COMPARING THE CLINICAL DIAGNOSIS AND PER-OPERATIVE FINDINGS OF ACUTE APPENDICITIS WITH MODIFIED ALVARADO SCORING SYSTEM

Muthu Sankaralingam¹, Karthikeyan Periyakaruppan²

¹Assistant Professor, Department of Surgery, Government Theni Medical College, Theni.

²Assistant Professor, Department of Surgery, Government Theni Medical College, Theni.

ABSTRACT

BACKGROUND

Appendicectomy for appendicitis is the most commonly performed emergency operation in the world. Alvarado scoring system is a very commonly used scoring system in appendicitis. This score varies depending upon the population in the area and the clinical setting. This study is to know the value of clinical diagnoses in appendicitis by comparing with modified Alvarado scoring system, and confirm with post-operative histopathological findings of respective cases.

MATERIALS AND METHODS

This is a prospective study of 100 patients admitted during the period of June 2009 to November 2011 and diagnosed clinically as acute appendicitis. Decision to operate was based only on clinical judgment not by scoring system. But the findings were compared with Modified Alvarado scoring system (excluding shift to left).

RESULTS

In this prospective study, 100 patients admitted in Thanjavur Medical College during the period of June 2009 to November 2011 and diagnosed clinically as acute appendicitis were included. In our study, negative appendicectomy rate was 18% in total, out of which, males outnumber the females (Males - 18% & Females - 10%). Diagnostic accuracy of clinical examination was 82%. Diagnostic accuracy in male patients was 87.5%. Diagnostic accuracy in female patients was 72.2%. Out of 100 patients, 66 patients were within the age group 10-30 years. None of the patient had Alvarado score below 4. If the patient had Alvarado score of 5, chance of getting positive histopathological finding was 22%. If the patient had Alvarado score of 6, chance of getting positive histopathological finding was 68%. If the patient had Alvarado score of 7, chance of getting positive histopathological finding was 87%. If the patient had Alvarado score above 7, chance of getting positive histopathological finding was 100%.

CONCLUSION

This study is to know the value of clinical diagnoses in appendicitis by correlating the post-operative histopathological findings of respective cases. Alvarado scoring system is a very commonly used scoring system in appendicitis. There is a significant association between HPE report and intra-operative findings of the respondents and their scores.

KEYWORDS

Alvarado Score, Acute Appendicitis, Histopathological Report.

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BACKGROUND

Appendicectomy for appendicitis is the most commonly performed emergency operation in the world.

Appendicitis is most commonly seen in second or third decade with slight male predominance (1.2 to 1.3:1).

In spite of technologic advances, the diagnosis of appendicitis is still based on patient history and physical examination. Prompt diagnosis and early intervention reduce the risk of perforation and prevent complication especially in extremes of age.¹

Mortality rate in non-perforated appendicitis is less than 1%, but in perforated appendicitis it is up to 5%, thus negative appendectomy is acceptable to prevent complication and reduce mortality.

This study is to know the value of clinical diagnoses in appendicitis by correlating the post-operative histopathological findings of respective cases. Alvarado scoring system is a very commonly used scoring system in appendicitis.² This score is varied depending upon the population in the area and the clinical setting.

In this scoring, by using pre-tested questionnaire, data were collected and analysed by using SPSS statistical computer software. All patients underwent surgery based on the clinical evaluation. The scores were cross tabulated.

The Objectives of this Clinical study are

- To find out the importance of clinical diagnosis in acute appendicitis by comparing with operative histopathological examination.
- To study the clinical presentation of appendicitis in TMCI-1.

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Corresponding Author:

Muthu Sankaralingam,

#5, Srisai Nagar, Muthuthavanpatty,

Theni- 625531.

E-mail: muthusankaralingam7@gmail.com

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- To study the accuracy of modified Alvarado scoring system in diagnosing acute appendicitis.

MATERIALS AND METHODS

This is a prospective study of 100 patients admitted in Thanjavur Medical College during the period of June 2009 to November 2011 and diagnosed clinically as acute appendicitis.

Methods

All patients were admitted as emergency.

Detailed history and clinical examination, blood investigation (total count, differential count), plain x-ray abdomen was done and documented in proforma.

Patients with urological, gynaecological or surgical problems other than appendicitis were excluded from this study.

Decision to operate was based only on clinical judgment not by scoring system. But the findings were compared with Modified Alvarado scoring system (excluding shift to left). Informed written consent was obtained.

Preoperative antibiotics were given to all patients.

All patients were operated under Regional or General Anaesthesia.

Appendectomy was done by open method by Lanz, McBurney, or mid line depending on pre-operative findings.

Intra-operatively macroscopic appearance of appendix was documented.

All appendectomy specimens were sent to Department of Pathology at TMCH for histopathological examination, microscopic findings were correlated with the Alvarado scoring and clinical diagnosis.

Postoperatively, patients were given antibiotics and discharged on 4th day except in cases of complication.

RESULTS

In this prospective study, 100 patients admitted in Thanjavur Medical College during the period of June 2009 to November 2011 and diagnosed clinically as acute appendicitis were included.

The incidence of appendicitis according to the age distribution is shown in Table 1, Fig. 1. According to this, highest age distribution of 36 patients was seen between 21-30 years. (36%).

Males are most affected than females i.e. 66 patients (60%) and females were 34% as in Table 2, Fig. 2.

Age					
		Frequency	%	Valid %	Cumulative %
Valid	Below 20 yrs.	30	30.0	30.0	30.0
	21-30 yrs.	36	36.0	36.0	36.0
	31-40 yrs.	19	19.0	19.0	19.0
	41-50 yrs.	6	6.0	6.0	6.0
	51 yrs. & above	9	9.0	9.0	9.0
	Total	100	100.0	100.0	

Table 1. Incidence of Appendicitis According to Age

Figure 1. Incidence of Appendicitis According to Age

		Frequency	%	Valid %	Cumulative %
Valid	Male	66	66.0	66.0	66.0
	Female	34	34.0	34.0	100.0
	Total	100	100.0	100.0	

Table 2. Gender Distribution

Figure 2. Shows the Gender Distribution

In Alvarado scoring, the score was given to the patient from 5 to 9. According to the table 3, the highest frequency was seen in patient with score 7 (31%), next in score 8 (29%). Patients with the score above 7 were taken for surgery without any other imaging studies. According to table 4, scores above 7 were 35% and below were 65%.

		Frequency	%	Valid %	Cumulative %
Valid	5.00	9	9.0	9.0	9.0
	6.00	25	25.0	25.0	34.0
	7.00	31	31.0	31.0	65.0
	8.00	29	29.0	29.0	94.0
	9.00	6	6.0	6.0	100.0
	Total	100	100.0	100.0	

Table 3. Alvarado Scoring

		Frequency	%	Valid %	Cumulative %
Valid	Below 7	65	65.0	65.0	65.0
	Above 7	35	35.0	35.0	100.0
	Total	100	100.0	100.0	

Table 4. Score

Alvarado Scoring	Percentage of Positivity
05	22
06	68
07	87
More than 7	100

Table 5. Alvarado Scoring Compared with Percentage of Positivity

Figure 3

According to Table 4, patients with Alvarado scoring above 7 were 35 and the percentage of positivity by comparing with histopathological diagnosis was 100%. The confirmed histopathological diagnosis obtained from the pathology department was given in the Table 6.

Pathology	Total No. of Cases
Acute appendicitis	72
Fulminant	23
Appendicular perforation	1
Appendicular Abscess	4

Table 6. Histopathology Diagnosis Obtained

Histopathological correlation was obtained. 72% of the cases were acute appendicitis and fulminant appendicitis cases were 23%. Appendicular perforation was in one case and abscess was in 4 cases as shown in Table 6, Fig. 4.

Clinical Presentation	Percentage
Migrating umbilical pain	67
Anorexia	96
Nausea	62
RIF Tenderness	97
Rebound Tenderness	80
Elevated Temperature	70
Leucocytosis	62

Table 7. Clinical Presentation

The most important clinical manifestation is the RIF tenderness (97%), Anorexia (96%). The other manifestations were rebound tenderness (80%), elevated temperature (70%), migrating umbilical pain (67%), nausea and leucocytosis were about 62% respectively as shown in Table 7, Fig. 5.

Figure 5

Commonest per-operative findings were congestion (18%), pus, gangrene, perforation in 12% of cases and inflammation was in 70%, which is shown in Table 8, Fig. 6.

Per Operative Findings	Percent	Valid Percent
Congestion	18	18
Pus & Gangrene & perforation	12	12
Inflamed	70	70

Table 8. Per-operative Findings

Figure 6

Age	Positive Finding	Negative Finding
10-20	06	06
21-30	11	03
31-40	04	01
41-50	02	00
50 above	01	00

Table 9. In Females, Positive/negative Finding Ratio based on Post-operative HPE Report

Figure 7

Among the 34 female patients, positive findings were seen in 24 patients and 10 patients were having negative findings. Among the 24 individuals with positive findings, 6 patients were in age group of 10-20 yrs., 11 in 21-30 yrs., 4 in 31-40 yrs., 2 in 41-50 yrs. and one patient was above 50 yrs.

In 10 negative finding cases, 6 were in age group of 10-20 yrs., 3 were in 21-30 yrs. and one patient was between 31-40 yrs. as shown in Table 9, Fig. 7.

Age	Positive Finding Per-operatively	Negative Finding Per-operatively
10-20	15	03
21-30	20	02
31-40	11	03
41-50	04	00
50 above	06	02

Table 10. Male Positive/Negative Finding Ratio

Among the 66 male patients, positive findings were seen per-operatively in 56 individuals and negative findings were seen in 10 patients. Among the 56 patients, 15 patients were in age group of 10-20 yrs., 20 were in 21-30 yrs., 11 were in age group of 31-40 yrs., 4 were in 41-50 yrs. and 6 patients were above 50 yrs. of age group.

Among the 10 individuals with negative findings, 3 were in age group of 10-20 yrs., 2 were in 21-30 yrs., 3 were in 31-40 yrs. and 2 were above 50 yrs. of age group as shown in Table 10, Fig. 8.

Per-op Finding * Score

X ² =54.762	DF=41	0.074 (<0.05) significant
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The above table shows that there is a significant association between intra-operative findings of the respondents and their scores. Hence, the study is significant.

DISCUSSION

Acute appendicitis is one of the most common abdominal emergencies in surgery and diagnosis is purely based only on clinical judgment. Also, it can lead to fatal complications, if the diagnosis is overlooked. So the possibility of negative appendectomy is high in order to prevent the complications.

In our study, negative appendectomy rate was 18% in total in which males outnumber the females (male — 18% & female — 10%).

In Females

In the age group of 10-20 years, total number of cases operated was 12. Out of these, 5 cases had positive histopathology and 6 cases had negative histopathology.

In 20-30 years age group, 16 cases were operated. Out of these, 11 cases had positive histopathology & 5 cases had negative histopathology.

In 30-40 years age group, total number of cases operated was 5. Out of these, 4 cases were histopathologically positive and 1 case was histopathologically negative. In age above 40 years, all cases were histopathologically proven as appendicitis.

In Males

In 10-20 years of age group, 18 cases were operated. Out of these, 15 cases were diagnosed as appendicitis. In 3 cases, appendix was normal.

In 20-30 years of age group, 21 cases were operated. Out of these, 20 cases were diagnosed as appendicitis and in one case appendix was normal.

In 30-40 years of age group, 14 cases were operated. Out of these, 11 cases were diagnosed as appendicitis. In 3 cases, appendix was normal.

In age above 40 years, 15 cases were operated. Out of these, 10 cases were diagnosed as appendicitis.

Sl. No.	Studies	Negative Appendectomy Rate
1	Ali Mohamed et al (2005)	21%
2	Rasool Buxbehan et al (2008)	18.6%
3	Subhaje Dey et al (2009)	13%
4	Mudassir Maqbool Wani et al (2007)	32.3%
5	Syed Waris Ali Shah et al (2007)	11.1%
	Our study	18%

Table 12. Comparison with Other Studies^{3,4,5}

Regarding Sex

Males had higher incidence of acute appendicitis than females. Male and female ratio in our study was 1.7:1.

Studies	Male: Female
Rasool Buxbehan et al	1.94:1
Ali Mohamed et al	1.2:1
Our study	1.7:1

Table 13. Comparison with Other Studies^{6,7,8}

Reading Diagnostic Accuracy

Diagnostic accuracy of clinical examination was 82%.

Diagnostic accuracy in male cases was 87.5%.

Diagnostic accuracy in female cases was 72.2%.

Studies	Percentage of Diagnostic Accuracy
Our study	82%
Ali Mohamed et al	76%

Table 14. Comparison with Other Studies^{9,10}

Reading Age

Out of 100 patients, 66 patients were within the age group of 10-30 years.

Studies	Total No. of Cases
Our study	66 cases
Ali Mohamed et al	61 cases
Table 15. Comparison with Other Studies^{11,12}	

Table 16 Shows Clinical Presentation with other studies

Studies	Our Study	Ali Mohamed et al	Rasool Buxbehan et al
Migrating umbilical pain	67%	82%	47%
Anorexia	96%	87%	80.7%
Nausea and vomiting	62%	67%	67.4%
RIF Tenderness	97%	100%	-
Rebound Tenderness	80%	90%	-
Table 16. Comparison with Other Studies^{13,14}			

Regarding Alvarado Scoring System

None of the patient had Alvarado score below 4.

If the patient had Alvarado score of 5, chance of getting positive histopathological finding was 22%.

If the patient had Alvarado score of 6, chance of getting positive histopathological finding was 68%.

If the patient had Alvarado score of 7, chance of getting positive histopathological finding was 87%.

If the patient had Alvarado score above 7, chance of getting positive histopathological finding was 100%.

Studies	Percentage of Positivity if Alvarado Score > 7
Rasool Buxbehan et al	100%
Our study	100%
Table 17. Comparison with Other Studies^{15,16,17}	

Statistical analysis was done by comparing HPE report with Alvarado score and comparing intra-operative finding with Alvarado score study, significant with P value of 0.001, 0.74 respectively.

Limitations of the Study

As this study compared the clinical diagnosis with the Alvarado scoring system and correlated with the histopathological report, the sensitivity, specificity, positive predictive value and negative predictive value of the clinical diagnosis with Alvarado scoring and with histopathological report were not done due to small study sample.

CONCLUSIONS

1. Acute appendicitis is one of the most common abdominal emergencies in surgery.
2. Males had higher incidence of acute appendicitis than females.
3. Diagnostic accuracy of clinical examination was 82%.
4. Out of 100 patients, 66 patients were within the age group of 10-30 years.

5. If the patient had Alvarado score above 7, chance of getting positive histopathological finding is 100%.

In spite of recent advances in medical technology, clinical judgement remains of great value in the diagnosis of acute appendicitis.

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