IS LEUKOCYTE COUNT SIGNIFICANT WITH RECURRENT APPENDICITIS, A STUDY FROM SOUTH KERALA POPULATION

Sinnet P. R[1], Sandeep Kumar David S[2], K. Raveendran[3], Benny P. B[4], S. Naraintran[5]

[1]Post Graduate Student, Department of Surgery, SM CSI Medical College, Karakonam.
[2]Assistant Professor, Department of Surgery, SM CSI Medical College, Karakonam.
[3]Professor, Department of Surgery, SM CSI Medical College, Karakonam.
[4]Assistant Professor, Department of Surgery, SM CSI Medical College, Karakonam.
[5]Assistant Professor, Department of Surgery, SM CSI Medical College, Karakonam.

ABSTRACT

INTRODUCTION
Appendicitis is one of the most common conditions causing acute abdomen. Some of the patients who are not managed by surgical methods again come with recurrent episode of acute appendicitis. Their symptoms, signs and laboratory findings are not always typical of a classical appendicitis. The study is to assess the total count in patients diagnosed with recurrent appendicitis and find, if there is any relationship between total count and histopathological result.

AIM
To study the association between leukocyte count and histopathology among patients with recurrent appendicitis.

RESULT
Study was done in Dr. SMCSI Medical College, Karakonam from January 2013-December 2015. The study included 79 patients with recurrent appendicitis who were planned for surgery by the attending surgeon. 75.9% of the patients with recurrent appendicitis had normal leukocyte count. Among them 69.3% patients were confirmed to have appendicitis and the rest negative by histopathology examination. Among the group with elevated total count, all of them had histopathologically proven appendicitis. Among the patients with normal total count the group having total count between, 8001-11000 cells/mm^3, had higher frequency of appendicitis confirmed histopathologically.

CONCLUSION
In patients with recurrent appendicitis, an elevated count is more diagnostic of appendicitis, while a normal count does not confirm or disapprove a diagnosis of appendicitis.

KEYWORDS
Recurrent Appendicitis, Total Leukocyte Count, Histopathology

MESHWORDS
Appendicitis, Leukocyte Count, Appendectomy.

INTRODUCTION: Appendicitis is one of the most common surgical causes for acute abdomen. The accepted management for this condition is appendectomy.[1,2] Among the patients treated with conservative methods, a subset may present with acute appendicitis or recurrent appendicitis again. The majority of these patients may not have a full blown picture of a typical appendicitis. Risk factors for a patient undergoing conservative management to again present with recurrent appendicitis are rebound tenderness, muscle guarding, appendicoliths, and appendiceal diameter > 9 mm.[3] Presence of intraluminal

appendiceal fluid is also considered as an independent predictor of recurrent appendicitis.[4]

One of the common markers used to identify inflammation is total leukocyte count. It is an important predictor for acute appendicitis. Higher levels of leukocyte count indicate complications.[5–9] It has been included in many scoring systems like Alvarado scoring system and RIPASA scoring system for the diagnosis of acute appendicitis.[10] In cases with acute appendicitis, elevation in the total leukocyte count usually guides the surgeon in making a diagnosis. But, in our clinical experience with recurrent appendicitis, total leukocyte count has not been found to be raised as in acute appendicitis cases.

Present study is conducted to find out if any association between the level of total leukocyte count and histopathology finding among patients with recurrent appendicitis. This could guide the surgeon to be cautious on

diagnosing recurrent appendicitis, even if the total leukocyte count is normal.

MATERIAL AND METHODS: The study is conducted at Dr. SMCSI medical college, after ethical clearance as per the institutional norms. Individuals with a clinical diagnosis of recurrent appendicitis and who underwent surgery is included in the study. Their total count histopathology results will be followed up and compared with, to come to a conclusion. The gold standard diagnostic test for diagnosis of appendicitis is considered as postoperative histopathological result of the vermiform appendix.

Study Design: Retrospective study.

Location: Patients attending the surgery outpatient and emergency department.

Period of Study: 2 years.

Inclusion Criteria: Patients with recurrent appendicitis who underwent appendectomy.

Exclusion Criteria: Patient with factors other than appendicitis affecting the total leukocyte count.

Variables: Age and sex, leukocyte count, histopathology finding, diagnosis (recurrent appendicitis).

STATISTICAL ANALYSIS: Data was entered into excel sheet. Graphs were prepared using MS Power point. Descriptive analysis conducted by MS excel and R- software. Chi- square test was conducted to find if any association between total count with recurrent appendicitis.

RESULTS: The present study was conducted in 79 patients with recurrent appendicitis. Among them 51 patients where females and the rest males. Majority of the patients [75.9%] with recurrent appendicitis had a normal total leukocyte count. Only 19 [24.05%] patients had abnormal leukocyte count i.e. leukocyte count less than 4000 cells/mm^3 or more than 11,000 cells/mm^3. [Figure 1]
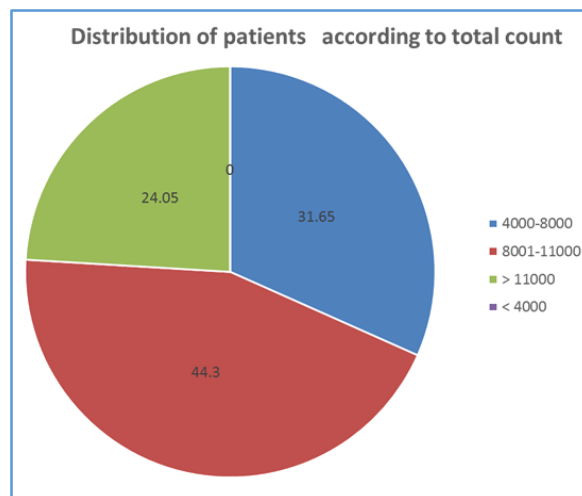

Figure 1: Total Leukocyte count

All the patients with elevated total leukocyte count (n=19) where histologically confirmed to have appendicitis. In the patients (n=60) with normal leukocyte count, 43 patients were histologically confirmed for the disease and 17 patients had negative appendectomy. [Figure 2]
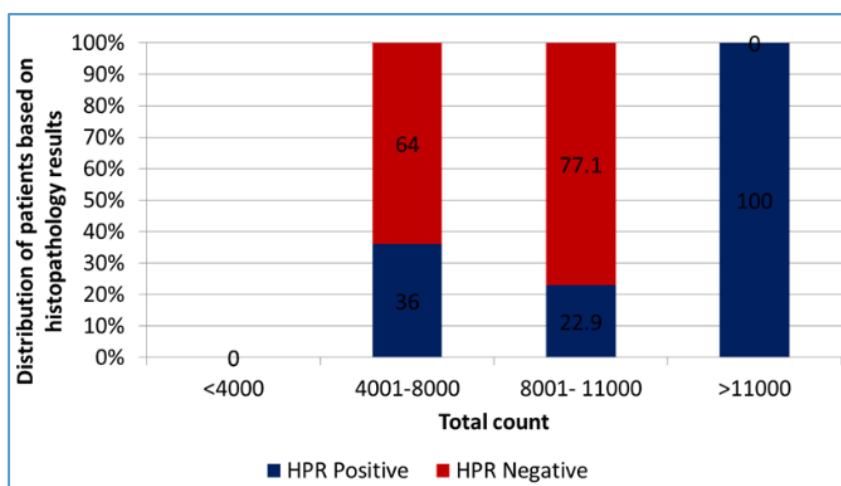

Figure 2 : Distribution of patients based on Histopathology results

All the patients with elevated count also had per-operative features of appendicitis. While among the 60 patients with normal leukocyte count, majority [n= 49] was diagnosed to have appendicitis intra-operatively by the surgeon, although some of them where found negative for appendicitis by Pathologist.

Per-operative findings (p-value = 0.025) and histopathological result (p-value = 0.015) were significantly associated with total count. All the cases (n = 19) with high total count were confirmed to have appendicitis preoperatively and histopathologically. At the same time, among patients clinically identified as recurrent appendicitis and with total count between 4501 and 8000, 72% were

preoperatively confirmed with appendicitis. In the same group of patients, only 64% of them had histopathologically confirmed appendicitis. In the group of patients with total count between 8001-11000 cells/mm^3, 77.1% of patients

were confirmed histopathologically and the rest had a negative appendectomy. There is no significant relation between total count and gender (p-value=0.601) [Table 1]

	Total Count			Chi- value	p- value
	4501- 8000 n (%)	8001- 11,000 n (%)	>11,000 n (%)		
Gender					
Male	7 (28)	13 (37.1)	8 (42.1)	1.018	0.601
Female	18 (72)	22(62.8)	11(57.8)		
Peroperative					
Negative	7 (28)	4 (36.4)	0	7.388	0.025*
Positive	18 (72)	31 (45.6)	19 (100)		
Histopathology					
Negative	9 (36)	8 (22.8)	0	8.351	0.015*
Positive	16 (64)	27 (77.1)	19 (100)		
Table 1: Distribution of cases according to gender, peroperative findings, histopathology					

* Significant at 5% level of significance.

As the value of the total count increased, even within normal range, the number of patients being diagnosed clinically based on per-operative features increased. So an elevated total count is of more value for arriving at a diagnosis.

DISCUSSION: Diagnosing an appendicitis is based on the patient's history and typical clinical findings.[7,11,12] The most common complaints that bring the patient to the surgeon are migratory abdominal pain, anorexia, nausea and vomiting.[7,11] On examination cutaneous hyperesthesia, right iliac fossa tenderness, guarding and Rovsing's sign can be elicited. Psoas sign, Obturator sign and Baldwin's test will give the clue regarding the position of the inflamed Vermiform appendix. Laboratory tests like C reactive protein level and total leukocyte count will help support in the diagnosis, although it's not confirmatory.[13,14] As the level of C reactive protein and total leukocyte count rises the specificity and positive predictive value for these tests increases.[15] In addition to the above mentioned methods, graded compression ultrasonography and Colour Doppler examination has improved the accuracy of diagnosing appendicitis.[16–18] For diagnosing appendicitis by CT scan of the abdomen, the sensitivity is 92% and specificity is 79%.[19] In cases with atypical signs and symptoms, CT scan of the abdomen greatly improves the diagnostic accuracy.[20–22] Based on few clinical and laboratory parameters many scoring system has been formulated for making a quick diagnosis of appendicitis, like Alvarado scoring system,[10] Modified Alvarado scoring system,[23] Teicher scoring system,[24] RIPASA scoring system[25] etc. When these scoring system is combined with radiological investigations the rate of negative appendectomy has fallen significantly.[26] In all these scoring system total leukocyte count is one of the laboratory parameters. Total leukocyte count helps in identifying the degree of inflammation. In the presence of signs and symptoms of acute appendicitis, an elevated total leukocyte count strongly supports the diagnosis of acute appendicitis. But the absence of an elevation in the total leukocyte count does not rules out an

acute appendicitis.[27] In this study we assessed the variation in the levels of total leukocyte count in relation to patients with recurrent appendicitis. The histopathology results, per-operative findings where compared with their total leukocyte count for coming to a conclusion.

In most of our patients (n=60), the total leukocyte count was within normal range. All the patients with abnormal leukocyte count were proven histopathologically for appendicitis. While patients with normal total leukocyte count, the majority (71%) were proven for appendicitis and the rest did not had appendicitis based on histopathology.

In a study by Jamaluddin et al (2013) has found that total leukocyte count can be normal in patients with acute appendicitis, and the diagnosis should be mainly rested on clinical findings and a minimum of investigations.[28] Raftery et al (1976) described that a total leukocyte count above 10,000/mm^3 supports the diagnosis of acute appendicitis. On other hand a normal leukocyte does not exclude it, even a perforated appendicitis. In this scenario the patient should be further investigated.[27] In the patients with acute appendicitis, an elevated total leukocyte count supports the diagnosis of acute appendicitis, while a normal level does not whether the patient is suffering from acute appendicitis. Data from patients with recurrent appendicitis shows that an abnormal level of total leukocyte count is more specific and sensitive, while a normal level does not help in the diagnosis. In our study among patients with recurrent appendicitis, an elevated leukocyte count has a high chance of having appendicitis. Similarly, a normal leukocyte count could not rule out or indicate appendicitis. An increased value of total leukocyte count, even though within the normal range, with symptoms and signs of appendicitis has more diagnostic value compared to a lower value in the normal range.

When the total leukocyte count is within normal range, the patient may or may not have appendicitis. So in a patient with recurrent appendicitis clinically and a normal leukocyte count, the surgeon should not give over weightage to the total leukocyte count. Further observation, examination or radiological investigations should be ordered for managing these particular set of patients.

CONCLUSION: An elevated total leukocyte count is better predictive of appendicitis rather than a normal count. Total leukocyte count should not be given undue importance for a patient presenting with recurrent appendicitis, if the total leukocyte count is within normal range.

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