IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 14, Issue 4 Ver.VI (Apr. 2015), PP 71-73
www.iosrjournals.org

Application of Alvarado Score in Diagnosis of Acute Appendicitis in Patients

U. Murali[1], S. Anu[2]
[1,2,] (*Department of Surgery, D Y Patil Medical College, Mauritius)*

Abstract: *The aim of this study was to assess the application of the Alvarado score in diagnosis of acute appendicitis. This study was reported for the first time from Republic of Mauritius. A total of 106 patients with clinical impression of acute appendicitis were included in this study. All patients underwent thorough clinical evaluation, pre-operative total leucocyte count (TLC) and differential leucocyte count (DLC) along with Alvarado scoring. Based on the presence of signs & symptoms Alvarado score was assigned. Decision of appendicectomy was based on high clinical suspicion. The removed appendix were sent for histopathological examination. Out of 106 patients evaluated, 67 patients were managed conservatively with supportive treatment and 36 patients underwent emergency appendicectomy and 3 patients underwent interval appendicectomy following initial conservative management. In all 39 cases histopathology confirmed acute appendicitis. It is concluded that Alvarado score increased the diagnostic sensitivity in our study.*

Keywords - *Alvarado score – Appendicitis – Signs & Symptoms – Appendicectomy*

I. Introduction

The importance of appendix in surgery results from its propensity for inflammation, which leads to the clinical syndrome known as acute appendicitis [1]. Acute appendicitis is the most common cause of an "Acute abdomen" in young adults, and appendicectomy is the most frequently performed emergency abdominal operation with a life time prevalence of approximately 1 in 7 [2]. A typical patient is one presenting with right lower abdominal pain, nausea & vomiting and has got tenderness and guarding in right iliac fossa on examination. However these symptoms and signs are not very specific for appendicitis [3].

Although the accuracy of diagnosis of this disease mostly depends on clinical expertise, equivocal or confusing cases do occur, particularly in very young patients, elderly patients and females of reproductive age. This is because they usually have atypical presentation and many other conditions also presents like appendicitis [4, 5]. A negative appendicectomy rate of 20-40% has been reported in literature [6]. Removing normal appendix is an economic burden both on patients and health resources. On the other hand, delay in surgery can lead to complications like appendicular lump, abscess, perforation & finally peritonitis. Both the cases are increasingly criticized now-a-days and have become a matter of great concern to the attending surgeon and as well as to the patient, bearing a socio-medical impact [7].

The Alvarado score was first described in 1988 by Alfredo Alvarado, it is diagnostic scoring system [8]. Score have been developed in an attempt to improve the diagnostic accuracy of acute appendicitis & to reduce the negative appendicectomy. It is a simple non-invasive score and is based on symptoms, clinical signs and laboratory values, each variable is given a score of 1 or 2, and so total score is 10 (Table – I).

The objective of the research work was to apply the Alvarado score in diagnosis of acute appendicitis in patients.

II. Materials And Methods

It was a prospective type of study with duration of 18 months from April 2012. Children above 6 years and adults below 60 years of age of both genders with pain and tenderness in the right iliac fossa attending the outpatient , inpatient and emergency departments at Jawaharlal Nehru Hospital (JNH), Rose Belle, Mauritius were included in the study. Patients with mass in right iliac fossa, pregnant women, immunocompromised and mentally retarded patients were excluded.

The ethics committee approved the study plan by protocol. The sample size was calculated according to W.H.O formula 'n' = N / 1 + Ne^2. Number of appendecectomy done per year in JNH = 144. So 'n' = 144/1 + 144x0.0025 – 106 sample size. Based on the history, clinical examination and & laboratory findings, Alvarado score were noted down. Later the score was correlated with the final outcome of all the patients managed conservatively and surgical group confirmed by the intraoperative findings and histopathology reports.

A total 106 patients with clinical impression of acute appendicitis were included in this study. All patients underwent thorough clinical evaluation, preoperative total leukocyte (TLC), differential leucocyte count (DLC) and along with Alvarado scoring. Based on the presence of signs and symptoms Alvarado score was assigned, decision of appendicectomy was based on the high clinical suspicion.

III. Results

Out of 106 patients with provisional clinical diagnosis of acute appendicitis, 39 patients were subjected to appendicectomy who had Alvarado score more than 6. Remaining 67 patients were managed conservatively with the antibiotic and supportive measures who had an Alvarado score less than 6 (Table-II and Table-III). The specimen of appendix sent for histopathology examination confirmed acute appendicitis in all 39 patients.

In majority of the surgical appendicectomized patients (75%) the appendix was inflamed. In other patients, gangrenous appendix was observed in 7 patients, while inflamed appendix with faecolith and perforated appendix were observed in 1 and 2 numbers of cases respectively.

IV. Discussion

According to previous studies [3] incidence of appendicitis gradually rises from birth, peaks in the late teen years and gradually declines in the geriatric years. In this study most of the patients were in second and third decades of life (58.5%), followed by fourth decade (14.2%), whereas it had also affected the fifth decade (6.6%) of life. The disease was more common in female population with the M: F ratio of 1:2.

The most common presenting symptom was migration of pain from the periumbilical area to right iliac fossa (61.3%). This finding has sensitivity and specificity of approximately 80% [9]. Pain was followed by anorexia (49.1%) and nausea (35.8%). Diarrhea or constipation was noted in as many as 18% of patients and was not considered to discard the possibility of appendicitis. Other symptoms were fever (20.8%).

The most common sign elicited in acute appendicitis group was tenderness in right iliac fossa (67.9%). This finding was the most consistent sign of all signs of acute appendicitis in previous studies [4, 5] as well. The next significant findings were rebound tenderness (54.7%) and elevated temperature (20.8%).

Studies [10] consistently show that 80-85% of adults with appendicitis have a white blood cell counts greater than 10,500 cells / mm^3 and neutrophil greater than 75% occurring in patients. In our study, considering the positive cut off value of TLC as $\geq$ 10,000/mm^3 the percent of patients showing raised leukocytosis was 58.5%. Considering positive cut off value of neutrophil as $\geq$ 75%, there were 32% of cases which showed positive for the shift to left in our study. These findings corroborate with the previous studies [10].

Various studies [11, 12] have examined the role of Alvarado score in the diagnosis of appendicitis. In our study, 37% of patients with acute appendicitis had Alvarado score more than 6. On the other hand majority of the patients of non-appendicitis group had a score below 6. As a score of $\geq$ 6 had a higher chance of appendicitis, it was considered as a positive cut off value. Being so, in the operated patients, all had acute appendicitis which was confirmed by histopathology. Therefore the diagnostic accuracy of Alvarado score in our study was higher.

It has been reported that mortality rate after appendicectomy was less than 1% [13]. The merit of our study was that there was no mortality.

Among 106 patients with clinical diagnosis of acute appendicitis, patient managed conservatively (Alvarado score of < 6) were 67 and surgical group (Alvarado score of > 6) were 39 who underwent appendicectomy. In our study clinical diagnostic accuracy was 85%.

On application of Alvarado score, the diagnostic sensitivity increased in our study. Therefore, proper evaluation of patients presenting with acute abdomen with suspicion of acute appendicitis include thorough clinical history, physical examination and Alvarado scoring. These are particularly important in very young patients, elderly patients and females of reproductive age group.

V. Tables

I. Alvarado score for the diagnosis of Appendicitis

Manifestations		Score
Symptoms	**M** = Migration of pain to the right lower quadrant	1
	A = Anorexia	1
	N = Nausea or vomiting	1
Signs	**T** = Tenderness in right lower quadrant	2
	R = Rebound tenderness	1
	E = Elevated temperature (≥37.3˚C)	1
Laboratory values	**L** = Leukocytosis (Total leucocyte count ≥10000/mm^3)	2
	S = Shift of White blood cell to the left (Neutrophils ≥75%)	1

II. Management based on Alvarado score

			Outcome (Surgery Vs Conservative)	
			Surgery	Conservative
	Positive Alvarado score	Count	34	6
		% within Alvarado score (Positive score > 6 Versus Negative score < 6)	85.0%	15.0%
		% within Outcome		

ALVARADO SCORE (Positive score > 6 versus Negative score < 6)	> 6	(Surgery Versus Conservative)	87.2%	9.0%
		% of Total	32.1%	5.7%
	Negative Alvarado score < 6	Count	5	61
		% within Alvarado score (Positive score > 6 Versus Negative score < 6)	7.6%	92.4%
		% within Outcome (Surgery Versus Conservative)	12.8%	91.0%
		% of Total	4.7%	57.5%

III. Treatment by conservative and surgical methods

	Frequency	Percent
Conservative	67	63.2
Elective appendicectomy (Interval)	3	2.8
Emergency appendicectomy	36	34.0
Total	106	100.0

VI. Conclusion

It is concluded that by using Alvarado score, diagnostic accuracy of acute appendicitis increased, negative appendicectomy rate was reduced and overall management improved.

Acknowledgements

We wish to express our thanks to Dr.R.K.Sharma, Dean, Padmashree Dr. D. Y. Patil Medical College, Mauritius for his support and encouragement. We also thank Dr.S. L. Bodhankar for his assistance in the preparation of manuscript.

References

[1] Wangensteen OH, Bowers WF, "Significance of the obstructive factor in the genesis of acute appendicitis", Archives of Surgery, 34(3), 1934 496-526.
[2] David G. Addiss, Nathan Shaffer, Barbara S. Fowler and Robert V. Tauxe, The epidemiology of appendicitis and appendicectomy in the United States. American Journal of Epidemiology, 132(5), 1990, 910-925.
[3] Smink DS, Soybel DI, Appendix and Appendicectomy, in Zinner MJ, Ashley SW (Ed.), Maingot's abdominal operations 11 (New York: McGraw Hill, 2007) 589-612.
[4] Wagner JM, Likelihood ratios to determine 'Does this patient have appendicitis'? Comment and clarification, Journal of the American Medical Association, 278(10), 1997, 819-820.
[5] Wagner JM, Mckinney WP, Carpenter JL, Does this patient have appendicitis? Journal of the American Medical Association, 276(19), 1996, 1589-1594.
[6] Hoffmann J, Rasmussen OO, Aids in the diagnosis of acute appendicitis. British Journal of Surgery, 76(8), 1989, 774–779.
[7] Silen W. Cope's, Early Diagnosis of the Acute Abdomen (New York. Oxford University Press, 2000).
[8] Alvarado A, A practical score for the early diagnosis of acute appendicitis, Annals of Emergency Medicine, 15(5), 1986, 557-564.
[9] Yeh B, Evidence-based emergency medicine / rational clinical examination abstract. Does this adult patient have appendicitis? Ann als of Emergency Medicine, 52(3), 2008, 301-3.
[10] Marchand A, Van Lente F, Galen RS, The assessment of laboratory tests in the diagnosis of acute appendicitis, American Journal of Clincal Pathology, 80(3) 1983, 369-74
[11] McKay R, Shepherd J, The use of the clinical scoring system by Alvarado in the decision to perform computed tomography for acute appendicitis in the ED, American Journal of Emergency Medicine, 25(5), 2007, 489-493.
[12] Schneider C, Kharbanda A, Bachur R, Evaluating appendicitis scoring systems using a prospective pediatric cohort, Annals of Emergency Medicine, 49(6), 2007, 778-784.
[13] Maa J, Kirkwood KS, The appendix, in Townsend CM, Beauchamp RD, Evers BM, Mattox KL (Ed), Sabiston textbook of surgery, the biological basis of modern surgical practice: Abdomen, 18 Vol-2. (Philadelphia, USA: Saunders, Elsevier, 2008) 1333-1347.