

## Relationship between adolescent varicocele and mean platelet volume

### *Adölesan varikozel ile ortalama trombosit hacminin ilişkisi*

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#### ABSTRACT

**Aim:** The aim of this study is to investigate the relationship between adolescent varicocele and mean platelet volume (MPV).

**Material and Method:** Fifty nine healthy cases who applied for routine controls and 43 patients with Grade 3 varicocele aged from 11 to 19 years were included in study as Group 1 and Group 2, respectively. MPV values of both groups were statistically compared.

**Results:** Between January 2012 and February 2018, a total of 102 cases were included in the study. The mean age of the cases was 15.12±2.12 years. The mean ages of the cases in Groups 1 and 2 were 15.07±2.18 and 15.19±2.06 years, respectively. No statistically significant difference was found between the two groups in terms of mean ages and their distribution ( $p > 0.05$ ). MPV values for Groups 1 and 2 were 8.09 ± 0.69 and 9.65 ± 1.6, respectively. MPV values measured in Group 2 were significantly higher than group 1 ( $p < 0.001$ ).

**Conclusion:** In our study, there was a significant relationship between adolescent varicocele and MPV. We believe that MPV elevation can be used as a guide in future studies performed on varicocele pathophysiology.

**Keywords:** Adolescent, varicocele, mean platelet volume

#### ÖZ

**Amaç:** Bu çalışmada adölesan varikozel ile ortalama trombosit hacmi (MPV) arasında ilişkinin araştırılması hedeflenmiştir.

**Gereç ve Yöntem:** Çalışmaya rutin kontroller için başvuran 59 olgu ve 11-19 yaş arası grade 3 varikozeli olan 43 hasta sırasıyla Grup 1 ve Grup 2 olarak dahil edildi. Her iki grup arasında yaş ortalamaları ve dağılımları açısından istatistiksel olarak farklılık yoktu. Her iki grubun MPV değerleri istatistiksel olarak karşılaştırıldı.

**Bulgular:** Ocak 2012 ve Şubat 2018 tarihleri arasında kliniğimize başvuran 102 olgu çalışmaya dahil edildi. Olguların yaş ortalaması 15.12 ± 2.12 yıl idi. Her iki grup arasında yaş ortalamaları ve dağılımları açısından istatistiksel farklılık izlenmedi ( $p > 0.05$ ). Grup 1 ve 2 için yaş ortalamaları sırası ile 15.07±2.18 ve 15.19±2.06 idi. Grup 1 ve 2 için MPV değerler sırası ile 8.09±0.69 ve 9.65±1.6 olarak hesaplandı. Grup 2'de ölçülen MPV değeri grup 1 göre istatistiksel olarak anlamlı olarak yüksek izlendi ( $p < 0.001$ ).

**Sonuç:** Çalışmamızda adölesan varikozel ile MPV arasında anlamlı ilişki olduğu gösterilmiştir. Gelecekte varikozel patofizyoloji hakkında yapılacak yeni araştırmalarda MPV yüksekliğinin bir rehber olarak kullanılabilceğini düşünmekteyiz.

**Anahtar Kelimeler:** Adölesan, varikozel, ortalama trombosit hacmi

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## INTRODUCTION

Varicocele is the varicose dilatation of pampiniform plexus veins. It is observed in 10-15% of the general population and in 19-41% of primary infertile cases. Its incidence in secondary infertile cases is 53-80 percent. This vascular lesion of the genitourinary system is the most commonly corrected pathology of male infertility (1). On the other hand, the prevalence of varicocele shows significant changes among age groups when clinical studies performed in previous years were reviewed (1,2). In children under 10 years of age, varicocele is rarely seen and its frequency increases towards adolescent period. In a study conducted by Akbay et al. (3), in our country the prevalence of varicocele was reportedly 0.9% in boys under 10 years of age and 11% in adolescent boys aged 11-19 years. The most valuable diagnostic method in the management of varicocele is the genitourinary system examination. Today, the classification system described by Dublin, and Amaral in 1970 p based on physical examination findings is being used in urology clinics. According to this classification grades of varicoceles were defined as follows: Grade 1; palpable only during Valsalva maneuver; Grade 2, palpable during rest without the need for Valsalva maneuver, and Grade 3 palpable and visible varicocele during rest (4). Nowadays, although many theories have been put forward to explain the causes of varicocele, it is still not fully elucidated.

Platelets are small, discoid shaped specialized blood cells without nuclei. Their main function is to provide hemostasis (5). MPV is often used as an easy and inexpensive parameter to evaluate platelet morphology during routine blood counts. This value equals to the ratio between plateletcrit value which is obtained by dividing platelet volume by whole blood volume and total number of whole blood volume (6). Nowadays MPV is being calculated automatically by automated blood cell counters, and documented among the hemogram test results thanks to advancing medical technology (7). MPV activity is considered as an indicator of platelet activity and higher MPV values indicate the presence of more reactive and large platelets. MPV has been shown to be associated with many clinical pathologies such as cardiovascular diseases, diabetes mellitus, ankylosing spondylitis, rheumatoid arthritis, familial Mediterranean fever (8-11).

However, when we look at previous studies, there is a very limited number of publications evaluating MPV levels in adolescents with varicocele. In this

retrospective study, we aimed to evaluate the relationship between MPV and adolescent varicocele

## MATERIAL AND METHOD

Between January 2012 and February 2018, 43 patients with Grade 3 varicocele aged from 11 to 19 years, and for the control group 59 healthy cases who applied for routine controls were evaluated retrospectively. A total of 102 cases included in the study were divided into two groups as follows: Group 1; control group, and Group 2 patients diagnosed as having only grade 3 varicocele. All data were obtained by retrospectively analyzing the files. Only patients whose data were fully recorded were included in the study. Patients with obesity, hyperlipidemia, type-1 diabetes mellitus, lymphoma, leukemia, immune thrombocytopenic purpura, Fanconi anemia, Bernard-Soulier syndrome, history of splenectomy, tuberculosis, active infection findings, those receiving nonsteroidal anti-inflammatory, anticoagulant, antiplatelet therapy were not included in the study. Testes smaller than  $> 2$  ml or  $>20\%$  when compared with the contralateral testis, were accepted as hypoplastic testes and these patients were excluded from the study.

Varicocele was diagnosed only by physical examination. Patients who were considered to have testicular abnormality detected during physical examination were also evaluated by scrotal ultrasonography and/or orchidometer. Demographic data and complete blood count parameters of all patients were examined. Complete blood count analysis was performed with the same device that was checked and maintained at regular intervals (Mindray BC-6800, China). The MPV values determined by this device for each patient were recorded. In the study, the reference range for the MPV value of the device on which the data was analyzed was 7.5-12.1 femtoliter (fL). The study was approved by Local Ethics Committee (Tokat, 2018 November, Confirmation number: 18-KAEK-269)

## Statistical Analysis

Descriptive statistics have been made in order to obtain information about the general characteristics of the study. Data of continuous variables were given as arithmetic mean and standard deviation. The conformity of continuous variables to normal distribution was investigated by Kolmogorov Smirnov test. Data with  $p \leq 0.05$  were considered to fit to normal, and those with  $p > 0.05$  deemed to have non-normal distribution. The variables that meet the normal distribution were compared with "independent samples

t-tests” and those with non-normal distribution with Mann Whitney U test. P values less than 0.5 were considered to be statistically significant. Calculations were performed using a statistical software (IBM SPSS Statistics 21, SPSS Inc., an IBM Co., Somers, NY) program.

## RESULTS

The mean age of 102 patients included in the study was  $15.12 \pm 2.12$  years. The mean ages of the patients in Groups 1 and 2 were  $15.07 \pm 2.18$  and  $15.19 \pm 2.06$ , respectively. There was no significant difference between the two groups in terms of the mean age ( $p > 0.05$ ). When the patients in Group 2 were evaluated, 38 patients had left and 5 patients had bilateral varicoceles. Isolated right varicocele was not observed in any patients. Only 11 of the patients in Group 2 were symptomatic and the main admission complaint was scrotal pain. The remaining 32 patients were diagnosed during routine physical examination. In our study, the mean MPV value of the patients was  $8.75 \pm 1.39$ . For Group 1 and 2, these values were  $8.09 \pm 0.69$  and  $9.65 \pm 1.6$ , respectively. MPV values measured in Group 2 were significantly higher relative to Group 1 ( $p < 0.001$ ).

## DISCUSSION

When we look at current literature, it is seen that varicocele was defined in very ancient times. When evaluated within this context, it is understood that varicocele was firstly defined by Roman Celsus in the first century AD, and the first varicocelectomy operation was performed by French surgeon Delpech about two centuries ago (12,13). Varicocele, known as backflow of blood within testicular veins and known as dilatation of plexus pampiniformis veins may cause loss of testicular volume, impaired sperm quality and reduced Leydig cell function. This condition is closely related to testicular dysfunction and infertility (14). In the adolescent period, it is mostly asymptomatic and rarely seen in association with scrotal pain. Its incidence increases with puberty. Approximately 20% of affected adolescents experience fertility problems later in life. The gold standard treatment is the surgical approach that involves ligation or occlusion of internal spermatic veins (13-15).

Although the pathophysiology of varicocele has not been fully elucidated, many different opinions have been discussed. For example, left testicular vein drains directly into left renal vein, while right testicular vein enters obliquely into inferior vena cava. Besides, right spermatic vein is about 8-10 cm shorter

than its counterpart, and testicular vein is devoid of adequate valvular system. In addition, left kidney vein is compressed between the aorta and upper mesenteric artery leading to partial occlusion of the testicular veins (nutcracker phenomenon) (13,16). However, in many clinical studies conducted in the past years, varicocele has been shown to have systemic reflections beyond local disease and may be associated with many different vascular pathologies. Kilic et al. (17) evaluated 152 patients, 52 of whom were diagnosed with varicocele and concluded that the presence of peripheral varicose veins positively correlated with varicocele. Similarly, the study by Yetkin et al. (18) showed that the prevalence of varicocele in patients with coronary artery ectasia increased. In another study, Koyuncu et al. (19) concluded that there was a statistically significant relationship between primary varicocele and saphenofemoral junction insufficiency. Similar results have also been reported in many studies examining the association between saphenofemoral junction insufficiency and varicocele (20,21).

Platelets are cell fragments of 1-3 micron in diameter originating from megakaryocytes, the largest cells of the hematopoietic system (22,23). The primary task of these cells is to stop bleeding after damage in the tissue or vascular endothelium (24). Apart from that, they have very different roles in inflammation, immunity and angiogenesis (23). Large platelets are more active metabolically and enzymatically than those of small size. They also have a stronger prothrombotic potential (25). MPV is a measure of the mean platelet size in the bloodstream and does not reflect the variation in the platelet size observed microscopically. Increased value of MPV in vascular pathologies such as coronary artery disease, peripheral vascular disease and cerebrovascular disease has been demonstrated in many studies conducted within the past years. The most important part of these clinical analyzes is that serum thrombopoietin level, which is secondary to increased platelet consumption, induces proliferation of megakaryocytes. Thus, it is thought that MPV value is increased by release of activated larger immature platelets into the circulation from bone marrow (26-29). Dilatation of the pampiniform plexus veins is also a vascular disorder. In this context, researchers have examined the link between MPV value and varicocele in the past. The first study that revealed the relationship between varicocele and MPV was performed by Bozkurt et al (30). In their study, a total of 117 cases with 60 varicoceles were examined and MPV values were significantly higher in patients with varicocele compared to the control group. In the same study, a positive correlation was found between grade of va-

ricoccele and MPV value. In a similar study, Çoban et al. (31) who evaluated a total of 484 cases with 264 varicoceles reported that the MPV value was significantly higher in patients with varicocele compared to the control group. However, in the same study, any statistically significant relationship could not be established between MPV value and spermatic vein diameter and grade of the varicocele. In another study by Çoban et al. (32), MPV values measured in the preoperative and postoperative 6th months of the patients who underwent varicocelectomy were compared. As a result of the study, the researchers reported a decrease in MPV value after varicocelectomy operation. In another study in which MPV levels of patients with varicocele and healthy subjects were analyzed, Mahdavi-Zafarghandi et al. (33) concluded that MPV values were higher in patients with varicocele. Unlike previous studies, Camoglio et al. (34) evaluated the relationship between varicocele and MPV in young and adult patients. In their study, they found a positive relationship between varicocele and MPV only in the adult group. Nevertheless, in a study by Okçelik et al. (35), researchers could not find a significant association between MPV and varicocele. In our study, a statistically significant correlation was found between high MPV and varicocele.

### Limitations of the study

Limitations of the study can be summarized as follows: The analysis of the data was performed retrospectively and only patients with grade 3 varicocele were included in the study.

### CONCLUSION

According to the results obtained in our study, there was a statistically significant positive relationship between adolescent varicocele and MPV. In this context, we believe that MPV elevation may be a guiding marker in the investigation of the varicocele pathophysiology. However, we believe that it would be very beneficial to support our results with prospective, multicentre and controlled studies.

### DECLARATION OF CONFLICTING INTERESTS

The author declared no conflicts of interest with respect to the authorship and/or publication of this article.

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