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Acute Appendicitis: Relationship of Total Leucocyte Count with Per-Operative Stage

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ABSTRACT

Objective: To correlate total leucocyte count(TLC) with per-operative stage of acute appendicitis.

Patients and Methods: This cross sectional study was conducted in department of surgery, Pakistan Institute of Medical Sciences (PIMS) from June 2016 to June 2017. A total 77 patients were included through consecutive sampling technique. Statistical Package for Social Sciences (SPSS) version 20 was used to analyze data.

Results: A total of 77 patients were included in the study, among them 47 (61%) were males, and 30(39%) were females. Mean age was 22.25 ± 5.19 years. Mean TLC was 12,900 ± 4087 cells/µL Patients having acute appendicitis were labeled as, acute appendicitis stage I which included 59 (76.6%) patients, Gangrenous appendicitis was named as stage II which included 11 (14.3%) patients. Perforated appendicitis was labeled as Stage III in which 7 (9.1%) patients were inducted. In stage I, mean age was 21.89 ± 5.50 years and mean TLC was 12,344 ± 4162 cells/µl. In stage II, mean age was 22.36 ± 3.90 years and mean of total leukocyte count was 15,072 ± 3497 cells/µl. In stage III, mean age was 25.57 ± 3.50 years and mean leukocyte count was 14,214 ± 4141cells/µl (p-value >0.05).

Conclusion: Significant statistical association was not found in patients in different stages of appendicitis with respect to TLC (p value >0.05), although patients in all stages had raised mean TLC with mean TLC highest in patients having stage II (Gangrenous appendicitis).

Key words: Acute appendicitis, Gangrenous appendicitis, Perforated appendicitis; Total leucocyte count.

Author`s Contribution
[1] *Conception, synthesis, planning of research and manuscript writing Interpretation and discussion*
[2,3] *Data analysis, interpretation and manuscript writing,*
[4] *Active participation in data collection*

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Introduction

Acute appendicitis is the most common surgical abdominal emergency in patients with abdominal pain, occurring in 10% of general population.[1,2] Vermiform appendix can have a variable course, retrocecal being the most common.[3] It is positioned near the ileocecal valve where the taenia coli converge on the cecum. Appendix is a true diverticulum of the cecum and it contains all layers of the colonic wall, i.e. mucosa, submucosa, muscularis and the serosa. This is in contrast to the acquired diverticular disease which only consists of protuberance of subset of the enteric wall layers.[4] Incidence of appendicitis is approximately 233/100,000 population, being highest in the 10-19-year-old age group. It frequently occurs in the second and third decade of life. Male to female ratio is 1.4:1 and lifetime incidence is 8.6% in males as compared to 6.7% in females. The primary cause of appendicitis is proposed to be appendicular obstruction.[5] Escherichia coli and streptococcus are the

common gram positive organisms to cause appendicitis.[6,7] Abdominal pain is reported as the most common symptom in almost all confirmed cases of appendicitis. Patients with acute appendicitis present with some of the classical symptoms as, anorexia, nausea, vomiting and right lower quadrant abdominal pain.[8] Mc Burney's point tenderness, rovsing's sign, psoas sign and the obturator sign are some commonly described signs in acute appendicitis. Most of the patients with acute appendicitis have mild leukocytosis (white blood cell (WBC) count more than 10,000 cells/µL).[9] Approximately 80% of the patients presenting with acute appendicitis have leukocytosis with left shift which is increased total leucocyte count (TLC), immature neutrophils (bands) and neutrophils.[10] Sensitivity and specificity of TLC in acute appendicitis is 80% and 55% respectively. Except in very early course of disease, TLC is usually raised.[11] Mean TLCs are higher in patients with gangrenous or perforated appendicitis. In Acute appendicitis level of TLC are found to be 15,500 ± 7300 cells/µL, in Gangrenous appendicitis levels are 17,100 ± 3900 cells/µL and in perforated appendicitis TLC count to be 17,900 ± 2100 cells/µL.[12] The main aim of this study was to find out the association of TLC with per-operative stage of acute appendicitis. It was also aimed to determine age group and gender distribution among patients with acute appendicitis.

Patients and Methods

This cross sectional study was conducted in department of surgery, Pakistan Institute of Medical Sciences (PIMS) Hospital after approval from ethical review board. Duration of study was one year, from June 2016 to June 2017.Total 77 patients presenting with signs and symptoms suggestive of acute appendicitis were included in this study[13] through consecutive sampling technique. Patients having Alvarado score of 5-10 were included in the study. Patients on steroids, immunosuppressive medication, having serious co-morbid condition and pregnancy were excluded from the study. Total four milliliter of venous blood was drawn from all patients for estimation of TLC, before antibiotic administration. Complete blood count (CBC) was carried out on an automated 5-part differential Cell Dyn®3700 coulter counter from abbot Laboratories USA. Staging of acute appendicitis was based on surgical and pathological findings as follows: Stage 1: Acute appendicitis, Stage 2: Gangrenous appendicitis and Stage 3: Perforated appendicitis.Statistical Package for Social Sciences (SPSS) version 20 was used to analyze and access data. Quantitative data was entered as mean±SD. Qualitative data was expressed as number and percentage. One-way ANOVA and chi-square test were applied to find out the association of different stages of appendicitis with TLC, gender and age.

Results

Total 77 patients were included in the study. Among them 61% were males and 39% were females with male to female ratio of 1.5:1. Age range of participants in study was from 14 years to 34 years with mean age of 22± 5.22 years (Table 1).

Table 1: Age and gender distribution of participants (n=77)

Characteristics	Results
Age (in years)	
Range (Mean±SD)	14-34 (22±5.22)
Gender; n(%)	
Male	47(61)
Female	30(39)
Stage of Appendicitis; n(%)	
Stage 1	59 (76.6)
Stage 2	11(14.3)
Stage 3	07 (9.1)

Total Leukocyte count ranged between 4900-26100/µl with mean of 12900±4087/µl. Association of different stages of appendicitis with TLC count was non-significant. Maximum TLC levels was found in stage II (Table 2).

Table 2: Association of different stages of appendicitis with TLC (n=77)

Stages of Appendicitis	TLC (cells/µl) (Mean ± SD)	p-value
Stage I (n=59)	12,344 ± 4162	0.09
Stage II (n=11)	15,073 ± 3497	
Stage III (n=07)	14214 ± 3963	

Association of stages of appendicitis with age and gender was also found to be non-significant. Out of 77 patients, maximum number of patients (both male and female) had stage I appendicitis. Mean age (third decade) was almost same in all three stages of appendicitis (Table 3).

Table 3: Association of different stages of appendicitis with gender and age (n=77)

Stages of appendicitis	Gender		p-value	Age Mean±SD	p-value
	Male n(%)	Female n(%)			
Stage I (n=59)	40(52)	19(25)	0.069	22 ±5.29	0.864
Stage II (n=11)	5(6)	6(8)		22 ±4.24	
Stage III (n=7)	2(3)	5(6)		21± 6.60	

Discussion

Patient in our study were selected on the basis of Alvarado score which is a 10-point clinical scoring system, also known by the acronym MANTRELS. In this scoring system, migration of pain, anorexia, nausea, rebound pain, elevated temperature and shift of white blood cells to the left are given 1 point each, while tenderness in right lower quadrant and leukocytosis are given 2 points each. This score enables risk stratification, linking the probability of appendicitis to recommendations regarding discharge, observation or surgical intervention.[13]

In present study a male predominance was noted among patients presenting with acute appendicitis; 61% males versus 39% females having male to female ratio of 1.5:1. In a study conducted in Saudi Arabia 67% patients were male and 33% were females having male to female ratio of 2:1.[14] Male to female ratio was 1.4:1 in another study.[4] In one study conducted in Islamabad, 52.2% patients were male while 47.8% patients were females with male to female ratio of 1.1:1.[15] Mean age was 22± 5.22 years in current study. In a similar study conducted in Islamabad mean age was 28.7 ± 11.9 years.[15] In another study mean age was 26 ±12 years.[16] Incidence of acute appendicitis has been reported highest in the 10-19-year-old age group and it frequently occurs in the second and third decade of life.[4] Current study clearly indicates highest frequency of acute appendicitis in third decade of life while it was noted to be highest in second decade of life in United States.

In present study, mean TLC was 12,900 ± 4087 cells/µl in overall study group. In Stage I mean TLC was 12,344 ± 4162 cells/µL; in Stage II mean TLC was 15,073 ± 3497 cells/µL and in Stage III mean TLC was 14,214 ± 3963 cells/µL. In one study, it was noted that mean TLCs are higher in patients with gangrenous or perforated appendix. Acute appendicitis (stage I): 15,500 ± 7300 cells/µL, Gangrenous appendicitis (Stage II): 17,100 ± 3900 cells/µL and perforated appendicitis (Stage III): 17,900 ± 2100 cells/µL.[12] Our study in comparison to above study is somewhat different as our study shows that mean TLC is highest in gangrenous appendicitis followed by perforated and acute appendicitis.

Conclusion

Significant association was not noted in patients with different stages of appendicitis with respect to TLC, age and gender. Although patients in stage II (Gangrenous appendicitis had highest mean TLC but it was not statistically significant.

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