Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/vwx69p02

COUNTING CLUES: LEUKOCYTE LEVELS VS HISTOPATHOLOGY IN ACUTE APPENDICITIS

Azhar Zahir Shah[1*], Ahmed Zeb[2], Aurang Zeb[3], Shah Jehan[4], Jibran Umar Ayub Khan[5] , Adil Shah Roghani[6]

[1,2,4,6]Department of Surgery, Kabir Medical College, Peshawar, Pakistan
[3]Department of Anaesthesia, Kabir Medical College, Peshawar, Pakistan
[5]Department of Medicine,Kabir Medical College, Peshawar, Pakistan

***Corresponding Author:** Azhar Zahir Shah
*Professor General Surgery, Department of surgery, Sardar Begum Dental College, Peshawar, Pakistan. Email: azhar.135.as@gmail.com

ABSTRACT

OBJECTIVES

To determine the sensitivity and specificity of total leukocyte count in diagnosing acute appendicitis

MATRIAL AND METHODS

The study was done at Maqsood Medical Complex and General Hospital Peshawar from August 2023 to January 2024. This was preceded by mandatory approval hospital research committee. The inclusion criteria were patients of acute appendicitis diagnosed on basis of history, clinical examination and relevant investigations. The exclusion criteria were patients having abdominal pain due to other causes such as gall stones. Patients were assessed by a senior surgeon before enlisting the patient for appendectomy. After the operation, the appendix specimen was being collected, placed in formalin solution and sent for histopathology report. Statistical analysis was done using SPSS 23 software package. Mean and SD were applied to quantitative data. Frequency % was be applied for categorical data. The sensitivity and specificity, positive as well as negative predictive value plus accuracy of leukocytosis was then be determined by using histopathology

RESULTS

According to the results mean age of the patient was 32 years with SD ± 7.84. 38% of them were males while 62% were females. Diagnostic accuracy of AP on total leukocyte count and histopathology as gold standard was analyzed as the sensitivity was 78%, specificity was 27%, Positive predictive value was 94%, Negative predictive value was 8% and the overall diagnostic accuracy was 75%.

CONCLUSION

Our study concludes total leucocyte count is an effective test for diagnosis of acute appendicitis, though this has to be accepted that history and appropriate clinical examination will add to the clinical diagnosis

KEY WORDS: diagnosis accuracy, positive predictive value

INTRODUCTION

Acute appendicitis is one of the most common surgical emergencies. [1]The diagnosis of acute appendicitis is still a daunting task especially when the doctors are inexperienced. It is one of the leading causes of abdominal pain in young patients and has an incidence 5.7- 50 patients 10000 individuals. [2]The risk of perforation is quite high accounting for 16 -40% and this incrementally increases in younger age group. The perforate cases have an overall morality of 5%.[3]

Most common presentation of acute appendicitis is pain the right iliac fossa. This is accompanied by fever with rigor and chills and rebound tenderness on clinical examination. [4]The crucial decision whether to operate or not is always challenging keeping in mind the renewed and keen interest non-operative treatment of uncomplicated cases. The risk of post-operative complications and costs of surgical procedures due to use of minimally invasive procedures forces the surgeon to think as well.[5]

The diagnosis of acute appendicitis should be timely. While the radiological options like Ultrasound and CT scan are available apart from the scoring systems as well as inflammatory markers, the role of total leucocyte count is inevitably essential. The diagnostic workup has to be improved by clinical judgment in addition to the above. [6]The aim of the study is to determine the sensitivity and specificity of total leukocyte count in diagnosing acute appendicitis.

MATERIAL AND METHODS

The study was done at Maqsood Medical Complex and General Hospital Peshawar from August 2023 to January 2024. This was preceded by mandatory approval hospital research committee. The inclusion criteria was patients of acute appendicitis diagnosed on basis of history ,clinical examination and relevant investigations. The exclusion criteria were patients having abdominal pain due to other causes such as gall stones. Patients were assessed by a senior surgeon before enlisting the patient for appendectomy. After the operation, the appendix specimen was being collected, placed in formalin solution and sent for histopathology report. Statistical analysis was done using SPSS 23 software package. Mean and SD were applied to quantitative data. Frequency % was be applied for categorical data. The sensitivity and specificity, positive as well as negative predictive value plus accuracy of leukocytosis was then be determined by using histopathology.

DATA ANALYSIS

All the data was analyzed be SPSS version 10.0, Frequency and percentages were calculated for categorical variables like gender, leukocytosis while numerical variables like age were presented with Mean $\pm$ SD. The sensitivity, specificity, positive predictive value and negative predictive value and accuracy of leukocytosis was then be determined by taking histopathology as gold standard from table below.

		HISTOPATHOLOGY		
		+	-	**Total**
TOTAL LEUKOCYTE COUNT	+	A True positive	B False negative	
	-	C False Positive	D True Negative	
	Total			

Sensitivity = (a/a+c) x 100,Specificity = (d/ d+b) x 100
Positive predictive value = (a/ a+b) x 100
Negative predictive value = (d/ d+ c) x 100.
Accuracy = a +d/a +b+c x 100

RESULTS

In this study the age distribution among 163 patients was analyzed as 30(18%) patients were in age range 18-25 years, 54(33%) patients were in age range 26-35 years. 47(29%) patients were in age range 36-45 years, 24(15%) patients were in age range 46-55 years. 8(5%) patients were in age range 56-65 years. Mean age was 32 years with SD ± 7.84.(table No 1).

Gender distribution among 163 patients was analyzed as 62(38%) patients were male while 101(62%) patients were female. (table No 2).

Acute appendicitis on total leukocyte count was among 163 patients was analyzed as AP on total leukocyte count was positive in 127(78%) patients and was negative in 36(22%) patients. While AP on histopathology was positive in 152(93%) patients and was negative in 11(7%) patients. (table No 3,4).

Diagnostic accuracy of AP on total leukocyte count and histopathology as gold standard was analyzed as the sensitivity was 78%, specificity was 27%, Positive predictive value was 94%, Negative predictive value was 8% and the overall diagnostic accuracy was 75%. (table No 5).

TABLE NO. 1 AGE DISTRIBUTION
(n=163)

AGE	FREQUENCY	PERCENTAGE
18-25 years	30	18%
26-35 years	54	33%
36-45 years	47	29%
46-55 years	24	15%
56-65 years	8	5%
Total	**163**	**100%**

Mean age was 32 years with SD ± 7.84

TABLE NO. 2 GENDER DISTRIBUTION
(n=163)

GENDER	FREQUENCY	PERCENTAGE
Male	62	38%
Female	101	62%
Total	**163**	**100%**

TABLE NO. 3 ACUTE APPENDICITIS ON HISTOPATHOLOGY
(n=163)

HISTOPATHOLOGY	FREQUENCY	PERCENTAGE
Positive	152	93%
Negative	11	7%
Total	**163**	**100%**

TABLE NO. 4 ACUTE APPENDICITIS ON TOTAL LEUKOCYTE COUNT
(n=163)

LEUKOCYTE COUNT	FREQUENCY	PERCENTAGE
Positive	127	78%
Negative	36	22%
Total	**163**	**100%**

TABLE NO 5. TOTAL LEUKOCYTE COUNT VS HISTOPATHOLOGY (n=163)

		HISTOPATHOLOGY		
		+	-	**Total**
TOTAL LEUKOCYTE COUNT	+	A 119 TP	B 8 FN	127
	-	C 33 FP	D 3 TN	36
	Total	152	11	163

Sensitivity=78%, Specificity = 27%, PPV = 94%
Negative predictive value = 8%, Diagnostic Accuracy = 75%

DISCUSSION

In 2018, Bosh et al did evaluate the utility of total leukocyte count and C-reactive protein (CRP) on patients of acute appendicitis The results did show that 125 (62.5%) of them had acute appendicitis without complications, 20 (10%) had appendicitis with complications , while rest of them (27.5%) had normal appendicitis.[7] The difference in MPV levels amongst them was minimal. RDW levels were greater in other groups as compared to one having acute uncomplicated appendicitis with a *P* = .006. However, there was any statistically significant difference found between positive as well as negative appendectomy groups. The study concluded that increase in PDW in combination with high WBC and neutrophil count are very helpful for the diagnosis of patients with acute appendicitis, while on other hand MPV and RDW levels alone are not handy in the diagnosis of the disease .[8]
In a study done by Kahramanca et al and his colleagues, the diagnostic utility or value of platelet to white blood cell ratio for diagnosing acute appendicitis in 569 patients who did undergo appendectomy was studied. [9]This ratio was found to be higher among patients who had operation and the study revealed that platelets-to-lymphocytes ratio is a very useful marker for the diagnosis of the condition.[10]

A study by RoozRokh et al did evaluate the diagnostic value of CRP, ESR, enhanced WBC, and the ratio of neutrophils to lymphocytes in peripheral blood for the diagnosis of acute appendicitis in children less than 14 y of age. They found it to be higher in patients of acute appendicitis and recommended it a reliable marker for the diagnosis with a sensitivity of 96.1%.[11]
In a study by Alexander et al. in Nigeria, NLR, platelets-to-lymphocytes ratio, and mean platelet volume (MPV) were again empathized as instrumental diagnostic markers.[12]
According to another study by neutrophils-to-lymphocytes ratio alone is good enough for positive diagnosis of acute appendicitis preoperatively and other CBC-related parameters didn't have . Further researches are therefore needed to explore this.[13]

CONCLUSION

Our study concludes that total leukocyte count is very useful instigation for the diagnosis of acute appendicitis

REFERENCES

1. Iqbal MF, Chowdhury AI, Rushdi Aziz S. Role of C-reactive Protein, Leucocyte and Neutrophil Count in Diagnosis of Acute Appendicitis. J Armed Forces Med Coll Bangladesh. 2022;17(1):26–9.
2. Fatima SR, Zaheer F, Moosa FA, Arqam SM, Mussab RM, Choudhry MS. Combined Diagnostic Accuracy of Total Leukocyte Count, Neutrophil Count, and Ultrasonography for the Diagnosis **of** Acute Appendicitis. Cureus. 2021;13(2).

3. Muneeb-ullah, Abbasi AS, SeemabNiaz, Ashfaq U. Acute appendicitis : relationship of total leucocyte count with per-operative stage. J Islam Med Dent Coll. 2017;6(4):255–8.
4. Dişçi E, Peksöz R, Kaşali K, Bayar B. Diagnostic value of imaging methods in diagnosing acute appendicitis in comparison with leukocyte counts. Ann Clin Anal Med. 2021;12(Suppl_04):437–41.
5. Abbasi SA, Mishwani AH. Diagnostic Accuracy of Total Leucocyte Count and Ultrasound in the Diagnosis of Acute Appendicitis. 2012;16(2):147–9.
6. Jaiswal AK, Rai RK, Chandra A. Prospective study of accuracy of C-reactive protein and leucocyte count in diagnosis of acute appendicitis in comparison with histopathology. Int Surg J. 2020;7(8):2662.
7. Brohi LB, Mooghal M, Ahmed H, Ahmad Khan W, Malik J, Mahmood Malik T, et al. Diagnostic Precision of C-Reactive Protein Levels, Neutrophil Count and Total Leukocyte Count in Identifying Acute Appendicitis Clinically. J Surg Res. 2021;04(03):441–9.
8. Çetinkaya E, Bayazıtlı ŞM, Göktaş A, Akın T, Akgül Ö, Er S, et al. A new, simple marker for predicting complicated appendicitis in patients with normal white blood cell count indicator; LUC %. Ulus Travma ve Acil Cerrahi Derg. 2023;29(8):872–6.
9. Basher MOS, Ahmed AA, Hamza AA. Mean platelet volume and total white blood cells as diagnostic biomarkers for acute appendicitis at Omdurman military hospital: a cross-sectional study − 2021. BMC Gastroenterol. 2023;23(1):1–5.
10. Between C, Leukocyte T, Count N, On AD, Of U, Appendicitis A. Correlation between total leukocyte count, neutrophil count, and appendix diameter on ultrasound of acute appendicitis patients. 2023;6(3):183–90.
11. Ravikkumar R, Vaidya K, Sharma A, Sukesh. Total leucocyte count and platelet indices: novel, early diagnostic markers of acute appendicitis. Int J Res Med Sci. 2023;12(1):129–32.
12. Kailas K. Accuracy of Leukocyte Count and C-Reactive Protein in the Diagnosis of Acute Appendicitis – A Prospective Study. Int J Anatomy, Radiol Surg. 2016;5(2):44–7.
13. Osterman E, Helenius L, Larsson C, Jakobsson S, Majumder T, Blomberg A, et al. Surgery for acute cholecystitis in severely comorbid patients: a population-based study on acute cholecystitis. BMC Gastroenterol [Internet]. 2022;22(1):1–11. Available from: https://doi.org/10.1186/s12876-022-02453-0