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Tzanski Score Vs Modified Alvarado Score in Diagnosis of Acute Appendicitis

Dr Praveen Shandil[1], Dr Brahmjeet Atrish[2], Prof. U.K. Chandel[3], Prof. A.K. Kaundal[4]

[1,2]Junior Resident, IGMC SHIMLA
[3]HOD Department of Surgery, IGMC SHIMLA
[4]Associate Professor Surgery, IGMC SHIMLA

Abstract

Background: Acute appendicitis is the most common non-traumatic surgical acute abdominal pain. Acute appendicitis is a frequent reason for emergency hospital admission, and appendectomy is one of the most common emergency procedures performed in contemporary medicine. The lifetime risk of developing appendicitis is 8.6% for males and 6.7% for females, with the highest incidence in the second and third decades. Complications are more common in extreme age group of patients who have greater perforation rate with more chances of intraperitoneal spread of infection due to their poor localizing capability. [6,7] Alvardo 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. This study compares the efficacy of Tzanaki and Alvardo scoring to diagnose acute appendicitis and reduce the rate of negative appendicectomy.

Objectives: This study aims to reduce the rate of negative appendicectomy by comparing the Tzanakis score and modified Alvarado score in diagnosis of acute appendicitis.

Methodology: Patients admitted to IGMC and Hospital Shimla from June 2020 to Sept 2022 who underwent appendicectomy for acute appendicitis were included in the study. For each patient clinical, biochemical and radiological investigations were done and graded with both Alvarado scoring and Tzanakis scoring. Histology results from the biopsy were followed up and the negative appendicectomy rate was then calculated. The results of both Alvarado score and Tzanakis score to determine sensitivity, specificity, Positive predictive value, negative predictive value were calculated and compared.

Results: 120 cases of acute appendicitis were admitted in IGMC&H and studied. There is a male predominance with a ratio of 4:1.There is a higher prevalence of acute appendicitis in second decade (52%) Right iliac fossa pain (90%) and anorexia (82%) were the consistent symptoms. Right iliac fossa tenderness is the most consistent clinical sign(62%) Most number of patients presented between 12-24 hours after the onset of symptoms. Retrocaecal was the most common location of the appendix (60%). Alvarado score is a simple aid in diagnosing acute appendicitis but significant number of cases are missed if entirely relied upon, with a negative appendicectomy rate of 8%. Though acute appendicitis is a clinical diagnosis, the Tzanakis scoring system can complement the clinical diagnosis. There was no post-operative mortality in our study.

Conclusion: Tzanakis scoring is significantly more efficient when compared to Alvarado scoring for the diagnosis of acute appendicitis. The incorporation of ultrasound in the Tzanakis score improves the diagnostic precision. Good clinical judgement aided by investigations and scoring systems can help to reduce the negative appendicectomy rate. Tzanakis scoring system can be used as an effective modality to establish the accurate diagnosis of acute appendicitis with reasonably low negative appendicectomy rate.

INTRODUCTION

The vermiform appendix is considered by most to be a vestigial organ, its importance in surgery results only from its propensity for inflammation, which results in the clinical syndrome known as acute appendicitis.[1] Acute appendicitis is the most common non-traumatic surgical acute abdominal pain. Acute appendicitis is a frequent reason for emergency hospital admission, and appendectomy is one of the most common emergency procedure performed in contemporary medicine. The lifetime risk of developing appendicitis is 8.6% for males and 6.7% for females, with the highest incidence in the second and third decades.2-5 The cornerstone of the diagnosis of AA has traditionally been the combination of history and physical examination. However at times, the clinical evaluation of patients with suspected AA become complex. Prompt and accurate diagnosis is imperative to decrease the frequency of complications, such as appendicular perforation, appendicular abscess and phlegmon formation which are associated with increase morbidity and mortality. Complication are more common in extreme age group of patients who have greater perforation rate with more chances of intraperitoneal spread of infection due to their poor localizing capability.[6,7]

Acute appendicitis is one of the most common reasons for emergency laparotomy. The lifetime risk of having an appendectomy is 12% for men and 25% for women.[3-5] One side there is fear of perforation due to delay in diagnosis leading to prolonged hospital stay and increased morbidity and mortality, on the other is a high negative appendectomy rate of 10% to 20% for the total population and as high as 26% in females of reproductive age[3] This is also a cause for concern with significantly longer hospital stay, high fatality rate, higher rate of infectious complications and unnecessary hospital expenses.[3] One should both decrease the rate of perforation and the negative appendectomy rate by increasing the diagnostic accuracy. The most accurate means of diagnosis of AA is still a source of debate. It has historically been a clinical diagnosis combination of history, physical signs, radiological investigations and laboratory analysis is used to balance the risk of delay in operative intervention against the removal of normal appendix. The overall accuracy of the clinical examination in diagnosing AA has been reported to be 70% to 87% (54% to 70% in children and 50% to70% in women of childbearing age).[8, 9]

The classical history of AA is a vague periumbilical pain that localizes to the right lower quadrant, followed by anorexia, nausea, vomiting, which evolves over 12 to 24 hours.

The symptom most consistently present are abdominal pain and anorexia.1 other symptoms are more variable, physical findings include tachycardia, low grade fever, and the laboratory values of leucocytosis with a left shift. Tenderness to 30% of patients with suspected acute appendicitis are with atypical findings[9]

Routine laboratory blood examination is mandatory in all but not always very helpful with normal finding in some patients. Both leucocytosis and raised C- reactive protein (CRP) levels are non-specific and only indicate that the patient may have inflammatory pathology in the body. However, a rise of repeated leukocyte count is more specific in diagnosing AA.[10,11]

Radiological investigation like X-ray of the abdomen has an abnormal finding in only 8% of patients. These include presence of fecaliths, dilated sentinel loop of bowel and blurring of psoas shadows.[11]

Ultrasonography (USG) has significantly improved the diagnostic accuracy in suspected appendicitis with an overall accuracy of 85 -96%.

The main limitation is that it is operator dependent with lower diagnostic rates with inexperienced radiologist.[12,13]

Computed tomography (CT) scan has also been widely studied for the diagnosis of inflamed appendix with high accuracy of 89 -98%. Limited availability and high costs limit it use in daily practice.[14]

Diagnostic laparoscopy is useful in evaluating patients with right lower abdominal pain, especially in those with equivocal signs of AA. It has the additional benefit of being therapeutic. Premenopausal women benefit the most from this procedure. In one study selective laparoscopy has reduced the rate of negative appendectomy rate from 37% to 31%; by contrast, routine laparoscopy has reduced the negative appendectomy rate to 5%. Its unavailability, invasiveness and the need for expertise are its limitations in our context.[15]

Early and accurate diagnosis is essential to reduce the morbidity and mortality as a consequence of delayed appendectomy and to reduce the negative appendectomies. The Tzanakis scoring system[16] was formulated in attempt to develop a simple and reliable scoring system with high diagnostic accuracy.

It is a combination of clinical evaluation, ultrasonography and laboratory marker of inflammatory response. Therefore, this study was conducted to find out the usefulness of Tzanakis scoring system in diagnosis of AA. This hopefully will lower the negative appendectomy rate in our setup.

Alvardo 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]. Tzanakis 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 Tzanakis and Alvardo scoring to diagnose acute appendicitis and reduce the rate of negative appendicectomy.

MATERIALS AND METHODS

The present study is a prospective study. This study was performed during the time period from June 2020 to September 2022. Patients admitted in IGMC and Hospital Shimla with features suggestive of acute appendicitis and underwent surgery for the same were included in the study. The decision to operate was taken by the operating surgeon based on overall clinical judgment and not the Alvarado score alone. The Alvarado score and Tzanakis score were calculated from the collected data. Histology results from the removed appendices were followed up. The negative appendicectomy rate was then calculated.

OBSERVATION AND RESULTS

A total 120 patients underwent appendicectomy for suspected acute appendicitis during the study period. Out of 120 patients 27 patients were found to be negative for acute appendicitis. A negative appendicectomy rate of 22.5% was observed in this study.

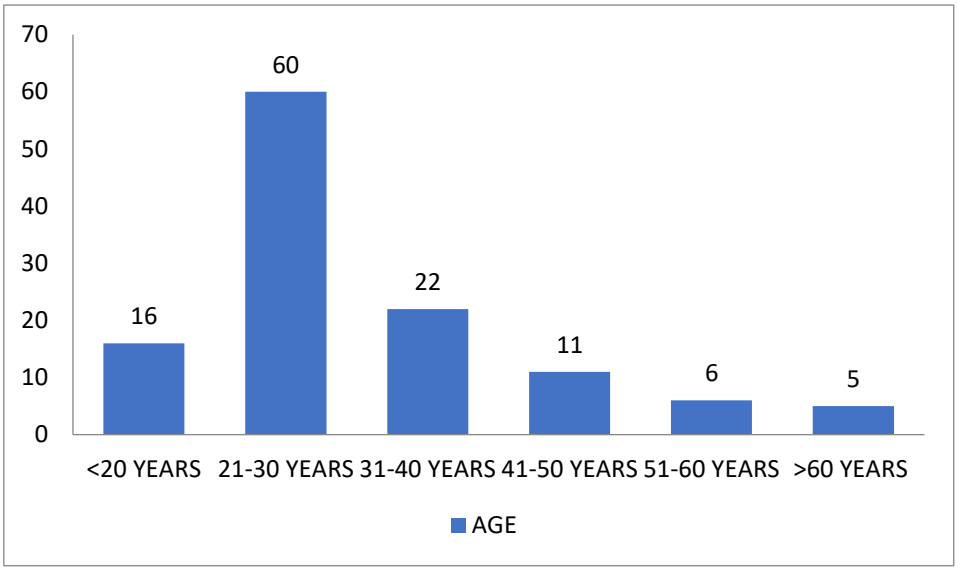
Age Distribution

Range was 16-75 years. Highest incidence is seen in patients of age group of 21-30 years (52%). Mean age was 30 ±12.40.

TABLE 5 AGE DISTRIBUTION

AGE	NO OF PATIENTS
<20 YEARS	16
21-30 YEARS	60
31-40 YEARS	22
41-50 YEARS	11
51-60 YEARS	6
>60 YEARS	5

GRAPH 11: AGE DISTRIBUTION



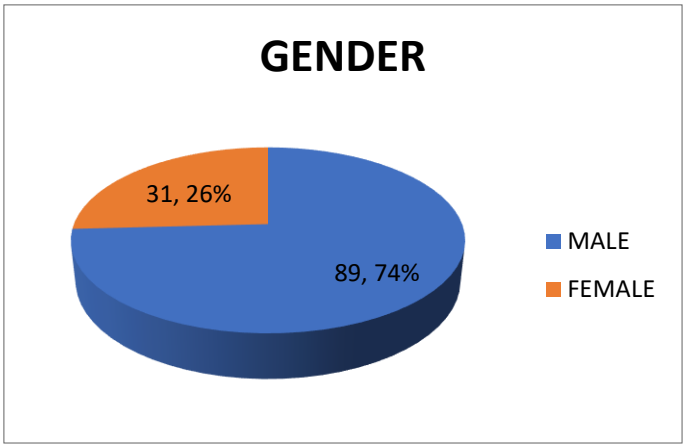
GENDER DISTRIBUTION

There was a male predominance observed in the study. Out of 120 patients 89 were males and 31 were females.

TABLE 6: Gender Distribution

MALE	FEMALE
89	**31**

GRAPH 2: Gender Distribution

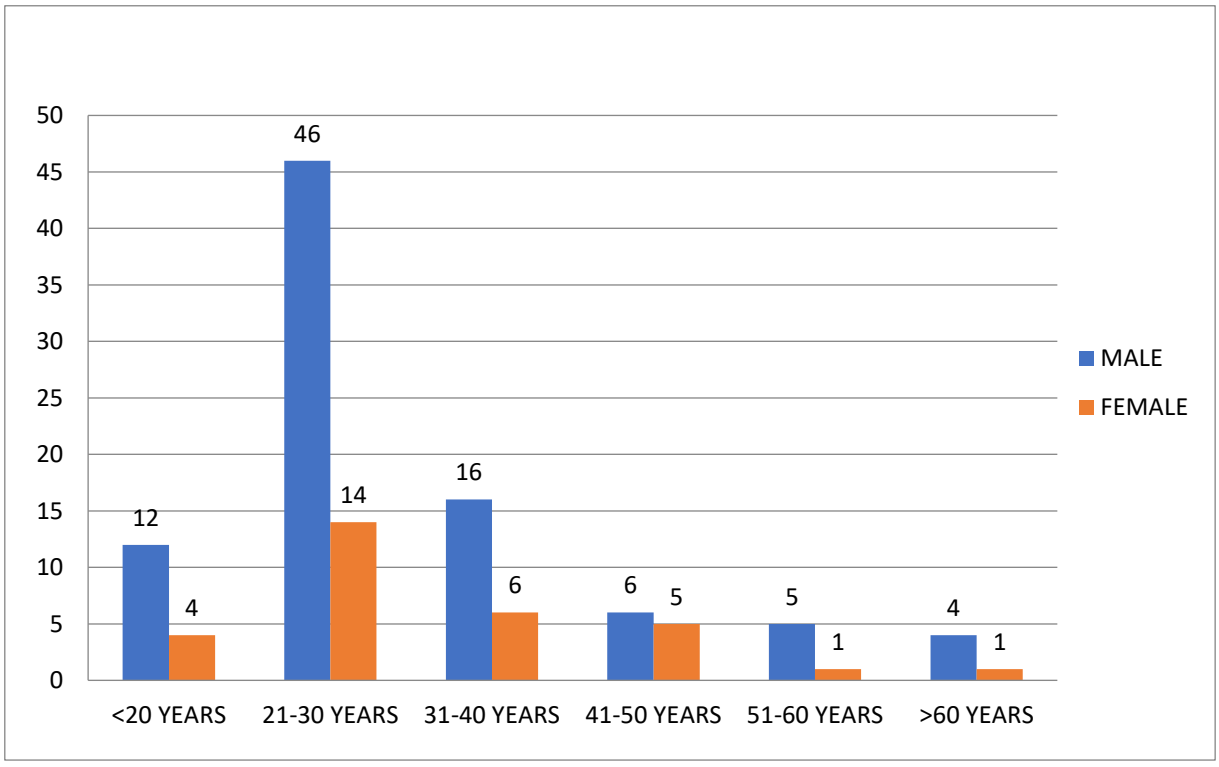


AGE AND GENDER DISTRIBUTION

TABLE 7: AGE AND GENDER DISTRIBUTION

AGE	MALE PATIENTS	FEMALE PATIENTS	TOTAL PATIENTS
<20 YEARS	12	4	16
21-30 YEARS	46	14	60
31-40 YEARS	16	6	22
41-50 YEARS	6	5	11
51-60 YEARS	5	1	6
>60 YEARS	4	1	5

GRAPH 3: AGE AND GENDER DISTRIBUTION



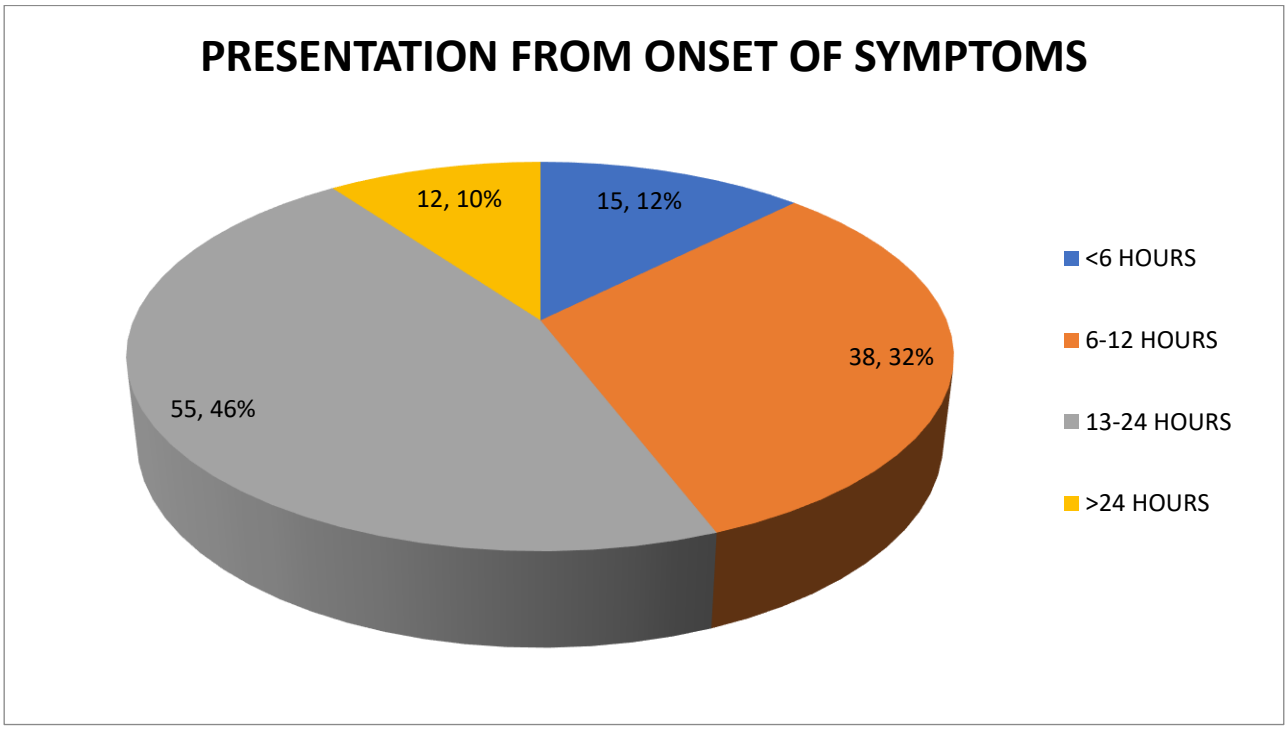
PRESENTATION AFTER THE ONSET OF SYMPTOMS

Mean duration of symptoms-17.72 hours. Most number of patients presented between 12-24 hours after the onset of symptoms.

TABLE 8: PRESENTATION AFTER THE ONSET OF SYMPTOMS

Presentation from onset of symptoms(in hours)	No. of patients
<6 HOURS	15
6-12	38
13-24	55
>24 HOURS	12

GRAPH 4: PRESENTATION AFTER THE ONSET OF SYMPTOMS



LENGTH OF HOSPITAL STAY

Range was from 2 days to 10 days. Mean duration of stay was 4.78 days with a standard deviation of 1.67

TYPE OF OPERATION

5 patients underwent laparoscopic appendicectomy, 95 patients underwent open appendicectomy

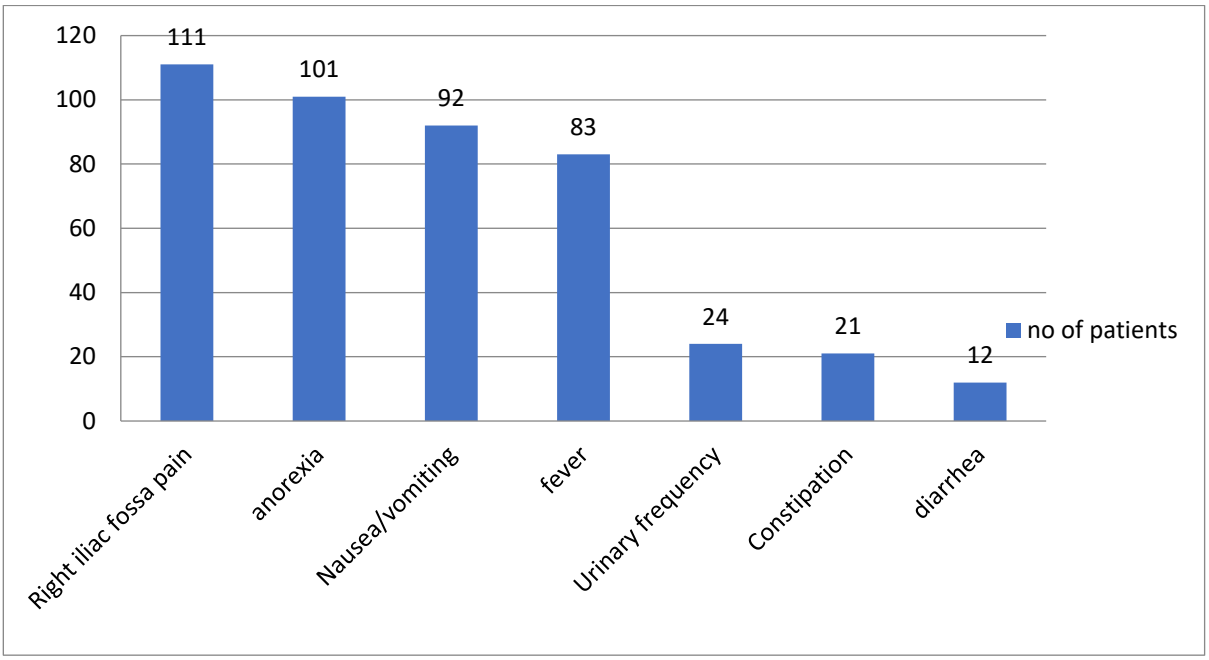
SYMPTOMATOLOGY

Right iliac fossa pain was the predominant symptom present in 92.5% of the patients followed by anorexia in 84.16% of the patients. Nausea/vomiting, fever, urinary frequency, constipation, diarrhoea were present in 76.66%, 69.16%, 20%, 17.5% and 10% respectively.

Table 9: Symptomatology

Symptom	No of patients	Percentage
Right iliac fossa pain	111	92.5
anorexia	101	84.16
Nausea/vomiting	92	76.66
fever	83	69.16
Urinary frequency	24	20
Constipation	21	17.5
diarrhea	12	10

Graph 5: Symptomatology



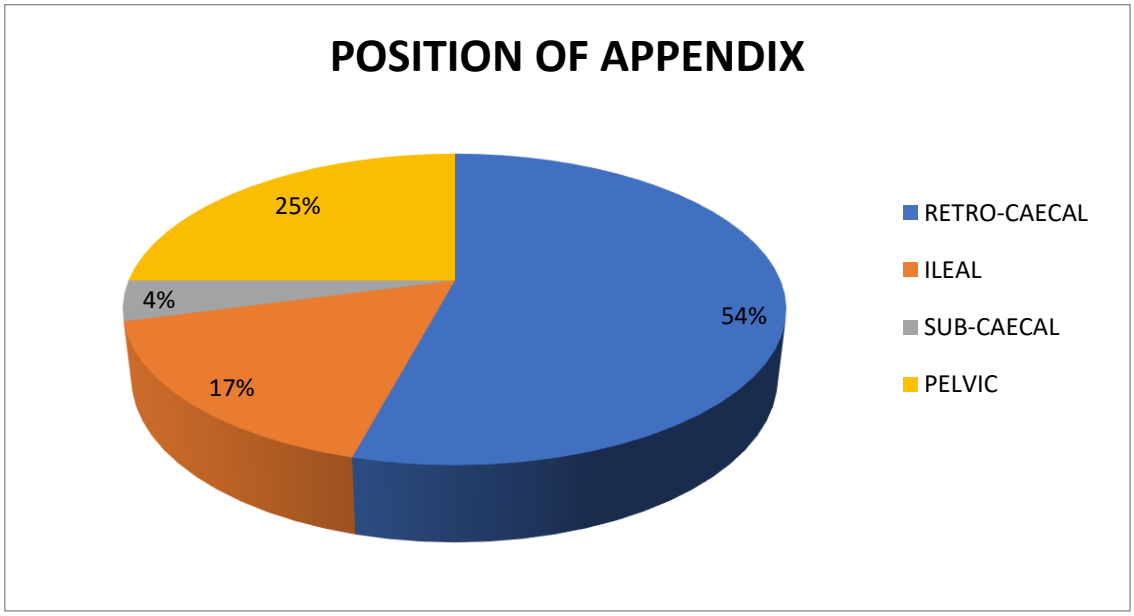
INTRA OPERATIVE FINDINGS REGARDING POSITIONS OF APPENDIX

Retro-caecal location of the appendix was found to be most common location(60%) followed by pelvic(30%).

TABLE 10: Position of Appendix

POSITION OF APPENDIX	NO OF PATIENTS	PERCENTAGE
RETRO-CAECAL	65	54.16
ILEAL	20	16.68
SUB-CAECAL	5	4.16
PELVIC	30	25

GRAPH 6: Position of Appendix

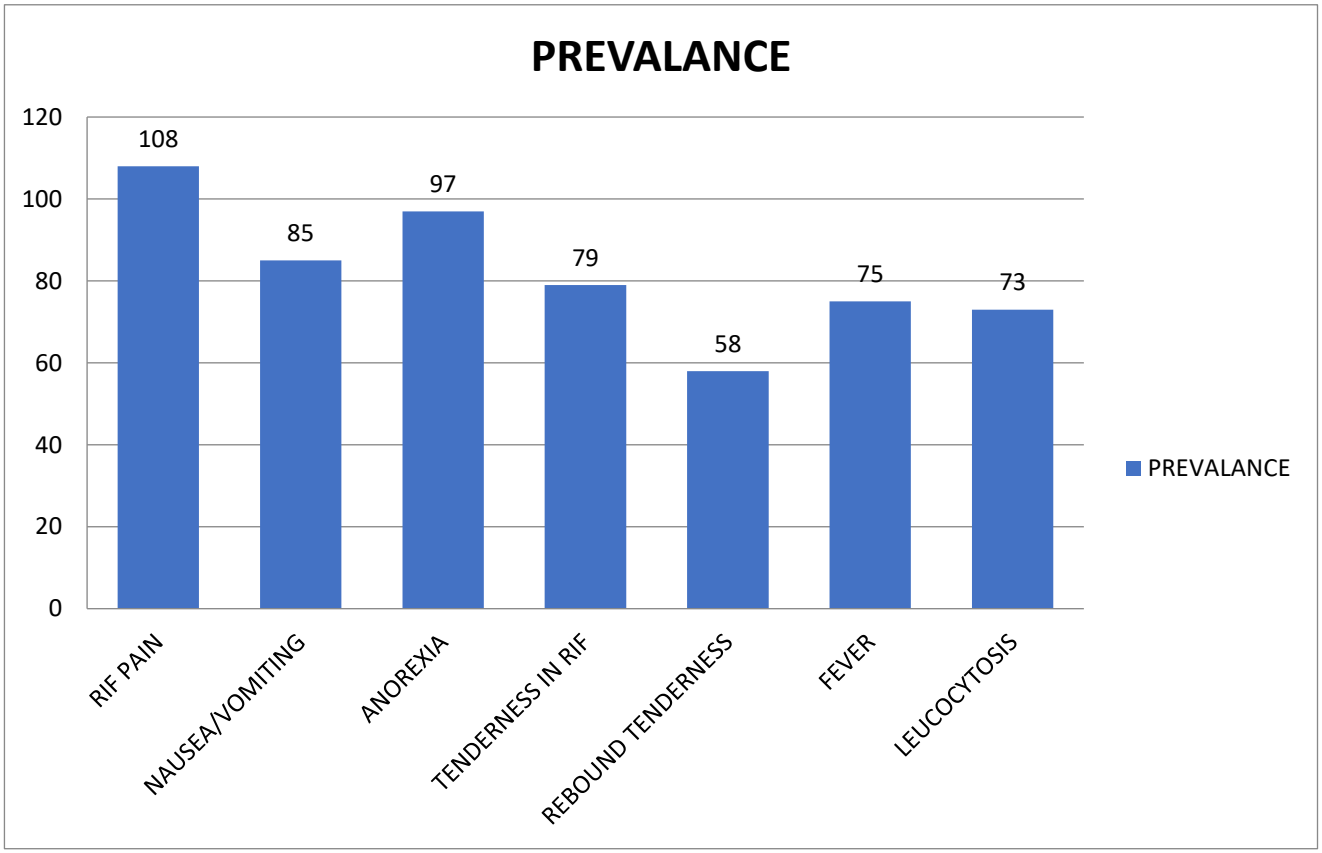


PREVALENCE OF PARAMETERS OF ALVARADO SCORING

TABLE 7: PREVALENCE OF ALVARADO SCORE PARAMETERS

PARAMETER OF MODIFIED ALVARADO SCORE	POSTIVE IN NO OF PATIENTS	PERCENTAGE
RIF PAIN	111	90.00
NAUSEA/VOMITING	92	70.83
ANOREXIA	102	80.83
TENDERNESS IN RIF	91	65.84
REBOUND TENDERNESS	65	48.34
FEVER	83	62.50
LEUCOCYTOSIS	83	60.84

GRAPH 7



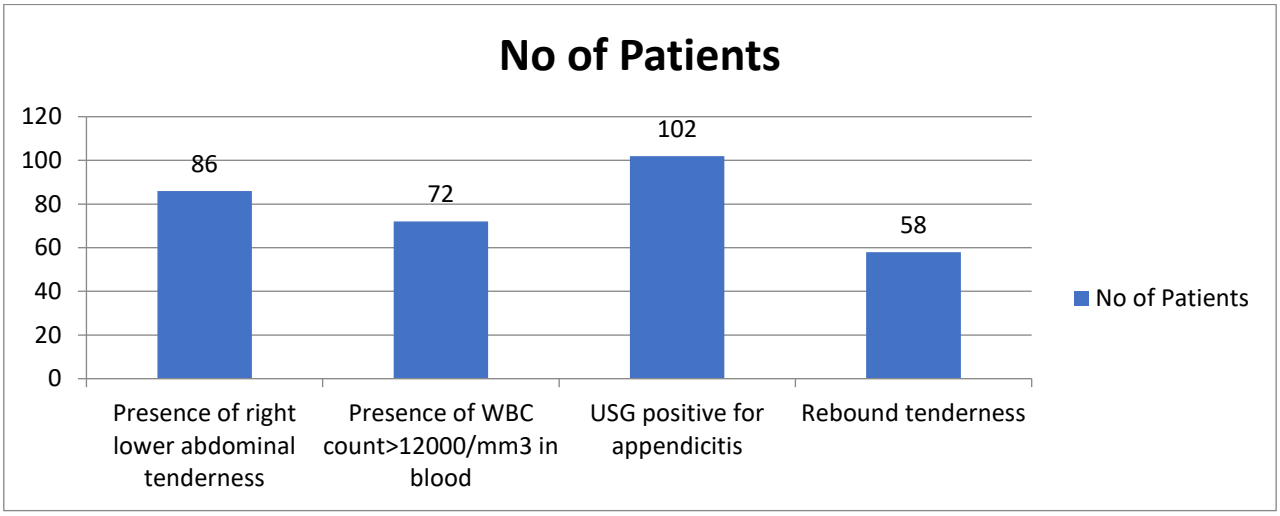
PREVALENCE OF PARAMETERS OF TZANAKIS SCORING

TABLE 8

symptom	No of patients	Percentage
Presence of right lower abdominal tenderness	91	71.67
Presence of WBC count>12000/mm3 in blood	83	60

USG positive for appendicitis	102	85
Rebound tenderness	65	48.34

Graph 8

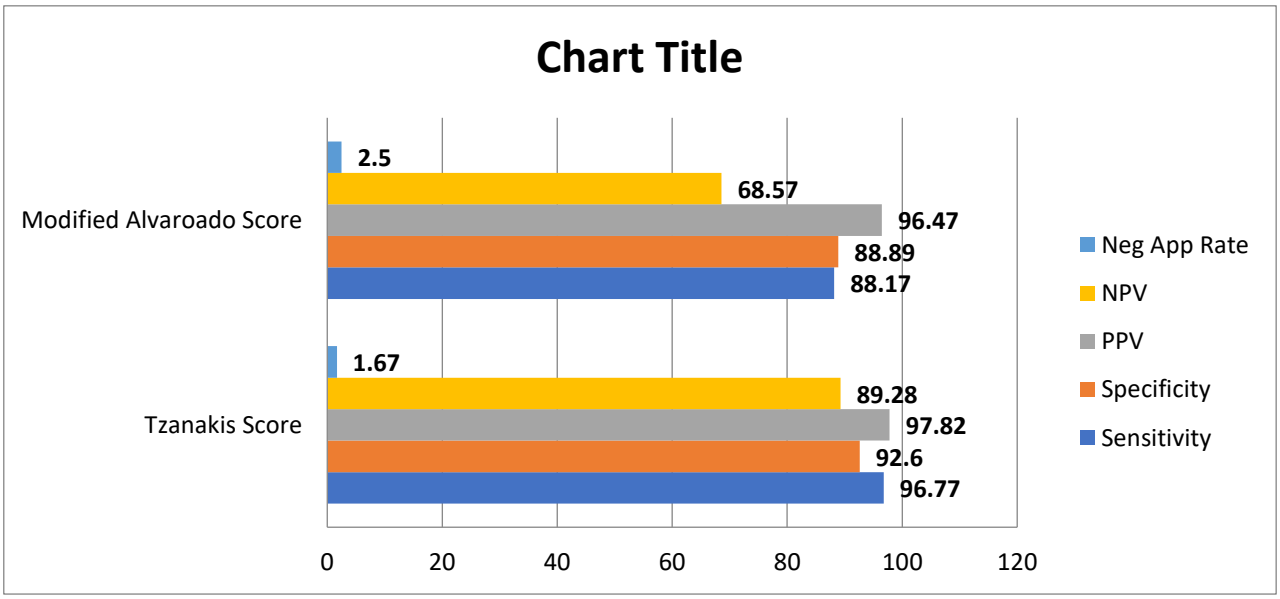


COMPARISON OF DIAGNOSTIC ACCURACY OF ALVARADO SCORE AND TZANAKIS SCORE.

TABLE 13

	Tzanakis Score	Modified Alvarado Score
Sensitivity	96.77	88.17
Specificity	92.6	88.89
Positive Predictive Value	97.82	96.47
Negative Predictive Value	89.28	68.57
Negative Appendicectomy Rate	1.67	2.5

GRAPH 11



Discussion

As the clinical picture of acute appendicitis' mimic various other intra-abdominal pathologies, the surgeon must make a confident preoperative diagnosis. Delayed diagnosis can result in complications, so various scoring systems with various parameters were introduced to support clinical judgment and increase diagnostic accuracy.

In our study of 120 patients undergoing appendicectomy at our hospital, patients are of ages between 16 to 75 years. Majority of the patients were in the age group of 21 to 30 years of age i.e. 60 patients with a percentage of 52%. The mean age of the population is 30 years with standard deviation of 12.40.

In our study, the male to female ratio is 2.87: 1. The total number of male patients is 89 and female are 31 in the study.

The mean duration from onset of symptoms to the time of presentation is 17.72 hours, with a range of 1 hour to 26 hours.

Right iliac fossa pain was the most common presenting symptom seen in 92.5% of the patients. Other symptoms such as anorexia, Nausea/vomiting, fever, urinary frequency, constipation, diarrhea were observed.

According to our study, Modified Alvarado score has a specificity of 88.89%, sensitivity of 88.17%, and positive predictive value of 96.47% and negative predictive value of 68.57%.

In the study conducted by Shahid-ul-haq Dar et al. The sensitivity and specificity was 93.7% and 85% respectively. The positive predictive value , negative predictive value were 96.1%, 77.2% respectively.

Rezak et al, in their retrospective study, found a sensitivity and specificity- 92% and 82% respectively.

Several studies have validated the Modified Alvarado score, which has a sensitivity range of 80-95% and a specificity range of 80-94%. When compared to other research, the sensitivity and specificity of this score in the current study were both rather low (88.17% and 88.89% respectively). This lower rates can be attributed to the delayed presentation from the onset and prior antibiotic treatments before diagnosis and admission in our hospital which altered the pathology and biochemical results of the study.

In various studies, on comparison of modified Alvarado score, there is similarity in the results on comparing the sensitivity, specificity, positive predictive value and negative predictive value, are on par with our study. sensitivity and sensitivity increases with the increase in the score. Modified Alvarado score is an effective method in diagnosing acute appendicitis, lower scores doesn’t rule out acute appendicitis. In cases of diagnostic inaccuracy, radiological imaging should be utilized for diagnosis. In patients presenting early, or late after onset of symtoms. There may not be significant clinical signs to calculate the score. In such cases, radiological imaging such as ultrasound or CT scan be done to evaluate the diagnosis.

In our study, Tzanakis score has a sensitivity of 96.77%, specificity of 92.6%, positive predicitive value of 97.82%, negative predictive value of 89.28%.

It has a diagnostic accuracy of 98.33%.

According to Tzanakis et al., the sensitivity and specificity were 95.4% and 97.4%, respectively. Our study's findings were equivalent to others.

Tzanakis score incorporates the radiological investigation i.e ultrasound imaging which has a sensitivity of more than 90% in identification of the diagnosis. This resulted in accurately diagnosing the appendicitis which the clinical signs may not be conclusive. Appendicitis of the tip of appendix, early presentation, or appendicular perforation can be identified on ultrasound, when the patient shows fewer signs and symptoms.

In the current study, the effectiveness of Alvarado scoring and Tzanakis scoring in the diagnosis of acute appendicitis is compared. In terms of sensitivity, specificity, positive and negative predictive values, Tzanakis' score was superior.

A 22.5% overall negative appendicectomy rate is observed in the study.

Since the majority of our patients arrived to the casualty facility late (mean symptom duration: 17.72 hours), more positive clinical findings and laboratory results are obtained. The rate of negative appendicectomy in our system has likely decreased as a result, and it is significantly lower in Tzanakis scoring (1.6%), compared to Modified Alvarado scoring (2.5%).

Therefore, this study supports the use of Tzanakis scoring as a helpful tool to aid in the accurate identification of acute appendicitis.

CONCLUSION

Tzanakis scoring is significantly more efficient when compared to Alvarado scoring for the diagnosis of acute appendicitis. The incorporation of ultrasound in the Tzanakis score improves the diagnostic precision. Good clinical judgement aided by investigations and scoring systems can help to reduce the negative appendicectomy rate. Tzanakis scoring system can be used as an effective modality to establish the accurate diagnosis of acute appendicitis with reasonably low negative appendicectomy rate.

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