appendicitis were seen in between 11–30 years. The mean age of the study population was 25.7 ± 15.49 years (Table 1). Out of them, 90% of patients were males and 10% patients were female (Table 2) and right iliac fossa tenderness was present in all cases which is 100%. Rebound tenderness was present in 58% of cases. The total leucocyte count is an important component in the diagnosis of appendicitis. In our present study, it was raised in 48% of cases. According to ultrasound findings, 36 patients had Positive USG for acute appendicitis and 14 patients had negative USG for acute appendicitis (Table 3). Out of 50 patients, 41 patients had Tzanakis score more than 8, and 9 patients had less than 8. All 50 patients, clinically diagnosed as cases of acute appendicitis in the study were histopathologically examined, 39 cases were acute appendicitis, 07 were chronic appendicitis and 04 were normal (Table 4). Tzanakis scoring system diagnosis correlates well with the histopathological diagnosis. P value is 0.002 which is less than 0.01 and is highly significant (Table 5). The negative appendectomy rate is 2% as per our study. In our study, sensitivity, specificity, negative predictive value, and positive predictive value are 86.5%, 75%, 33.33%, and 97.56%, the overall diagnostic accuracy of Tzanakis score is 86% (Table 6). Present study has a Sensitivity and positive predictive value and diagnostic accuracy which is comparable with original Tzanakis scoring system with specificity at a lesser side. But sensitivity and specificity is better than many existing scoring system (Table 7).

Table 1: Age distribution

Age	Number	Percentage
<40	41	82
≥40	9	18
Total	50	100

Table 2: Sex distribution

Sex	Number	Percentage
Male	45	90
Female	5	10
Total	50	100

Table 3: Senstivity and specificity of USG finding and HPE finding of Tzanakis score

Positive USG For Acute Appendicitis	HPE Report	
	Appendicitis	No Appendicitis
Negative	11	3
Positive	35	1
Total	46	4
Chi Square	4.764	
P value	0.029	
Significance	S	

Table 4: Histopathological diagnosis wise distribution of frequency

HPE Report	Number	Percentage
Acute Appendicitis	39	78
Chronic Appendicitis	7	14
Normal Appendicitis	4	8
Total	50	100

Table 5: Comparison of Tzanakis scoring diagnosis with histopathological diagnosis.

Tzanaki's Score		HPE report		Tzanaki's Score
		Appendicitis	No Appendicitis	
≥8	Count	40	1	41
	% within Tzanaki's Score	97.6	2.4	100
	% within HPE report	87	25	82
<8	Count	6	3	9
	% within Tzanaki's Score	66.67	33.3	100
	% within HPE report	13	75	18
Total	Count	46	4	50
	% within Tzanaki's Score	92	8	100
	% within HPE report	100	100	100
Chi Square	9.571			
P value	0.002			
Significance	HS			

Table 6: Diagnostic indices for Tzanakis score.

		95% CI
Sensitivity	86.95	73.74 – 95.06
Specificity	75	19.41 – 99.37
NPV	33.33	16.39 – 56.05
PPV	97.56	87.95 – 99.55
Accuracy	86	73.26 – 94.18

Table 7: Comparision of present study with other scoring system

Scoring system	Sensitivity	Specificity	PPV	NPV
Alvarado	73-90	87-92	-	-
Ripasa	88	67	93	53
Tzanakis	95.4	97.4	-	-
Present study	86.95	75	97.56	33.33

Discussion

Acute appendicitis has been recognised as one of the most common cause of severe acute abdominal pain. Diagnostics is one of the most extensively researched topics in relation to appendicitis.As quoted by Bailey & Love,'' Notwithstanding advances in modern radiographic imaging and diagnostic laboratory investigations, the diagnosis of appendicitis remains essentially clinical, requiring a mixture of observation, clinical acumen, and surgical science'' [8]. Detecting acute appendicitis presents a significant challenge for surgeons, requiring a scoring system that can effectively address the issues while maintaining acceptable sensitivity, specificity, and negative appendectomy rate. The goal of the scoring system should be to discriminate when there is uncertainty rather than making a diagnosis. Different scoring systems e.g., RIPASA, Alvarado, Ohman, and Tzanakis score are established to help decision making in uncertain cases. This study attempts to evaluate the predictability of a Tzanakis scoring system in the preoperative diagnosis of acute appendicitis and compare its accuracy with histopathological examination. The present study included clinically suspected 50 cases of appendicitis, With reference to age, in studies done by Gallego G [9] and Chong CF [10] the incidence of appendicitis below the age of 40 years was 52% and 84.3% respectively. In these studies, appendicitis was most frequently seen in patients in their second and fourth decades of life, with a mean age of 31.3 years and a median age of 22 years. In our present study, the number of patients with age less than 40 years was 82%. The mean age of the study population was 25.7 ± 15.49 years, When the male-female ratio is considered in cases of acute appendicitis, in a study done by Addis DG (1990)1 the male female ratio was 1.3:1, in a study done by Chong CF (2011)10 the ratio was 1.4:1, In our present study there was male preponderance, 90% patients were males and 10% patients were female. There were 64% of patients with appendicitis were seen in between 11-30 years. The study done by, Al-Ajerami Y [11] showed that the overall specificity and sensitivity for ultrasonography in cases of acute appendicitis was 84.8% and 83.3%, respectively. In a study by Javidi Parsijani P et al. [12] to determine the accuracy of ultrasonography for diagnosing acute appendicitis, ultrasonography was shown to have sensitivity and specificity of 75% and 69.2%, respectively. Our study shows the sensitivity and specificity of ultrasonography for diagnosing acute appendicitis as 76.08% and 75% respectively. All 50 patients, clinically diagnosed as cases of acute appendicitis in the study were histopathologically examined, 39 cases were acute appendicitis, 07 were chronic appendicitis and 04 were normal. The Mean of Tzanakis score as per the frequency of various histopathological diagnoses of Appendicitis was acute, chronic, and no appendicitis 12.28, 7.43 respectively. In the no appendicitis group, the mean score was 7.25. A comparison of the Tzanakis score according to a subtype of histopathological examination was done and found that there is a definite association between the Tzanakis score and histopathological outcome. The highest number of patients among the study participants were having a score of 10-12 followed by 13-15. In our study comparison of the Tzanakis scoring diagnosis with histopathological diagnosis was done, 41 patients had a Tzanakis score of more than 8 in which histological evidence of appendicitis was found in 40 patients & no appendicitis in 1 patient, 9 patients had Tzanakis score of less than 8 in which histological evidence of appendicitis was found in 6 patients & no appendicitis in 3 patients. Tzanakis et al found that their scoring system had sensitivity and specificity of 95.4% and 97.4% respectively. As per our study, the sensitivity of the Tzanakis scoring system was 86.95% which is in accordance with Tzanakis et al. In our study sensitivity is 86.95%, specificity is 75%, the positive predictive value is 97.56%, the negative predictive value is 33.33% and accuracy is 86%. The negative appendectomy rate in our institute and the current study have also supported this fact. Whereas this study has shown a negative appendicectomy rate of 2%. Majority of our patients present late which increases the rate of positive clinical findings as well as laboratory parameters for acute appendicitis. This has probably led to more accurate preoperative diagnosis and hence the lower rate of negative appendectomy in our setup. The present study has a sensitivity positive predictive value and diagnostic accuracy which is in accordance with the original Tzanakis scoring system with specificity at a lesser side. However, sensitivity and specificity are better than many existing scoring systems. This study had some limitations. Both clinical and ultrasonographic evaluations were done by different residents, allowing a place for inter-observer differences in findings. Similarly, the histological examination of the appendix was also done by different pathologists, in which opinions might differ, especially about the grading of severity of inflammation of the appendix.

Conclusion

Acute appendicitis is a common surgical emergency. The negative appendectomy rate may be decreased with the use of an investigation scoring system in conjunction with sound clinical judgment. In low-resource areas in particular, the Tzanakis scoring system is a useful tool for accurately diagnosing acute appendicitis that necessitates surgery and lowers the rate of unsuccessful appendicectomies. Even though the clinical diagnosis of acute appendicitis is made, the scoring system can support it. Investigations like CECT and diagnostic laparoscopy are of high cost and may not be available universally. The sensitivity, specificity, positive predictive value, and negative predictive value of the Tzanakis score are more as compared to other scoring systems used in the past. The diagnostic accuracy of the Tzanakis score is much better than another scoring system.

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