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ARAŞTIRMA / RESEARCH

Relationship between platelet distribution width and hospital stay in incarcerated inguinal hernia treated by open surgery

Açık cerrahi ile tedavi edilen inkarsere inguinal hernide hastane yatışı ile trombosit dağılım genişliği ilişkisi

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Abstract

Purpose: The study aimed to investigate the value of platelet distribution width (PDW) in incarcerated inguinal hernia which was treated with graft to illuminate its inflammatory role in surgery-related disorders.

Materials and Methods: We perormed a case-control study by retrospective screening data of the 88 patients with inguinal hernia and 75 healthy. Patients data included demographics, hernia location, hospital stay, and hemogram parameters. Platelet-related parameters were anayzled with automated devices from EDTA samples.

Results: The mean defect size was 25.3±17 mm for inguinal hernia, which ranged 6 to 75 mm. The PDW value was higher in group A as compared with that of group B. Also, the platelets were statistically higher in group A than group B. In the Pearson correlation analysis, PDW showed a strong and positive relationship with a hospital stay.

Conclusion: We suggest that a strong positive correlation of platelet distribution width with hospital stay can be useful in incarcerated inguinal hernia which we treated with grafted by open surgery.

Keywords: Platelet distribution width, incarcerated inguinal hernia, hospital stay

Öz

Amaç: Çalışma, greftle tedavi edilen, inkarsere inguinal hernideki trombosit dağılım genişliğinin (PDW) cerrahi ile ilişkili bozukluklardaki inflamatuvar rolünü aydınlatmak için değerini araştırmayı amaçladı.

Gereç ve Yöntem: İnguinal hernisi olan ve 75 sağlıklı olan 88 hastanın retrospektif tarama verilerini inceleyerek bir vaka kontrol çalışması yaptık. Hasta verileri demografik özellikleri, herni yerleşimi, hastanede kalış süresi ve hemogram parametrelerini içeriyordu. Trombosit ilişkili parametrelerde ölçüm EDTA'lı numune örneklerinden otomatize cihazlarla yapıldı.

Bulgular: Ortalama defekt büyüklüğü 6 ila 75 mm arasında değişen inguinal herni için 25.3±17 mm idi. PDW değeri hasta grubunda sağlıklı gruba göre daha yüksekti. Ayrıca, trombositler hasta grubunda istatistiksel olarak daha yüksekti. Pearson korelasyon analizinde PDW hastanede kalış ile güçlü ve pozitif bir ilişki gösterdi.

Sonuç: Trombosit dağılım genişliği ile hastanede kalış arasındaki güçlü pozitif korelasyonun, açık cerrahi ile tedavi ettiğimiz inguinal hernilerde hastane yatış süresi üzerinde yararlı bilgiler vereceğini düşünüyoruz.

Anahtar kelimeler: Trombosit dağılım genişliği, inkarse kasık fıtığı, hastanede kalış

INTRODUCTION

Hernia repair is the second most common surgical operation among general surgeons[1]. Soft and tension free repairs replace the repairs that are made using the tissues of the patient with their tissues[2]. Today, the superiority of repairs is considered to be indisputable. Topics such as types of mesh used in hernia repair and laparoscopic/open application techniques have been discussed[3]. Post-operative pain, recurrence, expensive technique, type of anesthesia and time to return to work are among the topics discussed. Wasing time in the surgery of external hernia is associated with extended hospitalazation and a prolonged intensive care, hence resulting in

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unexpected health costs, in addition to altered mortality and morbidity[4,5].

In order to lessen hospital stay duration, we need a powerful indicator such as radiologic imaging methods. In newly published reports, platelets and their effects attract the attention of academics[6-8]. The ability of platelets to affect other cells and morphological changes due to chronic inflammatory response may have an indicator role in the pathophysiology of surgery-related diseases[9-12]. They can join or contribute to the inflammatory-related process, wound heal, microbial host-defense, and tissue platelet-derived remodeling[13]. As a result, shape and numerical changes in platelets will cause changes in platelet distribution width (PDW), can be an important indicator in medical disorders and help surgeons in this regard.

In the current study, we aimed to investigate the value of platelet distribution width in incarcerated inguinal hernia which was treated with graft to illuminate its inflammatory role in medical disorders.

MATERIALS AND METHODS

A case-control study was performed as a result of retrospective screening of the patients' data. This cohort study was carried out on 88 consecutive patients who have been admitted to the emergency department with a diagnosis of incarcerated inguinal hernia throughout two years, including 2017 and 2018. The institutional Surgery Committee of the Medical Faculty of Mustafa Kemal University Research Hospital approved the study.

The data of consecutive cases were collected to achieve the target participant number for the patient's group. Healthy individuals were selected as control in the same duration and age. We included the patients who underwent open surgery for incarcerated hernia findings without strangulation and who had no additional disease. Exclusion criteria involve being younger than 18-year-old, having the thrombocytopenic disorder, having a history of medication use leading to the disorders of platelet structure or function, missing medical information in the hospital automation. Thirty-five patients were out of the study because of being younger than 18 years or having missing data files.

Patient Groups

The participants divided into two groups as control and an inguinal hernia for the study. Patient group (A) included 88 patients from who admitted to the general surgery clinic for external inguinal hernia repair. In contrast, group B included healthy individuals who were admitted to the general surgery clinic for treatment without a systemic disease or major surgical disorder. In addition to PDW, clinical data involved the following parameters: age, gender, body mass index, hernia location, operation type; hospital stay; the need for intensive care. The demographics, clinical characteristic and laboratory findings in groups are in Table 1.

Table 1. Demographic characteristics and laboratory results

Variables	Hernia (n:88)	Healthy controls (n:75)	p-value
Age (year)	60.5 ± 21	58.4 ± 17.3	0.109
Gender			
Male	74 (84%)	65 (86.6%)	0.215
Female	14 (16%)	12 (13.4%)	
BMI (m^2/kg)	26.9 ± 5.1	26.3 ± 7.2	0.582
Defect Size (mm)	25.3 ± 17	-	
Hospital Stay (day)	6.1 ± 3	-	
Glucose (mg/dL)	109 ± 11	94.1 ± 5.6	0.021
HbA1c (%)	5.8 ± 1.9	5.9 ± 0.5	0.614
Creatinine (mg/dL)	0.48 ± 0.5	0.45 ± 0.32	0.087
BUN (mg/dl)	14.2 ± 4.1	13.8 ± 3.3	0.042
Platelet ($\times 10^9$/l)	250.5 ± 68	140 ± 44.8	<0.001
MPV (fl)	10.6 ± 1.15	10.5 ± 1	0.058
PDW (fl)	13.7 ± 2.6	10.9 ± 2.6	<0.001

Abbreviations. MPV: mean platelet volume, PDW: platelet distribution width, HbA1c: Glicolized Hemoglobin, BMI: body mass index, BUN: blood urea nitrogen

Laboratory analysis

For the hematologic measurements, Siemens Hematology Auto-Analyzer Diagnostics BCS XP System (Siemens AG, Berlin, Germany) was used following biochemistry daily routine internal and monthly external quality controls. Blood samples were collected at the time of admission to the emergency department in the patient and control group.

Statistical analysis

The patient data analysis was done via SPSS software V21 (SPSS-Inc, Chicago, USA). P<0.05 was considered statistically significant. Data were reported as mean±SD. Shapiro-Wilk test was used for normality of the distributions of continuous variables. The differences between the data from the groups were compared via Student T-test. Degrees of association between continuous variables were evaluated via Spearman's correlation analysis.

RESULTS

The mean defect size was 25.3±17 mm for inguinal hernia, which ranged 6 to 75 mm. Hospital stay was as 6.1±3 days (ranged: 2-14 days). BMI, gender and age did not differ between groups (p>0.05). All demographic characteristics and laboratory finding are in Table-1.

The PDW value was higher in group A as compared with that of group B (P<0.001). Also, the platelets were statistically higher in group A than group B (P<0.001). In the Pearson correlation analyze, PDW showed a strong and positive relationship with a hospital stay (r:0,651, p<0.001). Althgouh MPV showed a positive correlation with a hospital stay, and this was not as strong as PDW in the umbilical hernia.

DISCUSSION

In recent reports, platelets and their effects attract attention as well-known[7,11]. The ability of platelets to affect other cells and morphological changes due to chronic inflammatory response may have an indicator role in the pathophysiology of many diseases[14]. In order to lessen hospital stay duration, an inflammatory based indicator might be useful. We showed the possible indicator effect of platelet distribution width for the hospital stay in incarcerated inguinal hernia which we treated with grafted by open surgery.

Platelet indexes, mean platelet volume, and platelet distribution width are a set of platelet parameters as part of the automated whole blood count and are the biological marker of platelet activation[10]. New evidence suggests that platelet indices may have diagnostic and prognostic value in some diseases. They allow extensive clinical trials that focus on diagnosis and prognostic values in a variety of settings without extra cost[6,9,13,15]. Measuring all of the platelet indices at the same time can provide a valid tool for measuring the severity of the disease and an idea of the potential etiology that causes a change in platelet indices. Recent studies have highlighted the role of platelet indices in thrombosis, angiogenesis, inflammation, and immunity. It has diagnostic value in some inflammatory diseases such as inflammatory bowel diseases, ulcerative colitis, and soon[7,13,16].

In incarcerated hernia that was treated by open surgery, post-operative pain, recurrence, expensive technique, type of anesthesia and time to return to work are among the topics discussed[17]. In addition to increased morbidity and mortality rates in the hernia, a delay in the treatment of strangulated external hernias is associated with extended hospital stays and an increased need for intensive care, thereby resulting in increased health costs[18]. Kahramanca et al., showed high PDW and MPV values in the patients with an incarcerated hernia[19]. In their study, they did not find any correlation between clinical factors and WBC parameters. According to our results, the mean defect size was 25.3±17 mm for inguinal hernia, which ranged 6 to 75 mm. Hospital stay was as 6.1±3 days. As similar to this study, we found PDW and MPV increased. In contrast, we reported a significant correlation with PDW and hospital stay of these patients in our study.

The study has some limitations. First, we performed the study as retrospective analyze and inadequate numbers. Secondly, any clinical data we could not analyze due to missing data from many patients was another limitation. To further investigate this issue, novel studies should be designed in a prospective randomized experimental approach with higher participants to reach more significant outcomes.

The ability of platelets to affect other cells and morphological changes due to chronic inflammatory response may play a role in an incarcerated inguinal hernia, as well as the pathophysiology of many

diseases. In order to lessen hospital stay duration, an inflammatory based indicator might be useful. We suggest that a strong positive correlation of platelet distribution width with hospital stay can be useful in incarcerated inguinal hernia which we treated with grafted by open surgery.

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