Research Article / Araştırma Makalesi

Do Platelet Indices Have an Effect On Mortality in Peptic Ulcer Perforation?

Peptik Ülser Perforasyonunda Trombosit Endekslerinin Mortalite Üzerine Etkisi Var mı?

Osman BARDAKÇI[1], Faik TATLI [1], Abdullah ÖZGÖNÜL [1], Mehmet YILMAZ [1], Ali UZUNKÖY [1]

1 Harran University, Faculty of Medicine, Department of General Surgery, Şanlıurfa, Turkey

Abstract

Background: Peptic ulcer disease (PUD) is an ulcerative lesion that extends to the submucosa or muscularis propria in the acid-induced stomach and duodenum. Peptic ulcer perforation (PUP) is the second-most common complication observed in 2%–10% of PUD cases.
Materials and Methods: The records of 70 patients who were operated with a diagnosis of PUP between
January 2010 and December 2018 were reviewed retrospectively. The mean platelet volume (MPV), platelet distribution width (PDW), white blood cell (WBC) count, and platelet count in the preoperative blood tests and at mortality were recorded in the patients. The patients were divided into two groups: those who did not develop mortality (Group 1) and those who developed mortality (Group 2).
Results: Mortality was seen in 10 (14.2%) patients, of which five each were male and female. All patients who developed mortality did so in the early postoperative period (6th hour and 2nd day). There was a statistically significant difference in MPV and PDW values ($p < 0.015$ and $p < 0.015$, respectively).
Conclusions: As a result, in our study, we think that preoperative high MPV and PDW values can be used to predict mortality in patients who will be operated for PUP. We anticipate that changes in MPV and PDW may be due to sepsis developed secondary to peritonitis due to perforation.

Key Words: Peptic ulcer perforation, Mean platelet volume, Surgery, Mortality.

Öz.

Amaç: Peptik ülser hastalığı (PUD), asite bağlı mide ve duodenumda submukoza veya muscularis propriaya kadar uzanan ülseratif bir lezyondur. Peptik ülser perforasyonu (PUP), PUD olgularının % 2-10'unda gözlenen en yaygın ikinci komplikasyondur.
Materyal ve Metod: Ocak 2010- Aralık 2018 tarihleri arasında PUP tanısı ile ameliyat edilen 70 hastanın kayıtları retrospektif olarak incelendi. Hastalar da preoperatif olarak bakılan kanda MPV, PDW, WBC Trombosit sayısı ve mortalite gelişip gelişmediği kaydedildi. Hastalar mortalite gelişmeyen hastalar (Grup 1) ve mortalite gelişen hastalar (Grup 2) olmak üzere iki gruba ayrıldı.
Bulgular: 10 hastada (%14,2) mortalite görüldü. Bu hastaların 5 tanesi kadın, 5 tanesi erkekti. Hastalar da mortalite postoperatif erken dönemde (6. saat ve 2. gün) görüldü. MPV ve PDW değerlerinde istatistiksel olarak anlamlı bir fark saptandı (sırasıyla $p<0.015$ ve $p<0.015$).
Sonuç: Çalışmamızda preoperatif olarak bakılan yüksek MPV ve PDW değerlerinin PUP nedeniyle opere edilecek hastalarda mortaliteyi öngörmede kullanılabileceğini düşünmekteyiz. MPV ve PDW'deki değişikliklerin perforasyona bağlı peritonite sekonder gelişen sepsis nedeniyle olabileceğini öngörmekteyiz.

Anahtar kelimeler: Peptik ülser perforasyonu, Ortalama trombosit hacmi, Cerrahi, Mortalite

Sorumlu Yazar / Corresponding Author

Osman BARDAKÇI

Harran University,
Faculty of Medicine,
Department of General Surgery,
Şanlıurfa, Turkey

E-mail:
drosmanbardakci@gmail.com

Tel: 0 507 6047820

Geliş tarihi / Received:
11.03.2020

Kabul tarihi / Accepted:
04.06.2020

DOI: 10.35440/hutfd.701634

Introduction

Peptic ulcer disease (PUD) is an ulcerative lesion that extends to the submucosa or muscularis propria in the acid-induced stomach and duodenum. Over the last 50 years, medical treatment for PUD has shown rapid improvements with the introduction of H_2 receptor blockers and proton pump inhibitors (1, 2).

Peptic ulcer perforation (PUP) is the second-most common complication observed in 2%–10% of PUD cases (3). Studies conducted thus far have noted that factors such as the presence of shock on admission, concomitant diseases, delayed surgery (>24 h), resection surgery, and postoperative abdominal and wound infections were associated with increased morbidity and mortality in perforated ulcer patients (4, 5). Platelets are suggested to not only be involved in haemostasis but also to regulate inflammatory processes. Platelet activity increases following the tissue injury and release of inflammatory mediators (6). Various research groups have shown a relationship between changes in platelet indices and coagulation system activation, severe infection, trauma, systemic inflammatory reaction syndrome, and thrombotic diseases (4).

Studies have reported that the mean platelet volumes (MPV), one of the platelet indices, are susceptible to perforated appendicitis and PUP (5); however, its effect on mortality has not yet been investigated. In this study, we aimed to investigate whether platelet indices measured preoperatively have an effect on the mortality of patients who are operated for PUP.

Materials and Methods

The present study was approved by the local ethics committee of the Harran University Medical Faculty in Turkey (Approval date-number: 07/06/2018- 18/06/13).The records of 70 patients who were operated with a diagnosis of PUP between January 2010 and December 2018 were reviewed retrospectively. This study was done in the general surgery clinic of Harran University Medical School. Patients with perforation associated with primary gastric malignancy were excluded from the study. The MPV, platelet distribution width (PDW), white blood cell (WBC) count, and platelet count in the preoperative blood tests and at mortality were recorded in the patients. As a surgical intervention technique, the Graham procedure or an omental patch was performed in the patients by an open surgical approach. The patients were divided into two groups: those who did not develop mortality (Group 1) and those who developed mortality (Group 2).

Demographic features, laboratory values, morbidity, mortality, additional diseases and postoperative complications of patients in both groups were recorded.

Statistical analysis

SPSS 20 (SPSS Inc., Chicago, IL, USA) was used for statistical analysis. Data were presented as mean ± standard deviation. A one-sample Kolmogorov–Smirnow test was used to evaluate the distribution of numerical data. In numerical data with a normal distribution, an independent sample t-test was used for evaluation between the groups. In cases with a nonnormal distribution, the Mann–Whitney U-test was used for comparison. The difference was considered to be statistically significant for $P < 0.05$.

Results

The mean age of the 70 patients included in the study was 54 (18–91) years; 55 (78.5%) patients were male and 15 (21.5%) were female. Mortality was seen in 10 (14.2%) patients, of which five each were male and female. All patients who developed mortality did so in the early postoperative period (6th hour and 2nd day). There was a statistically significant difference in MPV and PDW values ($p < 0.015$ and $p < 0.015$, respectively) (Table 1).

Table 1. Comparison of platelet indices by groups

	Group 1	Group 2	P
WBC (10^3/L)	14.73 ± 6.02	14.06 ± 8.29	0.66
Platelet count (10^3/L)	288.09 ± 124.05	312.31 ± 182.82	0.89
MPV(fL)	7.35 ± 1.94	9.10 ± 2.39	0.015
PDW (fL)	19.30 ± 3.19	21.24 ± 2.16	0.015

WBC: white blood cell;
MPV: mean platelet volüme;
PDW: platelet distribution width

Among the groups; there was no statistically significant difference between demographic features, comorbid diagnoses, and the time from onset of symptoms to surgery. For patients who did not develop mortality, the mean hospitalization time was 6 (2–9) days. Twelve patients developed wound infection; one patient, lung infection; and three patients, fistula.

Discussion

PUP is a common clinical problem with a high mortality rate, and it remains an important problem today. Studies have reported mortality rates of 1%–24% after the surgical repair of PUP (6-9). In our study, the mortality rate was found to be 14.2%.

Platelets play an important role in inflammation, and they have recently been shown to have many additional functions during inflammation. The simultaneous measurements of all platelet indices can help us to predict and detect the severity of the disease. The numerous studies that have investigated this issue have revealed a relationship between changes in platelet indices and coagulation system activation, severe infection, trauma, systemic inflammatory reaction syndrome, and thrombotic diseases (10).

MPV, one of the platelet indices, is a measure of the average platelet size and is part of the complete blood count

parameters. It is known to be an indicator of platelet function and activation (10). MPV acts as a negative or a positive acute-phase reactant under different inflammatory conditions. High MPV levels are associated with high-level inflammation owing to the presence of large circulating platelets. Aktimur et al. found that MPV values were higher in an appendicitis group than in a negative appendectomy group (11). Bilgic et al. found that MPV levels were high in patients operated for acute mesenteric ischemia in the group that developed mortality (12). Zampieri et al. detected increased mortality associated with high MPV values in sepsis patients who were admitted to an intensive care unit and were followed-up (13).

Becchi et al. found that MPV can be used as an indicator of platelet behaviour and disorder in indirect platelet production and activation during sepsis response. They showed that the MPV increase can be used to predict the prognosis of early-stage sepsis. They also found that MPV values at the time of admission were higher in patients who developed mortality than in the patients who did not (14). In our study, MPV values were found to be statistically higher in the group that developed mortality compared to the group that did not. We think that the reason for this might be the sepsis that developed due to PUP. PDW is a marker of platelet size and platelet activation (15). Zhang et al. reported that MPV and PDW values are valuable parameters that can be used to predict mortality in in-patients in intensive care units (16). Dinç et al. noted that PDW may be considered a marker for the early detection of perforation risk in patients with acute appendicitis (17). Patrick et al. found that PDW levels were significantly higher in patients with late-onset neonatal sepsis (18). In our study, PDW values were found to be statistically significantly higher in the group that developed mortality; this is consistent with the literature.

Conclusion

As a result, in our study, we think that preoperative high MPV and PDW values can be used to predict mortality in patients who will be operated for PUP. We anticipate that changes in MPV and PDW may be due to sepsis developed secondary to peritonitis due to perforation.

Ethical approval

The present study was approved by the local ethics committee of the Harran University Medical Faculty in Turkey (Approval date-number: 07/06/2018- 18/06/13).

Acknowledgments

The authors would like to thank all of the participants involved in the study.

Declaration of İnterests

The authors declare no conflict of interests.

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