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A SIMPLE SCORE SYSTEM TO REDUCE NEGATIVE APPENDICECTOMY RATE

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ABSTRACT

BACKGROUND: Appendicectomy is commonest emergency operation in surgical practice. A negative appendicectomy rate of 20-40% has been reported and many surgeons would accept rate of 30% as inevitable. 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. Difficulty in diagnosis arises in very young, elderly patients and females of reproductive age because they usually have atypical presentation and many other conditions also present like appendicitis. Therefore, in the present study the clinical finding in respect to Alvarado score will be evaluated against the operative findings and histopathological findings and a relationship will be established among them to reduce negative appendectomy rate.

AIM AND OBJECTIVE:

1. To improve the accuracy of clinical diagnosis by using Alvarado Score.
2. To avoid unnecessary laparotomy and its hazards in patients with doubtful clinical diagnosis having low Alvarado Score.
3. To avoid complications of appendicitis by timely intervention in patients with high Alvarado Score.
4. To minimize the cost of therapy by avoiding ultrasonography, CT-Scan or laparoscopy.
5. To assess the efficacy of clinical finding and operative finding by correlating with histopathological examination of resected appendix.

PATIENTS AND METHODS:

This study was conducted in the Department of General Surgery of M K C G Medical College & Hospital, Berhampur in collaboration with the Department of Pathology of the same institution during a period extending from November 2021 to October 2023. Out of 7734 patients admitted to Surgery Department, 492 were patients of suspected acute appendicitis. Out of these 216 patients were

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randomly selected to apply Alvarado Score. With routine pre-operative preparations patients with Alvarado score 8-9 in this study underwent laparotomy and appendicectomy was done. Histopathological examination of all the resected appendices were done to confirm the diagnosis and to evaluate the role of Alvarado scoring in the diagnosis of acute appendicitis.

RESULTS:

Out of 492 patients who were admitted for suspected acute appendicitis, 216 patients were examined randomly and evaluated by using Alvarado Score. 200 patients who scored above 8 were diagnosed clinically as acute appendicitis and were included in this study and these 200 patients were subjected to surgery for appendicectomy. Among the study group 112 patients were male and 88 patients were female. Out of these 200, patients 176 patients showed features of acute appendicitis in histopathological studies. Thus, the accuracy of diagnosis was 88% which was consistent with other reports.

CONCLUSION:

The diagnostic accuracy of "Alvarado Scoring" was 88%. A score of above 8 was the main stay to increase the clinical diagnostic accuracy. Application of Alvarado Score reduced negative appendicectomy rate to 12% and avoid unnecessary laparotomy with its hazards in patients with doubtful clinical diagnosis with low Alvarado Score. Complications of appendicitis were avoided by timely intervention in patients with high Alvarado Score. Cost of therapy was minimized by avoiding ultrasonography, CT scan or laparoscopy.

INTRODUCTION:

The vermiform appendix is considered by most to be a vestigial organ by Verhegan. Hippocrates called it as “Iliac passion”; its importance in surgery results only from its propensity for inflammation, which results in clinical condition known as acute appendicitis.[1]

In 1886, Reginald Fitz of Harvard Medical School first described the natural history of the inflamed appendix, coining the term "appendicitis”.[2] Addiss and associates estimated the incidence of acute appendicitis in the United States population to be 11 cases per 10,000 population annually, with a male: female ratio of 1.4:1.[3] Patients at extremes of age are more likely to develop perforated appendicitis. Overall, perforation was present in 25.8%[3] of cases of acute appendicitis[4].

Obstruction of the lumen is the dominant etiologic factor in acute appendicitis and fecoliths are the most common cause, less common causes are hypertrophy of lymphoid tissue, inspirated barium from previous x-ray studies, tumours, vegetable and fruit seeds, and intestinal parasites [2, 4].

The classic presentation of acute appendicitis begins with crampy, intermittent abdominal pain which may be either periumbilical or diffuse and difficult to localize which is followed by nausea. Vomiting may or may not be present. Classically, the pain migrates to the right lower quadrant and character of the pain also changes from dull and colicky to sharp and constant. Patients may report low-grade fever up to 101°F (38.3°C).

It is generally agreed that 15% to 30% of patients having diagnosis of acute appendicitis by acceptable standards in most hospitals will actually be found at operation to have a normal appendix (Fallouji, 1998).[4]A misdiagnosis can lead to an unnecessary operation whereas delay in diagnosis can give rise to various complications and increased morbidity and mortality.

Despite the unknown function of the appendix every effort should be made to preserve it for further reconstructive surgery such as replacement of damaged Common Bile Duct (CBD), right ureter.

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Diagnostic scoring systems have been developed in an attempt to improve the diagnostic accuracy of acute appendicitis. The most prominent of those scores, developed by Alvarado, was based on a retrospective analysis of 305 patients with abdominal pain suspicious for appendicitis. Alvarado Scoring" a scoring system described by Alvarado in 1986 is based on 3 symptoms (migration of pain, anorexia, and nausea), 3 signs (right lower quadrant tenderness, rebound tenderness, and pyrexia) and 2 laboratory tests (leucocytosis and a left shift) [4] to increase the clinical diagnostic accuracy [4,5]

ALVARADO SCORING SYSTEM

		Score
Symptoms	Migratory right iliac fossa pain	1
	Nausea/ vomiting	1
	Anorexia	1
Signs	Tenderness in the right iliac fossa	2
	Rebound tenderness in right iliac fossa	1
	Elevated temperature	1
Laboratory findings	Leucocytosis	2
	Shift to left of neutrophils	1
Total		**10**

Patients with a score of 1-4 were not considered likely to have acute appendicitis, a score of 5-6 were considered to have a likely diagnosis of acute appendicitis, but not convincing but, those with a score of 9-10 were considered to have acute appendicitis and submitted to surgery. The Alvarado score can increase or decrease on reassessment.[4, 5]

The Alvarado score was modified by Kalan et alby excluding one laboratory finding – shift to left of neutrophil maturation i.e., score 1, as this is not routinely available and therefore, patients were scored out of 9 instead of 10.[6] The Modified Alvarado Scoring System (M.A.S.S.) does not include the shift to the left of the neutrophils as this facility is not available at many places and excluding this criterion from the scoring system will increase the size of the population where it can be applied in the scarcity of the advanced diagnostic resources and services.[6]

Therefore, in the present study the clinical finding in respect to Alvarado score will be evaluated against the operative findings and histopathological findings and a relationship will be established among them to reduce negative appendectomy rate.

AIM AND OBJECTIVE OF THE STUDY:

1. To improve the accuracy of clinical diagnosis by using Alvarado Score.
2. To avoid unnecessary laparotomy and its hazards in patients with doubtful clinical diagnosis having low Alvarado Score.
3. To avoid complications of appendicitis by timely intervention in patients with high Alvarado Score.
4. To minimize the cost of therapy by avoiding ultrasonography, CT-Scan or laparoscopy.
5. To assess the efficacy of clinical finding and operative finding by correlating with histopathological examination of resected appendix.

MATERIALS:

This study was conducted in the Department of General Surgery of M K C G Medical College & Hospital, Berhampur in collaboration with the Department of Pathology of the same institution during a period extending from November 2021 to October 2023.

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Inclusion criteria:

1.All the patients with clinical diagnosis of acute appendicitis having Alvarado score more than 8.

Exclusion criteria:

1. All the Pregnant women.
2. Recurrent appendicitis
3. Other causes of right iliac fossa pain.

METHODS:

All the patients who were clinically diagnosed of acute appendicitis are subjected to various radiological investigation (like X Ray, ultrasound, CT scan, as necessary) after routine blood investigation. Alvarado score was calculated. A score of >8 was taken up for immediate surgery. The specimen was sent to pathology department. All the clinical examination data along with blood investigation reports and histopathological reports were collected in specified proforma and were analysed.

RESULTS AND DATA ANALYSIS:

We study every patient with the criteria of "Alvarado Score" and only those (n=200) with a score of above 8 out of total score 10 were included in our study (laparotomy group). Frequency of different symptoms, signs and laboratory findings of the laparotomy group will be seen from the table below:

Table 1: Alvarado Score (Appendicitis Group)

Symptoms, Signs & Laboratory findings	No. of patients	Percentage
Pain RIF (Migratory)	200	100%
Anorexia	192	96%
Nausea	164	82%
Vomiting	120	60%
Tenderness RIF	200	100%
Rebound tenderness	136	68%
Fever	140	70%
Leucocytosis	200	100%
Shift of the neutrophil to left	192	96%

Out of 200 patients diagnosed by using Alvarado Score as acute appendicitis 176 cases were diagnosed histopathologically as acute appendicitis and the remaining 24 cases have either normal appendix or normal appendix with other associated pathology. The overall diagnostic accuracy of Alvarado Score was 88%. It was higher in Male (91.1%) than in female. (84.1%)

Table 2: Operative Findings

	Inflamed appendix	Perforated appendix	Normal appendix
Clinically diagnosed (200)	120	48	32

In our study 60% appendix was found to be inflamed and 24% was perforated appendix and 16% normal appendix.

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Table 3: HISTOLOGY FINDINGS

	No of patients	Percentage
Acute Appendicitis (Histopathologically confirmed)	176	88.00
Non appendicitis (Histologically Normal appendix)	24	12.00

From the above table it can be found that Acute appendicitis was correctly diagnosed in 88% of cases by using "Alvarado Score".Alvarado Scoring system showed diagnostic accuracy - 88%, and positive predictive value - 88%.

Table 4: ASSOCIATED PATHOLOGY FOUND ON EXPLORATION

Pathology	Male (n=10)	Female (n=14)
Tubo ovarian mass	0	4
Peptic perforation	2	0
Meckel's diverticulitis	2	0
TOTAL	**4 (40%)**	**4 (28.6%)**

From the above table it is found that peptic perforation and Meckel's diverticulitis were common associated pathology (20%) each in males where as in females Tubovarian mass was the most common associated pathology (28.6%)

Table 5: Complication

Complications	No of patients	Percentage
Minor wound infection	20	10.00
Wound sepsis	12	6.00
Pulmonary complication	8	4.00
Delayed intestinal obstruction	2	1.00
Urinary tract infection	4	2.00
Prolonged ileus	6	3.00

Commonest complication was minor wound infection (10%), followed by wound sepsis (6%) and pulmonary complication (4%). Prolonged ileus was found in 3% cases, urinary tract infection in 2% cases due to catheterization during operation and in two cases there were reporting of delayed intestinal obstruction after 1 year.

DISCUSSION:

The study was conducted in the Department of Surgery of M K C G Medical College & Hospital, Berhampur with collaboration of Department of Pathology of the same Institution from a period of November 2021 to October 2023.

The overall aim and objective of the study was to reduce the negative appendicectomy rate by improving the accuracy of clinical diagnosis of acute appendicitis by using simple score i.e., Modified Alvarado Score.

Out of 492 patients who were admitted for suspected acute appendicitis, 216 patients were examined randomly and evaluated by using Alvarado Score. 200 patients who scored above 8 were diagnosed clinically as acute appendicitis and were included in this study and these 200 patients were subjected to surgery for appendicectomy. Among the study group 112 patients were male and 88 patients were female. Out of these 200, patients 176 patients showed features of acute appendicitis in histopathological studies. Thus, the accuracy of diagnosis was 88% which was consistent with other reports [7,8,9].

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Among the general factors age of the patients proved important, viz. 21-30 years age group appeared most vulnerable. In our study incidence in male was found to be predominant which was consistent with other reports.

Clinical study i.e., history and proper clinical examination and investigation as per the criteria of "Alvarado Score" appears to be very effective in accurate diagnosis (diagnosis accuracy 88%) and establishment of accurate clinico-pathological correlation. "Alvarado Score" of more than 8 found to be highly effective in the establishment of accurate diagnosis and it helps to reduce negative appendicectomy rate.

Addition of ultrasound as diagnostic tool does improve the diagnostic accuracy in patients with a negative or equivocal Alvarado Score particularly in female patients to exclude other intra-abdominal pathology and markedly reduces the negative appendicectomy rate,

In our study negative appendicectomy rate is reduced from 20.3% to 12% with the application of Alvarado score without increasing the rate of perforation due to prolonged observation.

CONCLUSION:

- The diagnostic accuracy of "Alvarado Scoring" was 88%.
- A score of above 8 was the main stay to increase the clinical diagnostic accuracy.
- Application of Alvarado Score reduced negative appendicectomy rate to 12% and avoid unnecessary laparotomy with its hazards in patients with doubtful clinical diagnosis with low Alvarado Score.
- Complications of appendicitis were avoided by timely intervention in patients with high Alvarado Score.
- Cost of therapy was minimized by avoiding ultrasonography, CT scan or laparoscopy.

The efficacy of clinical findings and operative findings was assessed by correlating with histopathological examination of resected appendix.

BIBLIOGRAPHY:

1. P. Ronan O'Connell: The Vermiform Appendix; Bailey & Love: Short Practice of Surgery; 26th ed; London NW1 3BH; Edward Arnold(publishers)Ltd; 2013;p 1199-1214
2. John Maa, Kimberly S. Kirkwood;The Appendix; Sabiston textbook of surgery:Courpney M. Townsend; 19th ed; USA, Elseviers Saunders Publications ; 2012; p 1279-1293.
3. Butchman TG; Zuidema GD: Reasons for delay of the diagnosis of acute appendicitis; Surg Gynaecol Obstet, 1984 Mar; 158(3):260-6.
4. Bernard M.jaffe,David H. Berger; The appendix; In: Schwartz's *principles of surgery*; Schwartz SI (Ed); 9th edition; , USA,McGraw Hill Publications ; 2010; p 1073-1091.
5. Alvarado A.: A practical score for the early diagnosis of acute appendicitis. Ann Emerg Med 1986; 15: 557-564
6. Kalan M., Rich AJ., Talbot D., Cunliffe WJ.: Evaluation of the modified Alvaradoscore in the diagnosis of acute appendicitis: a prospective study. Ann R. Coll. Surg.Engl 1994; 76:418-419.
7. Arbjornsson E: Scoring system for computer aided diagnosis of acute appendicitis: the value of prospective vs retrospective studies: Ann Chir Gynaecol, 1985; 74(4): 159-66.
8. Sitter H, Hoffmann S, Hassan I et al. Diagnostic score in appendicitis. Validation of a diagnostic score (Eskelinen score) in patients in whom acute appendicitis is suspected. Langenbecks Arch Surg 2004 Jan; 389(3): 213-8.
9. Shrivastava UK, Gupta A, Sharma D. Evaluation of the Alvarado score in the diagnosis of acute appendicitis. Trop Gastroenterol. 2004 Oct-Dec 25 ;(4): I 1B4-6.