

## Comparative study of Tzanakis score vs Alvarado score in the effective diagnosis of acute appendicitis

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### Abstract

**Background:** Acute appendicitis is the most frequent surgical emergency encountered worldwide. Diagnostic errors are common resulting in median incidence of perforation 20% and negative appendectomy 2% to 30%. This study was conducted to compare the efficacy of Alvarado scoring and Tzanaki scoring in diagnosing acute appendicitis and to reduce the negative appendectomy rate.

**Methodology:** Prospective observational nonrandomized study conducted at Victoria hospital Bangalore which included 50 clinically diagnosed cases of acute appendicitis who underwent emergency open appendectomy from Jan 2016 to May 2016. Final diagnosis was based on histological findings given by the pathologist.

**Results:** The sensitivity, specificity, positive predictive value and negative predictive value of Tzanakis score was 79.62%, 83.3%, 97.72% and 31.25% respectively and of Alvarado score was 61.9%, 50.0%, 86.6% and 15% respectively. Negative appendectomy in Tzanakis scoring was 12% and in Alvarado scoring was 16%.

**Conclusion:** Tzanakis score is an effective modality to establish the accurate diagnosis of acute appendicitis and helps in reducing negative appendectomy rate.

**Keywords:** Acute appendicitis; Tzanakis score; Alvarado score

### 1. Introduction

Acute appendicitis has a lifetime risk of 8.6% and 6.7% in men and women respectively [1-3]. The accuracy of clinical examination in diagnosing acute appendicitis is 70 to 87% [4,5]. Approximately 20% to 33% of patients with suspected acute appendicitis have atypical findings making clinical diagnosis difficult [6,7]. Diagnostic errors are common resulting in median incidence of perforation 20% and negative appendectomy 2% to 30%. Alvarado score [8] is widely used in diagnosing acute appendicitis; a score of 7 or more is considered diagnostic requiring surgery [9]. Its sensitivity and specificity ranges from 73-90% and 87-92% respectively [10,11]. Tzanaki score [12] is a combination of clinical evaluation and ultrasonography and inflammatory markers. There are together 4 variables and 15 points and a score of more than 8 is diagnostic for appendicitis requiring surgery. Its sensitivity, specificity are 95.4% and 97.4% respectively [12]. This study compares the efficacy of Tzanaki and Alvarado scoring to diagnose acute appendicitis and reduce the rate of negative appendectomy.

### 2. Materials and methods

It is a prospective study nonrandomized observational study conducted at Victoria hospital affiliated

Bangalore Medical College and Research Institute, Bangalore. The study was approved by the Institutional Ethical Review Board. Written informed consent was taken from each study subject at the time of enrolment.

A total of 50 patients clinically diagnosed to have acute appendicitis are studied who underwent clinically diagnosed cases of acute appendicitis emergency open appendectomy from Jan 2016 to May 2016. Tzanakis and Alvarado scores were obtained at the time of admission, and postoperatively specimen is sent for histopathological examination. Final diagnosis of acute appendicitis is based on histopathological reports.

#### Alvarado scoring:

- Migratory abdominal pain-1
- Anorexia-1
- Nausea/vomiting-1
- Rebound tenderness-1
- Leucocytosis-2
- Shift of white blood cell count to left-1
- Elevated temperature-1
- Tenderness in right lower quadrant-2

Total-10

1-4---discharge

5-7---Observation

7-10---surgery

**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 in the blood = 2 points
- Ultrasound finding: presence of positive ultrasound scan findings of appendicitis = 6points

TOTAL-15

&gt;8----Diagnostic of acute appendicitis requiring surgery

**2.1 Inclusion Criteria of the study:**

- All patients clinically diagnosed with acute appendicitis undergoing open or laparoscopic appendectomy.

**2.2 Exclusion Criteria of the study:**

- Patients not fit or not willing for surgery.
- Appendicular perforation, Appendicular abscess, Appendicular mass.
- Patients < 18 years.
- No consent for the study.

Even when both the scores were below cut-off value patients subjected for appendectomy based on clinical judgement.

**3. Results****Table 1: Age distribution**

Age (in years)	Number of patients
<20	5
21-30	18
31-40	10
41-50	5
>50	2

Acute appendicitis is a disease of the young commonly seen in the age group of 21-30 years followed by 31-40 years.

**Table 2: Sex distribution**

Male	Female
36	14

Acute appendicitis is more common in males (72%) as compared to females.

**Table 3: Presenting symptoms**

Symptoms	Number of patients
Pain abdomen	45
Fever	29
Vomiting	18
Urinary frequency	6
Constipation	4
Diarrhea	2

Main complaint was pain abdomen followed by fever and vomiting.

**Table 4: Alvarado scoring**

Scoring accounting for appendectomy	Appendicitis		
	Yes	No	Total
Yes	26(TP)	4(FP)	30
No	18(FN)	2(TN)	20
Total	44	6	50

TP- True positive; TN-True negative; FP-False positive; FN- False negative

**Table 5: Tzanakis scoring**

Scoring accounting for appendectomy	Appendicitis		
	Yes	No	Total
Yes	35(TP)	1(FP)	36
No	9(FN)	5(TN)	14
Total	44	6	50

TP- True positive; TN-True negative; FP-False positive; FN- False negative

**Table 6: Comparing both the scores**

	Alvarado scoring (in %)	Tzanakis scoring (in %)
sensitivity	79.62	59.09
Specificity	83.3	33.33
Positive predictive value	97.2	86.6
Negative predictive value	35.7	10

Tzanakis scoring is better in terms of sensitivity, specificity, PPV and NPV as compared to Alvarado scoring.

**Table 7: Further investigation of cases with histological normal Appendix**

Diagnosed as on further evaluation	Number of patients
Enterocolitis	1
Pelvic inflammatory disease	4

Negative appendectomy - 12%.

Total number of patients - 6.

Undiagnosed - 1

**4. Discussion**

Diagnosis acute appendicitis is a challenging job for a surgeon, delayed diagnosis can lead to complications. A high rate of negative appendectomy of 15%-25% has been accepted in the past at the cost of preventing complications. Though mortality of negative appendectomy was less associated with morbidities like surgical site infections, fecal fistula, adhesions, future hernias.

Tzanakis *et al* have reported the sensitivity and specificity of 95.4% and 97.4%. Results of our study was comparable with that. The low specificity of Tzanakis score was likely to be due to low sensitivity rate of USG which can be improved by experienced sonologists and newer advanced USG machines.

**5. Conclusions**

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 appendectomy. Though acute appendicitis is a clinical diagnosis the scoring system can complement the clinical diagnosis. Investigations like CECT and diagnostic laparoscopy are of high cost may not be available universally; can be a basis for not going to advanced investigations like CECT abdomen for diagnosis and management.

### Limitations of the study:

Both clinical and ultrasonographic evaluations are done by different people allowing place for inter observer variations.

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