Original Research Paper

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Surgery

A CROSS SECTIONAL STUDY OF ALVARADO SCORING SYSTEM IN PREOPERATIVE DIAGNOSIS OF ACUTE APPENDICITIS.

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ABSTRACT **Aim:** To study the Alvarado Scoring System in diagnosing acute appendicitis.usefulness of Alvarado Scoring System in cutting down the rate- of negative Appendicectomy without increasing morbidity and mortality. **Material and methods:** Study was carryout in the Govt.General Hospital,Nizamabad with Patients with symptoms & signs of acute appendicitis and suspected enough to warrant surgery for acute appendicitis. **Results:** The application of this scoring system improves diagnostic accuracy and consequently reduces negative appendicectomy and thus reduces complication rates. **Conclusion:** This study shows that Alvarado scoring system can be used to diagnose acute appendicitis in the emergency department. It is easy and quick to apply. It also allows observation and re-observation regarding clinical behaviour of patient, whether or not to intervene for surgery.

KEYWORDS : Alvarado Scoring System, Acute appendicitis, HPE,Negative Appendicectomy

INTRODUCTION

Acute appendicitis is one of the commonest surgical emergencies. Simple appendicitis can progress to perforation, which is associated with a much higher morbidity and mortality, and surgeons have therefore been inclined to operate when the diagnosis is probable rather than wait until it is certain.[1]

Acute appendicitis is essentially a clinical diagnosis.[2] About 6% of the population is expected to have appendicitis in their lifetime. Routine history and physical examination still remain the most practical diagnostic modalities. Absolute diagnosis of course is only possible at operation and histopathologic examination of the specimen.[3]

Removing normal appendix is an economic burden both on patients and health resources. Misdiagnosis and delay in surgery can lead to complications like perforation and finally peritonitis.[4]

Scoring systems are valuable and valid for discriminating between acute appendicitis and nonspecific abdominal pain.[5] At present many scoring systems for the diagnosis of acute appendicitis are available. Alvarado scoring system is one of them and is purely based on history, clinical examination and few laboratory tests and is very easy to apply.[6] The use of an objective scoring system such as the Alvarado system can reduce the negative appendicectomy rate to 0-5%.

My study is to evaluate the efficacy of Modified Alvarado Scoring System as a pre-operative diagnostic tool in acute appendicitis, in correlation with operative and histopathological findings.

ETIOPATHOGENESIS OF ACUTE APPENDICITIS

The etiology and pathogenesis of appendicitis are not completely understood. Obstruction of the lumen due to fecaliths or hypertrophy of lymphoid tissue is proposed as the main etiologic factor in acute appendicitis. The frequency of obstruction rises with the severity of the inflammatory process. Fecaliths and calculi are found in 40% of cases of simple acute appendicitis,[8] in 65% of cases of gangrenous appendicitis without rupture, and in nearly 90% of cases of gangrenous appendicitis with rupture.[9] Traditionally, the belief has been that there is a predictable sequence of events leading to eventual appendiceal rupture.

CLINICAL FEATURES

Symptoms:[10]

A patient with acute appendicitis may present with the triad of pain, anorexia/vomiting and fever (Murphy's triad), but it is not always so. Atypical presentations are common.

Laboratory Findings. Mild leukocytosis is often present in patients with acute, uncomplicated appendicitis and is usually accompanied by a polymorphonuclea prominence. An increased C-reactive protein (CRP) concentration is a strong indicator of appendicitis, especially for complicated appendicitis.[11]

Imaging Studies.

Plain films of the abdomen can show the presence of a fecalith and fecal loading in the cecum associated with appendicitis but are rarely helpful in diagnosing acute appendicitis[12]; however, they may be of benefit in ruling out other pathology.

A chest radiograph is helpful to rule out referred pain from a right lower lobe pneumonic process.

Ultrasonography and computed tomography (CT) scan are the most commonly used imaging tests in patients with abdominal pain, particularly in evaluation of possible appendicitis. Graded compression ultrasonography is inexpensive, can be performed rapidly, does not require a contrast medium, and can be used in pregnant patients. Sonographically, the appendix is identified as a blind-ending, nonperistaltic bowel loop originating from the cecum. The percentage of misdiagnosed cases of appendicitis is significantly higher among women than men (22% vs. 9.3%).[13,14] The negative appendectomy rate is highest in women of reproductive age.

ALVARADO SCORING SYSTEM:

In order to reduce the negative appendicectomy rates various scoring systems have been developed for supporting the diagnosis of acute appendicitis. Scoring systems are valuable and valid for discriminating between acute appendicitis and nonspecific abdominal pain.[5] At present many scoring systems for the diagnosis of acute appendicitis are available. Alvarado scoring system is one of them and is purely based on history, clinical examination and few laboratory tests and is very easy to apply.[6] Studies have shown that Alvarado scoring has diagnostic accuracy of around 80% and the Alvarado system can reduce the negative appendicectomy rate to 0-5%.

TABLE 1: ALVARADO (MANTRELS) SCORING SYSTEM[7]

SYMPTOM	SCORE
1.Migratory RIF Pain	1
2.Anorexia	1
3.Nausea & Vomiting	1
SIGN	
1.Tenderness Over RIF	2
2.Rebound Tenderness RIF	1
3.Elevated Temperature	1
LAB FINDINGS	
1.Leucocytosis	2
2.Shift To Left	1
TOTAL	10

- Those patients with scores of 7-10: Probably Appendicitis.
- Those patients with scores of 5-6: May be Appendicitis.
- Those patients with scores of 1-4: Unlikely to be Appendicitis.

TABLE 2: DIFFERENTIAL DIAGNOSIS OF ACUTE APPENDICITIS.

Children	Adult	Adult female	Elderly
Gastroenteritis	Regional enteritis	Mittelschmerz	Diverticulitis
Mesenteric adenitis	Ureteric colic	Pelvic inflammatory disease	Intestinal obstruction
Meckel's diverticulitis	Perforated peptic ulcer	Pyelonephritis	Colonic carcinoma
Intussusception	Torsion of testis	Ectopic pregnancy	Torsion appendix epiploicae
Henoch–Schönle in purpura	Pancreatitis	Torsion/rupture of ovarian cyst	Mesenteric infarction
Lobar pneumonia	Rectus sheath haematoma	Endometriosis	Leaking aortic aneurysm

MATERIAL AND METHODS

Study was carryout in the Govt.General Hospital, Nizamabad with Patients with department with symptoms & signs of acute appendicitis and suspected enough to warrant surgery for acute appendicitis. Taken sample size 120 with Systematic Random Sampling (Total no. of cases/Sample size = 350/120) and study done between SEP 2020 to AUG 2021.

Inclusion criteria:

1. Patients any age of either sex.
2. Patients willing for investigation and surgery.

Exclusion Criteria

1. Pregnant females.
2. Those taking pain killers
3. Appendicular mass.
4. Patient with recent history of any abdominal surgeries

RESULTS & OBSERVATIONS

TABLE 3: DISTRIBUTION OF PATIENTS BASED ON THEIR AGE GROUP

		Frequency	Percent	Mean + SD
Age Group (Years)	<24	72	60.0%	24.02 + 10.80
	25-34	29	24.2%	
	>45	9	7.5%	
	Total	120	100.0%	

In the present study, majority of the patients belong to the age group of <24 years (60%) followed by 25-34 years (24.2%), 35-44 years (8.3%) and >45 years (7.5%).

GRAPH 1: DISTRIBUTION OF PATIENTS BASED ON THEIR AGE GROUP

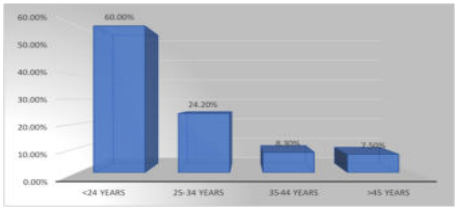


TABLE 4: INDIVIDUAL FEATURES OF ALVARADO SCORE

		Frequency	Percen
Clinical Features	M= Migratory RIF Pain	109	90.8%
	A= Anorexia	105	87.5%
	N= Nausea & Vomiting	85	70.8%
	T= Tenderness Over RIF	118	98.3%
	R= Rebound Tenderness RIF	82	68.3%
	E= Elevated Temperature	88	73.3%
	L= Leucocytosis	105	87.5%
	S= Shift to Left	58	48.3%

GRAPH 2:INDIVIDUAL FEATURES OF ALVARADO SCORE

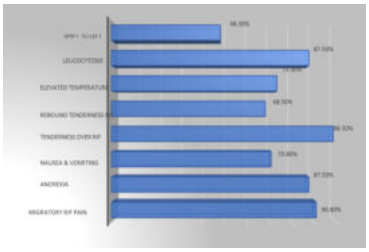


TABLE 5: PATHOLOGICAL DIAGNOSIS AS PER HISTOPATHOLOGICAL REPORT

	Frequency		Percent
Histopathological Report	Acute catarrhal appendicitis	32	26.7%
	Acute gangrenous appendicitis	8	6.7%
	Acute perforative appendicitis	7	5.8%
	Acute suppurative appendicitis	64	53.3%
	Normal Appendix	9	7.5%
	Total	120	100.0%

GRAPH 3:PATHOLOGICAL DIAGNOSIS AS PER HISTOPATHOLOGICAL REPORT

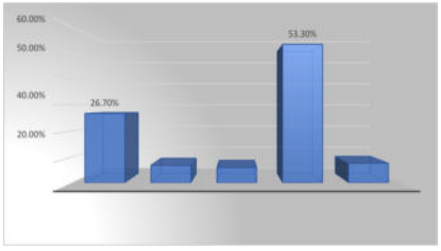


TABLE 6: DISTRIBUTION OF PATIENTS BASED ON ALVARADO SCORE

		Frequency	Percent
Alvarado Score	7-10	100	83.3%
	5-6	16	13.3%
	<5	4	3.3%
	Total	120	100.0%

GRAPH 4:DISTRIBUTION OF PATIENTS BASED ON ALVARADO SCORE

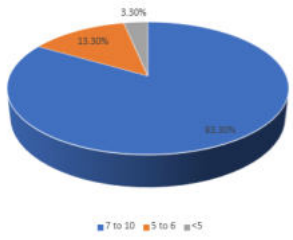


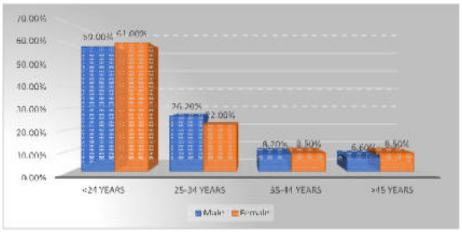
TABLE 7: DISTRIBUTION OF PATIENTS BASED ON AGE GROUP AND GENDER

			Gender		Total
			Male	Female	
Age Group	<24	n	36	36	72
		%	59.0%	61.0%	60.0%
	25-34	n	16	13	29
		%	26.2%	22.0%	24.2%
	35-44	n	5	5	10
		%	8.2%	8.5%	8.3%
	>45	n	4	5	9
		%	6.6%	8.5%	7.5%
Total		n	61	59	120
		%	100.0%	100.0%	100.0%

Among males, 59% patients belong to the age group of <24 years, 26.2% patients belong to the age group of 25-34 years, 8.2% patients belong to the age group of 35-44 years and 6.6% patients belong to the age group of >45 years.

Among females, 61% patients belong to the age group of <24 years, 22% patients belong to the age group of 25-34 years, 8.5% patients belong to the age group of 35-44 years and 8.5% patients belong to the age group of >45 years.

GRAPH 5:DISTRIBUTION OF PATIENTS BASED ON AGE GROUPAND GENDER



DISCUSSION

Acute appendicitis remains a common abdominal emergency throughout the world. Early and accurate diagnosis of acute appendicitis is required to reduce the morbidity and mortality associated with delayed diagnosis and its complications. In addition to significant morbidity and mortality, negative appendicectomy is also responsible for loss of precious staff hours and financial resources.

None of the investigations like USG, CT scan conclusively diagnose appendicitis. The diagnosis of acute appendicitis continues to be difficult due to the variable presentation of the disease and the lack of reliable diagnostic test. Time and again, it has proved that some of the investigations already discussed are costly, time consuming; require more sophisticated equipment and expertise, while some are not feasible and not readily available. So, even today, a thorough clinical examination with basic investigations like WBC count remains the corner stone in the diagnosis of acute appendicitis. With this background many eminent surgeons and physicians have been adopting different scoring systems in order to decrease negative appendicectomy.

Alvarado Scoring System is one of the many scoring systems available today. It is based on history, physical examination and few laboratory tests. It is a simple, easy to apply and cheap complimentary aid for supporting the diagnosis of acute appendicitis.

The present study was undertaken to evaluate the usefulness of Alvarado scoring system in reducing the number of negative appendicectomy and to evaluate its sensitivity & positive predictive value in the diagnosis of acute appendicitis.

In this study, Majority of the patients belong to the age group of <24 years (60%) followed by 25-34 years (24.2%), 35-44 years (8.3%) and >45 years (7.5%). Mean age was 24.02 + 10.80 years.

Pain was the commonest presenting symptom and migratory RIF Pain has been observed in 90.8% all the cases in the present study. Other symptoms observed were Anorexia in 87.5% patients and Nausea & Vomiting in 70.8% patients. Low grade fever was present in 73.3% of cases.

Majority of the patients presented within 48 hrs after the onset of pain, with most of them presenting between 12-24 hrs of onset of pain.

In this study, on clinical examination, tenderness at McBurney's point was the commonest sign (98.3%). Rebound tenderness was present in 68.3%.

In this study, on laboratory test, leukocytosis was seen in 87.5% of cases and leucocyte shift to left is seen in 48.3% of patients.

Histopathological report shows Appendicitis is present in 92.5% patients, in which Acute suppurative appendicitis is present in 53.3% patients, Acute catarrhal appendicitis is present in 26.7% patients, Acute gangrenous appendicitis is present in 6.7% patients and Acute perforative appendicitis is present in 5.8% patients.

In this study, Alvarado score is 7 to 10 in 83.3% patients, 5 to 6 in 13.3% patients and <5 in 3.3% patients, among patients with Alvarado score of 7 to 10, Appendicitis is present in 94% patients in which Acute suppurative appendicitis in 56% patients, Acute catarrhal appendicitis in 23% patients, Acute gangrenous appendicitis in 8% patients and Acute perforative appendicitis in 7% patients.

CONCLUSION

This study shows that Alvarado scoring system can be used to diagnose acute appendicitis in the emergency department. It is easy and quick to apply. It also allows observation and re-observation regarding clinical behaviour of patient, whether or not to intervene for surgery. Its application can avert negative appendicectomy or else prevent from complications leading to gangrene, perforation, wound sepsis, and hence use of costly antibiotics and increased hospital stay.

In the diagnosis of acute appendicitis, the Alvarado score is a fast, simple, reliable, non-invasive, repeatable and safe diagnostic modality without extra expense and complications.

It is very handy in day care hospitals or peripheral hospitals where back up facilities like USG scan or CT scan is not available.

The application of this scoring system improves diagnostic accuracy and consequently reduces negative appendicectomy and thus reduces complication rates.

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