

# Correlation between perforated appendicitis and total bilirubin

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## Abstract

**Aim:** In this study, we aimed to examine to what extent total bilirubin (TB) measurements can help us in diagnosing perforated appendicitis.

**Material and Methods:** The TB levels of the patients for whom a surgery was planned with a preliminary diagnosis of appendicitis, were measured and then recorded. The patients with a TB level of 1.20 mg/dL and below were considered "normal", and those with a TB value of 1.21 mg/dL and above were considered "high". The appendectomy materials were divided into three groups, namely non-appendicitis, perforated appendicitis and non-perforated appendicitis, according to postoperative pathology report. The statistical correlation between the postoperative pathological findings of appendectomy materials and the groups formed according to TB results was analyzed.

**Results:** Of the patients included in our study, 80 (46%) were female and 96 (54%) were male. The average age was 27.48±12.08 years, and the median age was 25 years. As per the pathology report, 15 patients had no appendicitis (negative laparotomy), 2 (13%) of whom had a high TB level whereas 24 patients had perforated appendicitis, 8 (33%) of whom had a high TB level and 135 patients had non-perforated appendicitis, 28 (21%) of whom had a high TB level.

**Conclusion:** Our study found that the TB level in perforated appendicitis was 1.6 times higher than that in non-perforated appendicitis and 2.5 times higher than that in negative laparotomies. The bilirubin value differences between the groups were statistically significant ( $p < 0.05$ ).

**Keywords:** Acute Appendicitis; Perforation; Hyperbilirubinemia.

## INTRODUCTION

Although acute appendicitis occurs in all age groups, surgery constitutes the vast majority of acute abdominal diseases in adults. The appendix is extremely rich in lymphoid tissue. The period in which the lymphoid activity is at the highest rate is between the ages of 20 and 30 years, and the lymphoid tissue decreases in number and is replaced by fibrous tissues as age advances. The age group of 20-30 years with the highest rate of lymphoid activation is the period during which acute appendicitis is most frequent (1). Its rate of incidence in males and females is close to each other. Acute appendicitis is a process that begins with obstruction of the appendix lumen for various reasons (lymphoid activation, foreign body, parasitosis, fecaloma, tumoral formations, etc.). With the obstruction of the appendix lumen, mucus accumulates within the lumen, which then leads to increased pressure, disruption

of circulation, pain and increased microbial colonization (2).

The most remarkable findings in the diagnosis of acute appendicitis are obtained through anamnesis and physical examination. Those findings are supported by imaging and laboratory tests. In imaging; ultrasonography, computed tomography, direct X-rays and magnetic resonance imaging are used (3). In blood tests, however, WBC, neutrophil ratio (NR), CRP, erythrocyte sedimentation rate (ESR) and bilirubin values are sought (4). Also, the scoring tests (Alvarado Score, etc.) are of importance in the diagnosis (5). Laparoscopy is, however, used for both diagnosis and treatment purposes.

## MATERIAL and METHODS

Among the patients admitted to Malatya State Hospital's General Surgery Clinic with a preliminary diagnosis

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of acute appendicitis and for whom appendectomy is planned, those whose clinical and laboratory information were complete and who agreed to participate in our study, were included in the study. Along with their blood tests routinely performed in the preoperative period, also the TB levels of the patients for whom appendectomy was planned were measured. The patients with a TB level of 1.20 mg/dL and below were considered "normal", and those with a TB level of 1.21 mg/dL and above were considered "high". According to postoperative pathology reports after appendectomy, the patients were divided into three groups, namely non-appendicitis, perforated appendicitis and non-perforated appendicitis. The correlation between the postoperative pathological findings of the appendectomy material and the groups that we formed according to TB results was analyzed. The recording and statistical analysis procedures were performed using the SPSS statistical software. The groups were compared using the Chi-square test.  $p < 0.05$  was considered significant.

## RESULTS

Our study included a total of 174 patients who underwent appendectomy in 2013-2014, of whom 80 (46%) were female and 96 (54%) were male. The average age of the patients was  $27.48 \pm 12.08$  years, and the median age was 25 years.

Of the 174 patients who underwent appendectomy, 136 (78%) had a normal TB level and 38 (22%) had a high TB level.

According to the postoperative pathology reports, 15 patients had no appendicitis; based on this result, the rate of negative laparotomy was 8%. Of the 15 patients with negative laparotomy, the TB levels were found to be high in 2 (13%). Of a total of 174 patients included in our study, 159 (92%) were reported to have postoperative pathologies as acute appendicitis. With regards to the pathology report, 135 (85%) out of 159 patients diagnosed with appendicitis had no perforation. Of 135 patients with non-perforated appendicitis, 28 (21%) had a high TB level. According to the pathology report, 24 (15%) out of 159 patients who were reported as appendicitis had perforated appendicitis. In 8 (33%) out of 24 patients with perforated appendicitis, TB was found to be high. (Table 1)

**Table 1. Total Bilirubin Results According to Postoperative Pathology**

		Appendix according to Postoperative Pathology			Total (n)
		Appendicitis Non-Appendicitis (n)	Perforated Appendicitis (n)	Non-Perforated Appendicitis (n)	
Total Bilirubin	Normal	13	16	107	136
	High	2	8	28	38
	Total	15	24	135	174

(n: number of patients)  $p < 0.05$

The correlation among the patients classified according to the TB and postoperative pathology results was analyzed using the Chi-square test. The differences between the groups were found statistically significant ( $p < 0.05$ ).

## DISCUSSION

15 out of 174 patients were found to have negative laparotomy, the rate of which was 8%. In their studies, Adams et al. reported the negative laparotomy rates as 13%, whereas it was reported to be 21% in the series of 194 patients by Sandstrom et al. (6,7).

The rate of perforated appendicitis was 15.09% in our study. In their studies, McGrowan et al., Adams et al. and Bonaddoi et al. reported the perforation rates as 12%, 24% and 42%, respectively (8,6,9).

TB rate was found to be 33%, 21% and 13% in perforated appendicitis, non-perforated appendicitis and negative laparotomy, respectively. In their study, Müller et al. reported the TB rate, in the series of 493 patients, as 48%, 36% and 14% in perforated patients, non-perforated and negative laparotomy, respectively (10). We found in our study that TB value was 1.6 times higher in those with perforated appendicitis compared to that of the patients with non-perforated appendicitis. The difference in-between was statistically significant ( $p < 0.05$ ). In their studies, Alanis-Rivera et al. reported this rate as 17 times higher whereas Eren et al. reported it as 5 times higher (11,12).

In their study which included 570 cases, Kaser et al. set forth that hyperbilirubinemia may be a marker for perforated appendicitis, but it is not as effective as CRP (13).

Emmanuel et al., Giordano et al. and D'Souza et al. reports in all their studies that the TB rate is a remarkable parameter in diagnosis, however it remains insufficient alone (14,15,16).

## CONCLUSION

As in numerous studies conducted in this regard, we found that the TB values were not dramatically high in perforated appendicitis (11,12). Nevertheless, although the increased TB was statistically significant in perforated appendicitis according to the results of our study, we believe that it has alone a limited sensitivity in the diagnosis and may constitute a marker having a supporting nature for the perforated appendicitis in its diagnosis.

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