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If Acute Appendicitis Due to Enterobius Vermicularis has Potential Predictive Differences in Terms of Blood Count Parameters Compared to Other Causes; Retrospective Study

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Abstract

Acute appendicitis is the most common cause of acute abdominal syndrome and the most frequent emergency operation in our country and all over the world. The main causes of acute appendicitis are; inflammation, fecaloid, tuberculosis, foreign body obstruction, tumor, diverticula and 'enterobius vermicularis' infection can cause this table formation. In this retrospective modified study, the possible predictive effects and differences of preoperative complete blood counts of enterobius vermicularis and acute appendicitis in patients who underwent appendectomy in acute appendicitis.

Keywords: Enterobius Vermicularis; Blood Count; Appendicitis

Introduction

Appendectomy is one of the most common emergency surgical procedures and is the most frequently performed surgical operation in the world and our country as acute abdominal surgery [1]. Addiss et al. found the risk of being appendicitis nearly 8.6% throughout life [2].In another study, it is noted that almost 7% of all people had an appendectomy operation during their lifetime [3]. The acute appendicitis, defined as the inflammation of the appendix, is mostly seen with the 2nd and 3rd decades [4]. Histopathological examinations of the specimens of patients who underwent appendectomy have been reported in studies are often infections such as acute inflammation, fibrous tissue, neoplasm, neuroendocrine tumors, tuberculosis, diverticulitis, granulomatous inflammation, adenomas, actinomycets, endometriosis and enterobius vermicularis [5]. The occlusion of the appendix lumen seems to be the reason for inflammation. The most common symptoms are abdominal pain (78%) and nausea-vomiting (26%) [6].

This study was constructed and applied in Eskisehir Osmangazi University general surgery department. Approximately 250 appendectomy surgeries are performed annually due to acute appendicitis at our center yearly. The operations can be performed open and laparoscopically. This study compared 21 patients who had undergone appendectomy surgery between 2012-2017 whose pathologic examination was the main acute inflammation and 17 patients who had the same operation who had enterobius vermicularis in the final pathology. Reasons for inflammation in the control group were fecaloid, tumor, foreign body, neuroendocrine tumor and diverticulitis. As comparison parameter, full blood count values at the time of first application of the patients were used. Statistical analyzes were performed using IBM SPSS, version 21. The T test was assessed to normal range specimens and Mann-Whitney U used for abnormal range of specimens.

This study is designed whether a possible predictive effect of pre-operative complete blood count between patients who underwent objective appendectomy and reported as enterobius vermicularis and other group of patients.

Results

Since the 'Hb, Htc, erythrocyte and MPV' variants showed normal distribution according to the distribution test (Table 1). T test was used to compare these variables with e.vermicularis and inflammation (other causative) patients (Table 2). Between 2012-2017,

38 patients undergoing appendectomy were analysed, divided into two groups (e.vermicularis-other). T test and Mann-Whitney U tests were used according to their variability or normal distribution of parameters (Table 3, 4 and 5). The results of the final evaluation revealed that the patients with enterobius vermicularis final histopathologic examination had statistically higher pre-operative initial blood counts than the other groups (Table 4).

Tests of Normality							
	GRUP	Kolmogorov-Smirnova			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
AGE	E.VERMİ	,228	17	,019	,744	17	,000
	İNFLAM	,230	21	,005	,657	21	,000
HBG	E.VERMİ	,127	17	,200*	,975	17	,898
	İNFLAM	,161	21	,160	,935	21	,171
HCT	E.VERMİ	,097	17	,200*	,962	17	,677
	İNFLAM	,143	21	,200*	,963	21	,572
ERITROCYTE	E.VERMİ	,121	17	,200*	,967	17	,759
	İNFLAM	,104	21	,200*	,975	21	,843
RDW	E.VERMİ	,263	17	,003	,884	17	,038
	İNFLAM	,353	21	,000	,471	21	,000
LEUKOCYTE	E.VERMİ	,159	17	,200*	,859	17	,015
	İNFLAM	,095	21	,200*	,970	21	,733
ABS_NEU	E.VERMİ	,179	17	,153	,877	17	,029
	İNFLAM	,175	21	,091	,967	21	,663
ABS_LYM	E.VERMİ	,188	17	,113	,878	17	,029
	İNFLAM	,164	21	,146	,857	21	,006
AB_MONO	E.VERMİ	,365	17	,000	,553	17	,000
	İNFLAM	,188	21	,051	,841	21	,003
AB_EOSIN	E.VERMİ	,145	17	,200*	,922	17	,161
	İNFLAM	,195	21	,036	,805	21	,001
AB_BAZO	E.VERMİ	,333	17	,000	,499	17	,000
	İNFLAM	,312	21	,000	,741	21	,000
PLT	E.VERMİ	,281	17	,001	,787	17	,001
	İNFLAM	,131	21	,200*	,975	21	,841
MPV	E.VERMİ	,129	17	,200*	,955	17	,532
	İNFLAM	,116	21	,200*	,977	21	,875

*This is a lower bound of the true significance.
a. Lilliefors Significance Correction

Table 1: Since the Hgb, Hct, Ert, and Mpv variables showed normal distribution according to the normal distribution test, the T test was used to compare these variables with the patients and normal individuals

T-Test					
Group Statistics					
	GRUP	N	Mean	Std. Deviation	Std. Error Mean
HB	E.VERMİ	17	12,9000	1,98463	,48134
	İNFLAM	21	13,9429	1,86187	,40629
HCT	E.VERMİ	17	38,3059	5,05760	1,22665
	İNFLAM	21	40,9000	4,94702	1,07953
ERıtrocyte	E.VERMİ	17	4,7229	,62176	,15080
	İNFLAM	21	4,8848	,58681	,12805
MPV	E.VERMİ	17	8,3235	,93443	,22663
	İNFLAM	21	8,7095	1,26091	,27515

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
HB	Equal variances assumed	,180	,674	-1,667	36	,104	-1,04286	,62556	-2,31156	,22584
	Equal variances not assumed			-1,656	33,370	,107	-1,04286	,62989	-2,32385	,23813
HCT	Equal variances assumed	,187	,668	-1,591	36	,120	-2,59412	1,63013	-5,90016	,71193
	Equal variances not assumed			-1,588	34,044	,122	-2,59412	1,63403	-5,91470	,72647
ERİTROSİT	Equal variances assumed	,114	,737	-,823	36	,416	-,16182	,19660	-,56054	,23690
	Equal variances not assumed			-,818	33,471	,419	-,16182	,19783	-,56410	,24046
MPV	Equal variances assumed	1,390	,246	-1,049	36	,301	-,38599	,36787	-1,13206	,36007
	Equal variances not assumed			-1,083	35,765	,286	-,38599	,35647	-1,10912	,33713

HB t= -1.67 sd= 36 P=0.104 p>0.05
HCT t= -1.60 sd= 36 P=0.120 p>0.05
ERITROCYTE t= -0.83 sd= 36 P=0.416 p>0.05
MPV t= -1.05 sd= 36 P=0.301 p>0.05

Table 2: There is no significant difference in patient and control groups for Hgb, Hct, Ert, and Mpv according to T test results

Nonparametric Tests: The Mann-Whitney U test was used for nonparametric tests because the other variables were not normal distributions for RDW, LEUKOCYTE, ABS_NOTROFIL, ABS_LENFOSITE, AB_MONO, AB_EOZINE, AB_BAZO and PLT.

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of RDW is the same across categories of GRUP	Independent Samples mann-whitney U Test	.750[1]	Retain the null hypothesis.
2	The distribution of LOKOSIT is the same across categories of GRUP	Independent Samples mann-whitney U Test	.68[1]	Retain the null hypothesis.
3	The distribution of ABS_NOTROFIL is the same across categories of GRUP	Independent Samples mann-whitney U Test	.56[1]	Retain the null hypothesis.
4	The distribution of ABS_LENFOSIT is the same across categories of GRUP	Independent Samples mann-whitney U Test	.308[1]	Retain the null hypothesis.
5	The distribution of AB_MONO is the same across categories of GRUP	Independent Samples mann-whitney U Test	.29[1]	Reject the null hypothesis.
6	The distribution of AB_EOZIN is the same across categories of GRUP	Independent Samples mann-whitney U Test	.161[1]	Retain the null hypothesis.
7	The distribution of AB_BAZO is the same across categories of GRUP	Independent Samples mann-whitney U Test	.128[1]	Retain the null hypothesis.
8	The distribution of PLT is the same across categories of GRUP	Independent Samples mann-whitney U Test	.42[1]	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.
[1]Exact significance is displayed for this test.

Table 3: There are significant differences between these variables for AB_mono and PLT

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
RDW	38	13,6658	2,76838	11,50	28,60	12,5750	13,1000	13,7000
LEUKOCYTE	38	13821,8421	5047,09971	6400,00	28410,00	10250,0000	13750,0000	16050,0000
ABS_NEU	38	11099,7368	5201,51874	2900,00	26400,00	6575,0000	11750,0000	13325,0000
ABS_LYM	38	1652,3684	744,61466	800,00	3400,00	1000,0000	1400,0000	2225,0000
AB_MONO	38	794,7368	548,06656	100,00	2700,00	500,0000	600,0000	1000,0000
AB_EOZİN	38	175,2632	172,68526	,00	600,00	,0000	190,0000	285,0000
AB_BAZO	38	94,4737	150,14763	,00	600,00	,0000	20,0000	100,0000
PLT	38	244157,8947	85578,95874	67000,00	547000,00	191750,0000	227000,0000	279750,0000
GROUP	38	1,5526	,50390	1,00	2,00	1,0000	2,0000	2,0000

Table 4: Descriptive Statistics

Test Statistics[a]								
	RDW	LEUKOCYTE	ABS_NEU	ABS_LYM	AB_MONO	AB_EOZİN	AB_BAZO	PLT
Mann-Whitney U	167,000	116,000	113,500	143,000	104,500	130,500	126,000	109,000
Wilcoxon W	320,000	269,000	266,500	374,000	257,500	361,500	279,000	340,000
Z	-,339	-1,836	-1,908	-1,044	-2,197	-1,443	-1,647	-2,041
Asymp. Sig. (2-tailed)	,735	,066	,056	,296	,028	,149	,099	,041
Exact Sig. [2*(1-tailed Sig.)]	,750[b]	,068[b]	,056[b]	,308[b]	,029[b]	,161[b]	,128[b]	,042[b]

a. Grouping Variable: GRUP
b. Not corrected for ties.
AB-MONO z=-2.20 p=0.028 p<0.05*
PLT z= -2.04 p=0.041 p<0.05*
Table 5: Mann-Whitney Test

Discussion

Acute appendicitis is the most common acute abdominal surgery worldwide. Obstruction of appendix lumen is seems to be the cause of appendiceal inflammation. Rare reasons such as fecalids, neoplasms, lymphoid hyperplasia are leading for obstruction [7]. Parasitic infections are common in South American countries. Parasitic infections are associated with poor hygienic conditions, low socioeconomic status, contaminant foods and contaminant water [8]. In recent studies, several cases of enterobius vermicularis that causes acute appendicitis are present all over the world. Enterobius vermicularis microorganism that spend lifetime in intestinal lumen is considered as an etiologic factor of acute appendicitis because of the ability of obstruction of the appendix lumen. In the case of acute appendicitis, physical examination, laboratory and ultrasonography triad is critical. In this process, pain in the lower right quadrant (Mc Burney point) and rebound in the examination are provided with laboratory tests. There is a critical advantage of the inflammatory parameters like wbc, sediments and CRP. Abdomen ultrasonography is the most commonly used imaging method in diagnosis in parameters of appendiceal inflammation, wall thickness, etc., but it can not provide definitive information about the etiologic reason for the naturality. Abdominal tomography can also be used in selected patients [9]. At the point our knowledge that routine blood counts were made in patients presenting with a complaint of abdominal pain and suspected of infection, we designed this retrospective study to analyse the possible predictive effect of parameters other than the most commonly used inflammatory markers (Wbc, sediments, CRP, neutrophil/lymphocyte ratio ...) of this whole blood count in determining whether acute appendicitis was caused by enterobius vermicularis or another cause during patient admission.

Main limitation fort his study was the average age of patients. Enterobius vermicularis caused acute appendicitis were diagnosed in young patients rather than elderly population.

Conclusion

As a result; absolute monocyte and plt (platelet) values should be considered in patients with acute appendicitis as a predictive factor for enterobius vermicularis infection except for the usual parameters. A good anamnesis and socioeconomic situation should be investigated in case of questioning whether antihelmintic medical therapy can suppress the evidence without needing surgery. This study should be designed and supported with studies in which the number literature is limited yet.

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