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Prospective Observational Study Evaluating Tzanakis Scoring System in the Diagnosis of Acute Appendicitis

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ABSTRACT

Background : Appendicitis is the most common abdominal emergency worldwide with lifetime risk of acute appendicitis is 8.6% and 6.7% for men and women respectively. The classical symptomatology only occurs in 50-60% of cases, with accuracy of clinical diagnosis of acute appendicitis being 70-87%. Approximately 20% to 33% of patients with suspected acute appendicitis have atypical findings making clinical diagnosis difficult. Diagnostic errors are common resulting in median incidence of perforation of about 20% and negative appendicectomy from 2% to 30%.

Aim :To find out the efficacy of Tzanakis Scoring System in the diagnosis of acute appendicitis

Method : This was a Prospective Observational Study conducted over a period of one and half year, from October 2022 to April 2024. The study was conducted in the Postgraduate Department of General Surgery, Government Medical College, Srinagar. All the findings including history, clinical examination, laboratory investigation, ultrasound findings, and intraoperative findings and HPE reports were recorded. The final diagnosis was based on the histopathological findings.

Results : In our study 130 patients were included. Out of 130 cases, 13 cases had Tzanaki's score of < 8 and 117 cases had Tzanakis score of ≥ 8. Sensitivity and Specificity of Tzanakis score were 94.44% and 75.00% respectively. Positive Predictive Value (PPV) and Negative Predictive Value (NPV) were 99.17% and 30.00%. The Diagnostic accuracy of Tzanakis Score in the present study was 93.85%.

Conclusion : From our study, we concluded that Tzanakis Scoring System has a good diagnostic accuracy, especially when the total cut-off score is 8 or more than 8. It is useful and quite accurate tool to diagnose patients with acute appendicitis.

INTRODUCTION

Appendicitis is the most common abdominal emergency worldwide[(1-4)]. Lifetime risk of acute appendicitis is 8.6% and 6.7% for men and women respectively[(5-7)]. The accuracy of clinical examination in diagnosing acute appendicitis is 70 to 87%[(8,9)]. Abdominal pain is the most common symptom in acute appendicitis. In the classic presentation, the patient describes the pain as beginning in the periumbilical region and then migrating to right iliac fossa. This is associated with fever, anorexia, nausea, and vomiting. However this "classic" symptomatology only occurs in 50-60% of cases, with accuracy of clinical diagnosis of acute appendicitis being 70-87%[(10)]. Approximately 20% to 33% of patients with suspected acute appendicitis have atypical findings making clinical diagnosis difficult[(11,12)]. Diagnostic errors are common resulting in median incidence of perforation of about 20% and negative appendicectomy from 2% to 30%[(13,14)]. Although negative appendicectomy has negligible mortality, it has associated morbidity rate of 10%[(13,14)]. Appendicitis still poses a diagnostic challenge, and many methods have been investigated to try to reduce the removal of a normal appendix without increasing the perforation rate. Radiological methods such as ultrasonography and computed tomography, as well as laparoscopy, are all methods that have been investigated previously. Many diagnostic scores have been advocated, but most are complex and challenging to implement in a clinical situation[(13,14)].

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Tzanaki's scoring system was first conducted in Athens University Medical School, Greece by Nicolaos E Tzanakis in 2005; combining clinical assessment, raised leucocytes count and ultrasonography. There are only four variables with a total of 15 points, and a score of either 8 or more is considered acute appendicitis requiring surgical treatment[7]. Its sensitivity and specificity are 95.4% and 97.4% respectively[15].

Tzanakis scoring:

- Presence of right lower abdominal tenderness= 4 points
- Rebound tenderness = 3 points
- Laboratory findings: presence of white blood cells greater than 12,000/microlitre in the blood = 2 points
- Ultrasound finding: presence of positive ultrasound scan findings of appendicitis = 6 points
- TOTAL=15
- >8 is diagnostic of acute appendicitis requiring surgery.

Method

This was a Prospective Observational Study conducted over a period of one and half year, from October 2022 to April 2024. The study was conducted in the Postgraduate Department of General Surgery, Government Medical College, Srinagar. The Institutional Medical and Ethics Committee approval was obtained before collecting the data. An informed consent in English and Urdu language was sought from the patients for enrolment in the study.

Inclusion Criteria: Patients of ≥ 2 years of age who were clinically diagnosed with acute appendicitis and underwent open or laparoscopic appendectomy.

Exclusion Criteria: Patients with appendicular lump, patients with neoplastic lesions of appendix, patients unfit for surgery and patients with age <2 years

In the present study, the clinical diagnosis of acute appendicitis was done on the basis of detailed history, symptoms and signs especially pain, nature of pain and migration of pain, nausea and vomiting, anorexia, fever and signs of peritoneal inflammation such as right iliac fossa tenderness, rebound tenderness and guarding. After clinical suspicion of acute appendicitis the patients were advised for laboratory investigations, which included complete blood count (CBC) especially total leukocyte count (TLC), kidney function test (KFT), blood glucose, liver function test (LFT), routine urine microscopy, coagulation profile, serum electrolytes and random blood sugar. Radiological investigations included chest x-ray (CXR), ultrasonography (USG) abdomen pelvis and computer tomography (CT) was done only in selected patients to rule out other causes of acute abdomen. In addition an electrocardiography (ECG) was also done. Tzanakis score was also calculated in all patients enrolled for the study.

Patients with ≥ 8 points were diagnosed as acute appendicitis requiring surgery. However the final decision regarding surgery was taken by the operating surgeon. The intraoperative findings were noted and the specimen was sent in 10% formalin for histopathological examination. The final diagnosis was based on the histopathological findings. All the findings including history, clinical examination, laboratory investigation, ultrasound findings, intra operative findings and histopathological findings were recorded as per the proforma. All the data collected was tabulated on Microsoft Excel, calculated and analysed. Different variables like age and gender distribution, distribution on the basis of Tzanakis Score as well as the correlation of Tzanakis Score to histopathology were analysed and noted. Similarly, Sensitivity, Specificity, Positive Predictive Value, Negative Predictive Value and diagnostic accuracy were also calculated.

Results

130 patients diagnosed with acute appendicitis admitted in the general surgery department were included in the study. Out of 130 patients included in or study, 89 (68%) were males and 41 (32%) were females. Male to female ratio seen was 2.2:1. The age in our study ranged from 2 years to 65 years. The mean age at presentation was 22.51years. The most common age group with acute appendicitis was 11-20 years 24% (n=31) followed by 21-30 years 19.2% (n=25) (Table 1). Out of 130 patients, 25 males and 8 females were in the age group of 11 to 20 years. Least number of patients were seen in age group of more than 60 years with 3 males and 1 female in that group. Among 130 patients, 50 patients (38.4%) had Tzanakis Score of 13-15 followed by 44 patients (33.8%) had Tzanakis score of 10-12. None of the patients had Tzanakis score of 0-3 points (Table 2).

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Table 1: Age Distribution

Age group	Frequency	Percentage
0-10	22	17
11-20	31	24
21-30	25	19.2
31-40	23	17.6
41-50	19	14.6
51-60	6	4.6
>60	4	3.0
Total	**130**	**100**

Table 2: Tzanakis score wise Distribution.

TZS	Frequency	Percentage
0-3	0	0
4-6	4	3.07
7-9	32	24.6
10-12	44	33.8
13-15	50	38.4
Total	**130**	**100**

Out of 130 patients, 119 (91.6%) patients had findings of acute appendicitis on histopathological examination: Acute suppurative appendicitis (ASA) (n=100) and acute appendicitis (AA) (n=19). 7 (5.4%) appendixes had lymphoid follicular hyperplasia (LFH) on histology and 4 (3%) were histologically unremarkable (N). Out of 130 cases, 13 cases had Tzanakis score of <8 and 117 cases had Tzanakis score of ≥8 (Table 3).

On histopathology: among 13 patients with TZS of <8; 5 had acute appendicitis, 5 had lymphoid follicular hyperplasia and 3 had normal appendix. Among 130 patients with TZA of ≥8; 100 had acute suppurative hyperplasia, 19 had acute appendicitis, 7 had lymphoid follicular hyperplasia and 1 had normal findings (Table 4). In our study, Sensitivity and Specificity of Tzanakis score were 94.44% and 75.00% respectively. Positive Predictive Value (PPV) and Negative Predictive Value (NPV) were 99.17% and 30.00%. The Diagnostic accuracy of Tzanakis Score in the present study was 93.85%.

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Table 3: Correlation of TZS to Histopathology.

TZS	ASA	AA	LFH	N	Total
<8	0	5	5	3	13
≥8	100	14	2	1	117
Total	**100**	**19**	**7**	**4**	**130**

Table 4: Distribution based on Histopathology.

HPE	Frequency	Percentage
ASA	100	77
AA	19	14.6
LFH	7	5.4
Normal	4	3
Total	**130**	**100**

Discussion

Acute appendicitis is one of the most common medical condition encountered in clinical practice. Despite the advancements in medical field, it is a challenging task for surgeons to diagnose acute appendicitis.

In the present study we aimed to evaluate the diagnostic accuracy of Tzanakis Scoring System at our teaching hospital over a period of one and half year. A total of 130 patients with the diagnosis of acute appendicitis were enrolled in the study, and underwent open appendectomy. Patients ≥2 years were included in the study. Patients <2 years of age, neoplastic lesion and appendicular lump were excluded.

All the 130 patients who presented to the emergency department and were assessed for Tzanaki's Score and underwent open appendectomy. The final diagnosis of acute appendicitis was confirmed by histopathological examination of the resected specimen. In our study, out of 130 patients 68% (n= 89/130) were males and 32% (n=41/130) were females. Male to Female ration in our study was 2.2:1. Most of the patients 24% (n=31/130) presented in the age group of 11-20 years and least number of patients 3% (n=4/130) were seen in the age group of >60 years. The findings were similar to those of Malik A et al[17] and Mahmood FM et al[18], where males slightly outnumbered the females and mean age was found to be around 20-30 years.

Out of 130 patients, 90% (n=117/130) patients had Tzanakis Score of ≥8 and rest of the 10% (n=13/130) had Tzanakis Score of <8. 33.4% (n=50/130) patients had Tzanakis Score of 13-15 followed by 10-12 in 33.8% patients (n=44/130). 24.6% (n=32/130) patients had Tzanakin's Score between 7-9 and none of the patient had Tzanakis score of <3 in our study. Similar findings were reported by Malik A et al[17] and Mahmood FM et al[18]. The histopathological examination which was considered as the final diagnosis, revealed acute appendicitis in 91.6% (n=119/130) (acute suppurative appendicitis in 100 patients and acute appendicitis in 19 patients). 5.4% (n=7/130) had findings of lymphoid follicular hyperplasia on histology and 3.07% (n=4/130) were histologically unremarkable. The results were corresponding to the studies by Shrestha D et al[20] who in their study reported 88% of acute appendicitis on histopathological examination. Sharma D et al[21] who in their study reported acute appendicitis in 88 patients out of 100. Saleem MM et al[22] also found acute appendicitis on histopathological examination in 70% of patients .

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When we compared histopathology findings with the positivity of Tzanakis Score, out of 130 patients, 90% (n=117/130) patients had Tzanakis Score of ≥8. However, among these patients histological examination revealed acute suppurative appendicitis (ASA) in 100 specimens, acute appendicitis (AA) in 14 specimens, 2 showed lymphoid follicular hyperplasia (LFH) and 1 was found histologically unremarkable. In patients with TZS of <8, 5 had AA, 5 had LFH and 3 were histologically unremarkable. In the studies carried by, Anupriya R et al[19], Malik A et al[17], Kumar SLA et al[16] and Saravanan et al[23] showed almost similar findings as in our study. Out of 117 clinically diagnosed with acute appendicitis with Tzanaki's Score of ≥8, 116(99.16) patients on histopathology (True Positive) had histological findings consistent with clinical diagnosis and one (0.84%) (False Positive) of the appendix had normal histological findings. 13 patients who, had very low TZS (<8) and were operated, 10 had histological diagnosis of appendicitis (False Negative) and 3 (True Negative) were found normal. Saleem MM et al[22], in his study had 102 true positive cases, 40 true negative, 7 false positive and 7 false negative cases of appendicitis in total 158 cases. Kumar SLA et al[16] had 165 true positive cases, 5 true negative, 2 false positive and 28 false negative cases of appendicitis in a total 200 cases.

In our study, Sensitivity and Specificity of Tzanakis score were 94.44% and 75.00% respectively. Positive Predictive Value (PPV) and Negative Predictive Value (NPV) were 99.17% and 30.00%. The Diagnostic accuracy of Tzanakis Score in the present study was 93.85%. On comparing the results with other studies by Malik A et al[17], Kumar SLA et al[16], Anupriya R et al[19], Saleem MM et al[22] and Mahmood FM et al[18], the results were comparable and almost similar.

In our study the overall negative appendectomy rate was 3.07%, when comparing Tzanakis Scoring System results with histopathological findings. Similar findings were also reported by Malik A et al[17], Mahmood FM et al[18], Anupriya R et al[19] and Saleem MM et al[22].

Conclusion

From our study, we concluded that Tzanaki's Scoring System has a good diagnostic accuracy, especially when the total cut-off score of 8 or more than 8 and is a useful and quite accurate tool to diagnose patients with acute appendicitis. Tzanaki's Scoring System also proved to have low negative appendectomy rates. In our study, we had a total of 3.07% of negative appendectomy rate.

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