

The Role of Hematologic Parameters in Predicting Orchiectomy for Testicular Torsion

Cengiz Çanakçı, Erdinç Dinçer, Orkunt Özkaptan, Medet Sevinç, Bilal Eryıldırım

Department of Urology, Health Sciences University, Kartal Dr. Lutfi Kırdar City Hospital, Istanbul, Türkiye

Submitted: 2024-02-20

Accepted: 2024-06-26

Correspondence

Cengiz Çanakçı, MD

Kartal Dr. Lutfi Kırdar City Hospital

D100 Güney Yanyol Cevizli 34890

Kartal / İstanbul / Türkiye

E-mail: cengizcanakci@hotmail.com

ORCID

C.Ç. [0000-0002-2654-1986](https://orcid.org/0000-0002-2654-1986)

E.D. [0000-0002-0644-8282](https://orcid.org/0000-0002-0644-8282)

O.Ö. [0000-0003-3659-1319](https://orcid.org/0000-0003-3659-1319)

M.S. [0009-0007-3484-397X](https://orcid.org/0009-0007-3484-397X)

B.E. [0000-0002-2213-3985](https://orcid.org/0000-0002-2213-3985)

Abstract

Objective: Testicular torsion is an urological emergency that requires early intervention. When torsion is diagnosed late, the possibility of organ loss increases. In this study, we investigated the role of preoperative hematological parameters in predicting orchiectomy.

Material and Methods: A total of 136 patients who had undergone surgery due to testicular torsion were included in this study. Patients are divided into two groups as orchiectomy (n=48) and testicular fixation (n=88). The groups were compared with age, neutrophil/lymphocyte ratio (NLR), platelet/lymphocyte ratio (PLR), platelet count (PLT), mean platelet volume (MPV), neutrophil count, lymphocyte count, symptoms of duration, side and the degree of torsion.

Results: The mean age was 18.2 ± 9.6 in orchiectomy group and 17.2 ± 6.1 in testicular fixation group ($p=0.569$). The symptoms of duration was statistically higher in orchiectomy group (57.4 ± 35.7 vs. 8.7 ± 7.4 ($p=0.001$)). NLR was 5.03 ± 2.93 in orchiectomy group and 6.72 ± 3.51 in testicular fixation group ($p=0.005$). MPV was found to be significantly higher in the orchiectomy group ($p=0.001$). There were no differences between the groups in terms of the PLR ($p=0.137$), PLT ($p=0.251$), neutrophil count ($p=0.309$) and lymphocyte count ($p=0.895$). In multivariate analysis, the degree of torsion and the duration of symptoms were found to be predictive for orchiectomy ($p=0.003$, $p<0.001$).

Conclusion: Many studies have reported that preoperative haematological parameters predict orchiectomy. However, no predictive factor was found in our study.

Keywords: Testicular Torsion, Orchiectomy, Hematological Parameters.

INTRODUCTION

Testicular torsion is an emergency condition characterized by the rotation of spermatic cord around itself and has incidence of 1/4000 of men under the age of 25 (1). As a result of torsion, testicular blood supply is impaired, ischemia occurs and the risk of infertility increases (2). The possibility of testicular ischemia is depends on the duration of symptoms (1). It is

diagnosed with physical examination and scrotal doppler ultrasonography. If intervention occurs within the first 6 hours after the onset of torsion, the possibility of undergone orchiectomy decreases, whereas if it continues longer than 12 hours, the orchiectomy rate increases dramatically (3,4). 31-41% of cases result in orchiectomy and it may cause severe consequences such as decreased fertility rate, hormonal

Cite; Çanakçı C, Dinçer E, Özkaptan O, Sevinç M, Eryıldırım B. The Role of Hematologic Parameters in Predicting Orchiectomy for Testicular Torsion. New J Urol. 2024;19(2):90-94. <https://doi.org/10.33719/nju1439058>

dysfunction and psychological trauma (5).

The most important parameters that affecting recovery is the onset of symptoms and depends entirely on the information given by patient. Patients are mainly at pediatric ages and the time of onset of symptoms is subjective (6). Besides that, it prolongs the process of application to clinic because the teenagers do not consent to genital area examination (7).

Some studies in the literature have indicated that haematological parameters may be useful in predicting testicular viability in the presence of testicular torsion. Neutrophil-Lymphocyte Ratio (NLR) is a simple blood test result that has proven predictive role in many disorder and has become more popular lately. It is an inflammation parameter and has previously been used to differentiate between testicular torsion and epididymitis (1,8). In this study, we aimed to investigate the results of hematological parameters in predicting the orchiectomy in testicular torsion in a large population.

MATERIAL AND METHODS

The patients' data who had undergone orchiectomy or testicular fixation due to testicular torsion between January 2013 and January 2023 were analyzed retrospectively. The patients' age, side, duration of symptoms, medical and surgical history, the degree of torsion and preoperative hematological parameters were evaluated. The patients with the history of previous scrotal surgery, diagnosed epididymitis within 1 month and neonatal torsion were excluded. Patients who were initially diagnosed preoperatively with torsion but subsequently found not to have torsion during exploration were excluded from the study. one hundred-thirty six patients who diagnosed testicular torsion via both physical examination and scrotal doppler ultrasonography were included the study. In the patients, the testicle which appeared ischemic during scrotal exploration, was detorsioned and warm physiological saline was applied and waited for 15 minutes. Orchiectomy or testicular fixation was performed according to reperfusion. A complete blood count analysis was conducted preoperatively on all patients, with the recorded values for lymphocyte count, neutrophil count, platelet count (PLT), and mean platelet volume (MPV). The NLR and platelet-to-lymphocyte ratio (PLR) were subsequently calculated.

This study was achieved accordance to Helsinki Declaration (193/2013), approved by our Institutional Review Board (2020/514/184/2), and written informed consent was obtained from all patients before the treatment.

Statistical analysis

For descriptive statistics, mean, standard deviation and frequency were used. The Kolmogorov-Smirnov test was used to test the distribution of the variables. Quantitative data were compared using independent samples t-test and Mann-Whitney U-test. Chi-Square was used to compare qualitative data. Multivariate logistic regression analysis was performed to investigate variables which might be predictive for orchiectomy. Variables included symptom duration, testicular torsion angle, NLR, PLT, PLR, MPV. SPSS 26.0 was used for statistical analyses.

RESULTS

A total of 88 patients who had undergone testicular fixation and 48 patients who had undergone orchiectomy were compared. The demographic data of the patients and perioperative parameters are given in Table 1. The mean age was 18.2 ± 9.6 for orchiectomy group and 17.2 ± 6.1 for testicular fixation group ($p=0.569$). No differences were observed in the side and previous inguinal surgery history between the groups. ($p=0.076$, $p=0.770$ respectively). Time to surgery was significantly higher in the orchiectomy group (57.5 ± 35.7 vs. 8.7 ± 7.4) ($p=0.001$). Degree of torsion is statistically higher in the orchiectomy group ($p<0.001$).

No statistically differences were observed between the groups with regard to the PLT ($p=0.251$), neutrophil count ($p=0.309$) and lymphocyte count ($p=0.895$) (Table-2). PLR value was similar in both groups (149.8 ± 60.6 vs. 178.4 ± 105.4 respectively) ($p=0.137$). NLR was 5.03 ± 2.93 in orchiectomy group and 6.72 ± 3.51 in testicular fixation group. It was found to be significantly higher in testicular fixation group ($p=0.005$). MPV was found to be significantly higher in orchiectomy group than testicular fixation group ($p=0.001$) (8.81 ± 1.1 , 8.19 ± 0.94 , respectively). In multivariate analysis, while the degree of torsion and the duration of symptoms were found to be predictive for orchiectomy preoperatively; MPV and NLR didn't have predictive roles for orchiectomy (Table-3).

Table 1. Patient characteristics and peroperative data

	Orchiectomy mean±Sd / min-max	Orchiopexy mean±Sd / min-max	p value
Age	18.2 ± 9.6 / 4-34	17.2 ± 6.1 / 3-36	0.569
Laterality: Right (n/%)	25 (52)	32 (36)	0.076
Left (n/%)	23 (48)	56 (64)	
Symptom duration (h)	57.5 ± 35.7 / 3-160	8.7 ± 7.4 / 2-48	0.001
Previous inguinal surgery (n/%)	8 (16)	13 (14)	0.770
Testicular torsion angle (n/%)			<0.001
0-180	4 (8)	38 ((43)	
-360	21 (44)	37 (42)	
-540	11 (23)	9 (10)	
-720	9 (19)	4 (5)	
-1080	3 (6)	0	

Table 2. Hematologic parameters of the study groups

	Orchiectomy mean±Sd / min-max	Orchiopexy mean±Sd / min-max	p value
Lymphocyte (10 ³ /μL)	1.99 ± 0.73 / 6.8-19.4	1.97 ± 1.12 / 5.3-29.7	0.895
Neutrophil (10 ³ /μL)	8.8 ± 2.9 / 3.5-16	9.5 ± 3.6 / 2-19.3	0.309
PLT (10 ³ /μL)	266.0 ± 52.2 / 165-367	284.4 ± 87.7 / 140-550	0.251
NLR	5.03 ± 2.93 / 1,2-13	6.72 ± 3.51 / 0.8-16.2	0.005
PLR	149.8 ± 60.6 / 69,7-327	178.4 ± 105.4 / 46.9-507.7	0.137
MPV(μm ³)	8.81± 1.1 / 6.9-11.2	8,19± 0,94 / 6.5-10.9	0.001

PLT:platelet count; NLR:neutrophil to lymphocyte ratio; PLR:platelet to lymphocyte ratio; MPV:mean platelet volume

Table 3. Multivariate analysis results

	Odds ratio	%95 CI	P value
Symptom duration	0.833	0.757-0.917	<0.001
Testicular torsion angle	0.199	0.070-0.568	0.003
MPV	0,577	0.169-1,968	0,380
NLR	1.025	0.601-1.749	0.959
PLR	0.996	0.974-1.019	0.767
PLT	0,997	0.980-1.015	0.764

PLT:platelet count; NLR:neutrophil to lymphocyte ratio; PLR:platelet to lymphocyte ratio; MPV:mean platelet volume

DISCUSSION

In this study, it was investigated whether hematological parameters had a role in predicting orchiectomy in patients admitted due to testicular torsion.

Complete Blood Count (CBC) is a rapid test used routinely before the surgery. Various parameters in the CBC is used in the diagnosis and follow-up of many diseases (9). Although these parameters vary in acute or chronic cases, they can provide important information about the course of diseases. These parameters have recently been examined in testicular torsion, which is an acute inflammatory condition. Numerous studies have reported that hematological parameters can be used in the differential diagnosis of testicular torsion (2,10).

In a study that published in 2015, 75 patients diagnosed with torsion were compared with 56 healthy male patients. In this retrospective study, NLR, PLR and PLT values were higher in TT group. Besides that, NLR was found to be higher in patients with duration of symptoms more than 12 hours (2). In a study published in 2019, the data of 60 patients who had undergone surgical exploration with a diagnosis of torsion were retrospectively examined and orchiectomy was performed in 38 of these patients, testicular fixation was performed in 22. In this study, NLR ($p<0.001$), PLR ($p=0.01$) and WBC ($p=0.01$) values were found to be significantly higher in orchiectomy group but PLT was similar between the two groups ($p=0.28$). It is reported that NLR and the duration of symptoms has a predictive role (11). Chen et al. compared the results of 43 patients who had underwent orchiectomy, 124 patients who underwent orchiopexy, and 100 control patients, retrospectively. NLR and PLR values were found to be statistically higher in orchiopexy group but PLT value was found to be similar ($p=0.204$) (12). Meder et al. compared orchiopexy ($n=61$), orchiectomy ($n=27$) and the control groups ($n=56$). NLR was found to be statistically lower in control groups but there was no difference between orchiectomy and orchiopexy groups (13). In our study, NLR was found to be statistically higher in orchiectomy group. However, degree of torsion and symptom duration were found to be predictive, while NLR was not found to be predictive in multivariate analysis.

MPV is an indicator of platelet activation. Studies shown that MPV can be used in the diagnostic process of various inflammatory and vascular disorders. In a study, Çiçek et al. compared TT and healthy control group. MPV was found to be higher in TT group (8.3 ± 1.2 vs. 7.1 ± 0.8 , $p<0,001$) (2).

In another study which they compared the hematological parameters of 19 patients with testicular torsion, MPV found to have predictive role of testicular viability in patients with symptoms lasting less than 6 hours (14). In a retrospective study, He et al. compared orchiopexy ($n=54$) and orchiectomy ($n=58$) patients and it is found that MPV value was significantly higher in orchiectomy group. MPV was reported to be a predictive parameter in predicting orchiectomy in TT (10). In a study reported by Güneş et al, testicular torsion patients and healthy patients as control group were compared and no significant difference was found between the groups in terms of MPV (2). In another study, patients who had undergone orchiectomy and orchiopexy were compared and no difference was found between the groups in terms of MPV (12). In the present study, MPV value was found to be higher in orchiectomy group. However, it was not found to be predictive for orchiectomy in multivariate analysis. When all these findings are evaluated, the role of MPV in diagnosing torsion and predicting orchiectomy is still controversial.

The most important predictive parameter for testicular viability in testicular torsion is duration of symptoms. In some studies, it was found that the degree of testicular rotation was also predictive of testicular viability (10,12). Similarly, in our study, symptom duration and degree of testicular rotation were significantly higher in the orchiectomy group. In the regression analysis, it was found to be a predictive factor for orchiectomy.

We have two limitations in this study. First, the nature of study is retrospective. Torsion is an emergency disease that requires urgent intervention, so the patients were examined by different surgeons and scrotal doppler ultrasound was performed by different radiologists. Secondly, other inflammatory parameters such as sedimentation and CRP could not be evaluated for some patients and could not be included in this study.

CONCLUSIONS

CBC is a cheap, rapid simple blood test. Hematological parameters may be an independent variable for diagnosing testicular torsion and predicting testicular ischemia. However, the definitive diagnosis is still performed with scrotal exploration and the experience of the surgeon. Prospective studies with large population are essential to reaching certain conclusions.

Conflict of interest: The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

Funding / support: The authors report no involvement in the research by the sponsor that could have influenced the outcome of this work.

Ethics Committee: Ministry of Health Kartal Dr Lütfi Kırdar City Hospital Clinical Research Ethics Committee, Date: 26.08.2020, Decision No: 220/514/184/2.

REFERENCES

1. Zhu J, Song Y, Chen G, et al. Predictive value of haematologic parameters in diagnosis of testicular torsion: Evidence from a systematic review and meta-analysis. *Andrologia*2020;52(2):e13490. <https://doi.org/10.1111/and.13490>.
2. Güneş M, Umul M, Altok M, et al. Predictive role of hematologic parameters in testicular torsion. *Korean Journal of Urology*2015;56:324-329. <https://doi.org/10.4111/kju.2015.56.4.324>.
3. Boettcher M, Bergholz R, Krebs TF, Wenke K, Aronson DC. Clinical predictors of testicular torsion in children. *Urology*2012;79:670-4. <https://doi.org/10.1016/j.urology.2011.10.041>.
4. Bowlin PR, Gatti JM, Murphy JP. Pediatric testicular torsion. *SurgClinNorthAm*2017;97:161-72. <https://doi.org/10.1016/j.suc.2016.08.012>.
5. Bodiwala D, Summerton DJ, Terry TR. Testicular prostheses: development and modern usage. *AnnRCollSurgEngl*2007;89:349-53. <https://doi.org/10.1308/003588407X183463>.
6. Rampaul MS, Hosking SW. Testicular torsion: most delay occurs outside hospital. *Ann R Coll Surg Engl* 1998;80:169-72.
7. Nasrallah P, Nair G, Congeni J, Bennett CL, McMahon D. Testicular health awareness in pubertal males. *J Urol* 2000;164:1115-7. <https://doi.org/10.1097/00005392-200009020-00049>.
8. Bitkin A, Aydın M, Özgür BC, et al. Can haematologic parameters be used for differential diagnosis of testicular torsion and epididymitis? *Andrologia*2018;50(1). <https://doi.org/10.1111/and.12819>.
9. Cicek T, Togan T, Akbaba K, Narci H, Aygun C. The value of serum mean platelet volume in testicular torsion *J Int Med Res.*2015;43(3):452-9. <https://doi.org/10.1177/0300060514558898>.
10. He M, Zhang W, Sun N. Can haematologic parameters be used to predict testicular viability in testicular torsion? *Andrologia.*2019;51:e13357. <https://doi.org/10.1111/and.13357>.
11. Jang JB, Ko YH, Choi JY, et al. Neutrophil-Lymphocyte Ratio Predicts Organ Salvage in Testicular Torsion with Marginal Diagnostic Delay. *World J Mens Health*2019;37:99-104. <https://doi.org/10.5534/wjmh.180049>.
12. Chen P, Huang W, Liu L, et al. Predictive value of hematological parameters in testicular salvage: A 12-year retrospective review *Front. Pediatr.*2022;10:989112. <https://doi.org/10.3389/fped.2022.989112>
13. Merder E, Bozkurt M, Ariman A, et al. Comprehensive examination of haematological parameters of patients operated due to testicular torsion *Andrologia*2020;52:e13674. <https://doi.org/10.1111/and.13674>.
14. Peretti M, Zampieri N, Bertozzi M, et al. Mean platelet volume and testicular torsion: new findings. *Urol J.*2019;16:83–5. <https://doi.org/10.22037/uj.v0i0.4042>