

# Diagnostic Value of immature granulocytes and neutrophil-to-lymphocyte ratio in differentiating epididymo-orchitis from testicular torsion

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## ABSTRACT

**BACKGROUND:** Testicular torsion is an important urologic emergency, and early identification is crucial. This study aimed to evaluate the diagnostic value of hematological parameters—particularly immature granulocytes (IGs) in differentiating epididymo-orchitis from testicular torsion in patients presenting with acute scrotal pain.

**METHODS:** This retrospective cohort study included 301 male patients presenting with acute scrotal pain between January 2020 and December 2024. Diagnoses were confirmed by Doppler ultrasonography or surgical exploration. Patients were classified into epididymo-orchitis (n=200), testicular torsion (n=37), and control (n=64) groups. Complete blood count parameters (WBC, neutrophil, lymphocyte, platelet, IG, NLR, PLR) were analyzed. Nonparametric tests were used for group comparisons, and ROC curve analyses were performed to determine diagnostic performance. Multivariable logistic regression adjusted for age identified independent predictors.

**RESULTS:** NLR (cut-off=2.19, AUC=0.644, p<0.001) and IG count (cut-off = 0.06, AUC=0.590, p=0.011) were significantly elevated in epididymo-orchitis compared with controls. No parameter showed diagnostic significance for testicular torsion. In the epididymo-orchitis vs torsion comparison, NLR (AUC=0.781, p<0.001) and IG count (AUC=0.730, p<0.001) demonstrated the best discriminative ability. Multivariable regression confirmed NLR (OR=1.17, 95% CI 1.05–1.31, p=0.005) and IG (OR=2.26, 95% CI 1.10–4.63, p=0.027) as independent predictors of epididymo-orchitis.

**CONCLUSION:** Immature granulocyte count and NLR are valuable and accessible hematological biomarkers that can assist in differentiating epididymo-orchitis from testicular torsion. Their integration into diagnostic evaluation may enhance clinical decision-making in the emergency management of acute scrotum.

**Keywords:** Epididymo-Orchitis; immature granulocytes; testicular torsion.

## INTRODUCTION

The term acute scrotum refers to the sudden onset of pain and swelling within the scrotal contents and represents a true urological emergency requiring rapid evaluation and management. Several conditions may account for this presentation, such as epididymo-orchitis, torsion of the testicular append-

ages, testicular torsion, trauma, inguinal herniation, or, more rarely, vasculitic disorders. The wide range of possible causes highlights the need for early and accurate evaluation. Among these, testicular torsion and epididymo-orchitis are the two most frequent causes encountered in emergency departments (EDs) and account for the majority of acute scrotal presentations. Testicular torsion, resulting from twisting of

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the spermatic cord, primarily affects adolescents and young adults and necessitates urgent surgical intervention to restore testicular perfusion. In contrast, epididymo-orchitis, an inflammation of the epididymis and testis, is usually of infectious origin and managed conservatively with antibiotic therapy. Despite their distinct etiologies and treatment approaches, both conditions present with similar clinical features, including acute scrotal pain and swelling, which can make accurate differentiation challenging in the emergency setting.<sup>[1]</sup>

Hematologic indicators, including the neutrophil-to-lymphocyte ratio (NLR), platelet-to-lymphocyte ratio (PLR), and immature granulocyte (IGs) count, have gained increasing attention as readily available, cost-effective biomarkers of systemic inflammation and tissue stress.<sup>[2]</sup> These markers offer potential utility in differentiating between ischemic and infectious pathologies, including acute scrotal conditions. Differentiating testicular torsion from epididymo-orchitis is essential due to their divergent management strategies. However, current diagnostic modalities, such as Doppler ultrasonography (US), have limitations, including operator dependency, limited accessibility, and potential delays in time-sensitive cases.<sup>[3]</sup> While previous studies have investigated the diagnostic roles of NLR and PLR in various inflammatory diseases, their utility in distinguishing between testicular torsion and epididymo-orchitis remains inconclusive. Epididymo-orchitis, due to its infectious nature, is expected to present with elevated neutrophil counts and NLRs, whereas testicular torsion, an ischemic process, may be associated with less pronounced neutrophilia but relatively increased PLRs or IGs, reflecting early myeloid activation and tissue stress responses.<sup>[4]</sup> Immature granulocytes are released into the peripheral circulation during acute infectious and inflammatory states as a result of bone marrow stimulation and accelerated myelopoiesis. Pro-inflammatory cytokines such as interleukin-6 and granulocyte colony-stimulating factor promote early release of granulocytic precursors, leading to increased immature granulocyte counts in systemic infections.<sup>[5]</sup> Among these, IGs, representing early-stage granulocyte precursors, have shown promise in various inflammatory and ischemic conditions but have been not systematically evaluated in the context of acute scrotum.<sup>[6]</sup> To date, no comprehensive study has systematically assessed the diagnostic potential of IGs in this specific clinical context.

We examined the ability of specific hematologic indicators, with a focus on immature granulocytes, to discriminate between epididymo-orchitis and testicular torsion in patients who presented with acute scrotal complaints.

## MATERIALS AND METHODS

### Study Design and Setting

This retrospective cohort study was conducted at a tertiary healthcare facility, between January 2020 and December 2024. The study protocol was approved by the Local Clinical

Research Ethics Committee (Decision No: 22; Date: February 25, 2025). Given the retrospective design and use of de-identified patient data, the requirement for prospective written informed consent was waived by the ethics committee in accordance with national regulations and the principles of the Declaration of Helsinki.

### Study Population, Inclusion and Exclusion Criteria

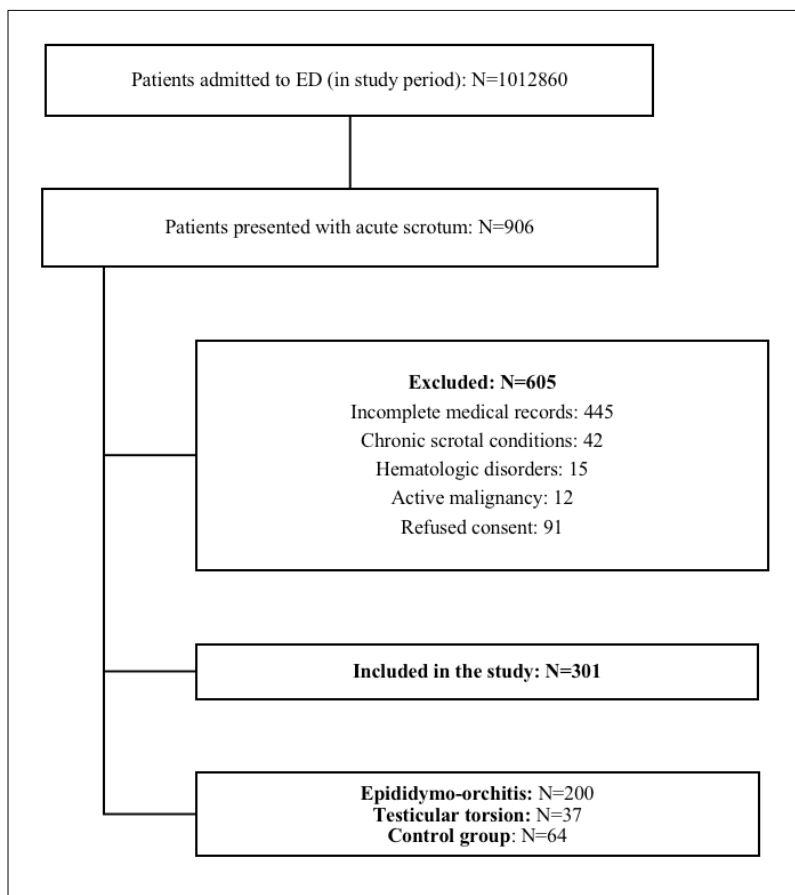
The study included a total of 301 male patients who were diagnosed with epididymo-orchitis (n=200) or testicular torsion (n=37), along with a control group of 64 individuals. Patient identification was conducted through a systematic electronic medical record query using predefined diagnostic codes for testicular torsion and epididymo-orchitis. The inclusion criteria comprised adult male patients presenting to the ED with acute scrotal pain of less than 12 hours' duration, whose diagnoses were confirmed by review of clinical notes, laboratory findings, scrotal Doppler US, and operative reports when applicable. The control group consisted of patients who presented to the emergency department with acute scrotal pain or discomfort and in whom both infectious and ischemic etiologies were excluded based on clinical assessment, laboratory findings, and scrotal Doppler ultrasonography. These patients were ultimately diagnosed with non-specific or self-limiting scrotal conditions and did not require surgical or antimicrobial treatment (Figure 1). The study included all consecutive eligible patients during the predefined study period. The study period was determined a priori and was not influenced by sample size considerations. No retrospective expansion of the dataset was performed to achieve a target number of cases. A post hoc power analysis was performed solely to describe the statistical power of the final cohort and did not influence study design, case inclusion, or data collection. Exclusion criteria were the presence of chronic scrotal conditions, hematologic disorders, active malignancy, or incomplete medical records.

### Data Collection

The primary laboratory variables assessed were leukocyte ( $\times 10^3/\mu\text{L}$ ), neutrophil ( $\times 10^3/\mu\text{L}$ ), lymphocyte ( $\times 10^3/\mu\text{L}$ ), platelet ( $\times 10^3/\mu\text{L}$ ), and IG ( $\times 10^3/\mu\text{L}$ ) counts.

Derived hematological ratios were also calculated, including the NLR and PLR. The NLR was calculated as the ratio of absolute neutrophils to lymphocytes, PLR was determined by expressing platelet numbers in relation to lymphocyte counts. The IG count represented the absolute number of immature granulocytes, automatically measured as part of the complete blood count (CBC) analysis.

Clinical data, including age, comorbidity profiles, and current medications, were retrieved from the hospital's electronic medical records. CBC results were generated through an automated hematologic analyzer (Sysmex XN-1000; Sysmex Corporation, Kobe, Japan), with daily calibration and internal quality controls performed according to the manufacturer's recommendations to ensure analytical reliability. Data collec-



**Figure 1.** Patient flow diagram.

tion followed a standardized protocol to minimize measurement bias and maintain data integrity.

### Statistical Analysis

All statistical procedures were conducted using IBM SPSS Statistics for Windows, version 26.0 (IBM Corp., Armonk, NY, USA). Normality of continuous data was assessed with the Shapiro–Wilk test. Since none of the continuous variables followed a normal distribution, results were presented as medians with interquartile ranges (IQRs). Categorical variables were summarized as frequencies and percentages. Comparisons of non-normally distributed continuous data were performed using the Kruskal–Wallis test, and pairwise differences were examined with the Dwass–Steel–Critchlow–Fligner (DSCF) post hoc method. Relationships between categorical variables were evaluated using either the chi-square test or Fisher’s exact test, depending on suitability.

Diagnostic accuracy of complete blood count–derived parameters was examined through receiver operating characteristic (ROC) curve analyses, covering age, leukocyte count, neutrophil count, lymphocyte count, platelet count, NLR, PLR, and IG count. For each parameter, the area under the ROC curve (AUC), optimal cut-off point determined by the Youden index, sensitivity, and specificity were calculated to-

gether with 95% confidence intervals (CIs). To explore independent predictors distinguishing epididymo-orchitis from testicular torsion, multivariable logistic regression analyses were performed using a backward stepwise elimination strategy, with age retained in all models as a mandatory covariate. Variables yielding  $p < 0.05$  in univariate testing were entered into the initial multivariable model. Results were reported as odds ratios (ORs) with corresponding 95% CIs.

To identify independent predictors of epididymo-orchitis and testicular torsion, multivariable logistic regression analyses were conducted using a backward stepwise elimination method, with age entered as a forced covariate in all models. Only variables with  $p < 0.05$  in univariate analyses were included in the initial model. Results were expressed as odds ratios (ORs) with 95% CIs. Model performance was evaluated using the AUC of predicted probabilities and McFadden’s pseudo- $R^2$ . Statistical significance was defined as a two-tailed  $p$ -value  $< 0.05$ .

## RESULTS

A total of 301 patients were included in the analysis, comprising 200 with epididymo-orchitis, 37 with testicular torsion, and 64 controls. Baseline characteristics of the study groups

**Table 1.** Baseline characteristics of the study population

Parameter	Total (n=301)	Epididymo-orchitis (n=200)	Testicular torsion	Control (n=37)	p-value* (n=64)
Age (years), median (IQR)	39 (25-58)	43 (28-61)	25 (21-35)	38 (23-49)	<0.001
Leukocyte count ( $\times 10^3/\mu\text{L}$ ), median (IQR)	10.9 (8.4-14.5)	12.2 (9.3-15.7)	11.1 (8.6-14.9)	8.3 (7.1-9.4)	<0.001
Neutrophil count ( $\times 10^3/\mu\text{L}$ ), median (IQR)	7.4 (5.0-11.5)	9.0 (5.9-12.3)	7.6 (5.7-12.3)	4.9 (4.1-6.4)	<0.001
Lymphocyte count ( $\times 10^3/\mu\text{L}$ ), median (IQR)	1.99 (1.48-2.61)	1.90 (1.35-2.56)	1.88 (1.50-2.44)	2.35 (1.77-3.02)	0.012
Platelet count ( $\times 10^3/\mu\text{L}$ ), median (IQR)	247 (207-292)	253 (217-292)	244 (210-289)	242 (205-278)	0.427
IG ( $\times 10^3/\mu\text{L}$ ), median (IQR)	0.04 (0.02-0.08)	0.05 (0.02-0.08)	0.04 (0.02-0.06)	0.03 (0.02-0.04)	<0.001
NLR, median (IQR)	3.73 (2.15-6.48)	4.40 (2.59-7.82)	4.37 (2.29-6.43)	2.12 (1.54-3.42)	<0.001
PLR, median (IQR)	127 (92.5-178)	130 (95-186)	136 (110-188)	109 (77-157)	0.029

\*One-way ANOVA (Kruskal-Wallis) test; IQR: Inter Quartiler Range; IG: Immature granulocyte; NLR: Neutrophil/lymphocyte ratio; PLR: Platelet/lymphocyte ratio.

**Table 2.** Diagnostic performance of CBC parameters

Variable	Cut-off (Youden J)	Sensitivity (%)	Specificity (%)	AUC	95% CI	p-value*
Leukocyte count ( $\times 10^3/\mu\text{L}$ )						
EO vs C	9.5	70.2	55.0	0.610	0.540-0.680	0.002
TT vs C	9.8	55.0	50.5	0.540	0.450-0.630	0.290
EO vs TT	10.2	69.0	71.0	0.720	0.650-0.790	<0.001
Neutrophil count ( $\times 10^3/\mu\text{L}$ )						
EO vs C	7.2	72.0	56.3	0.625	0.555-0.695	0.001
TT vs C	7.0	52.0	56.0	0.532	0.440-0.624	0.320
EO vs TT	8.2	71.2	72.8	0.740	0.670-0.810	<0.001
Platelet count ( $\times 10^3/\mu\text{L}$ )						
EO vs C	260.0	52.0	57.5	0.545	0.470-0.620	0.210
TT vs C	258.0	50.0	50.0	0.505	0.420-0.590	0.960
EO vs TT	259.0	56.0	53.0	0.570	0.490-0.650	0.150
NLR						
EO vs C	2.19	83.7	44.9	0.644	0.577-0.711	<0.001
TT vs C	3.83	51.4	49.0	0.501	0.411-0.591	0.983
EO vs TT	3.12	70.1	76.0	0.781	0.705-0.857	<0.001
PLR EO vs C						
TT vs C	106.9	54.0	54.3	0.540	0.455-0.624	0.431
EO vs TT	117.4	59.3	55.8	0.564	0.470-0.658	0.210
IG ( $\times 10^3/\mu\text{L}$ )						
EO vs C	0.06	44.5	78.2	0.590	0.523-0.656	0.011
TT vs C	0.12	45.9	60.9	0.531	0.429-0.634	0.539
EO vs TT	0.08	65.8	74.5	0.730	0.642-0.818	<0.001

\* ROC Analysis, NLR: Neutrophil/lymphocyte ratio; PLR: Platelet/lymphocyte ratio; IG: Immature granulocyte; AUC: Area Under the Curve; CI: Confidence Interval.

are presented in Table 1. Patients with epididymo-orchitis were significantly older than those with testicular torsion

(median 43 vs. 25 years,  $p < 0.001$ , DSCF post hoc). Both disease groups exhibited higher leukocyte counts, neutrophil

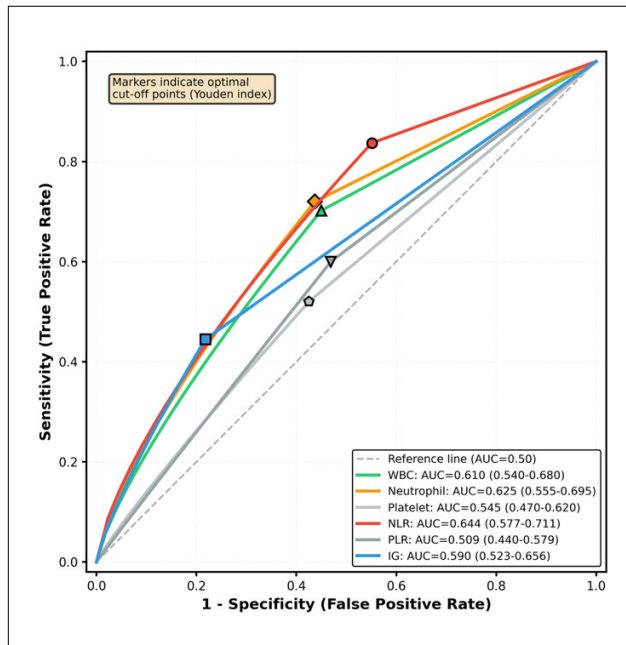


Figure 2. ROC Curves for Epididymo-orchitis vs control.

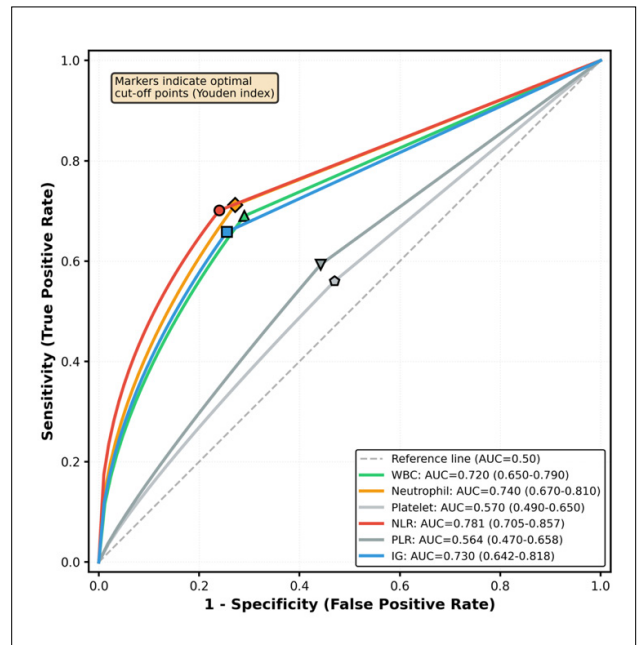


Figure 3. ROC Curves for Epididymo-orchitis vs Testicular Torsion.

counts, and NLR compared with the controls ( $p < 0.001$  for all). The IG count was also elevated in the epididymo-orchitis group compared with controls (median 0.05 vs 0.03,  $p < 0.001$ , DSCF post hoc).

ROC analyses were performed to evaluate the diagnostic performance of CBC-derived parameters in differentiating epididymo-orchitis, testicular torsion, and control groups (Table 2). For epididymo-orchitis vs control, several inflammatory markers demonstrated statistically significant diagnostic accuracy. The NLR (cut-off = 2.19) showed the highest discriminative ability (AUC=0.644 [95% CI 0.577–0.711],  $p < 0.001$ ) with a sensitivity of 83.7% and specificity of 44.9%. This was followed by the neutrophil count (cut-off= $7.2 \times 10^3$ /

$\mu\text{L}$ , AUC=0.625 [95% CI 0.555–0.695],  $p = 0.001$ ; sensitivity 72.0%, specificity 56.3%). IG count (cut-off=0.06) also demonstrated modest but statistically significant performance (AUC=0.590 [95% CI 0.523–0.656],  $p = 0.011$ ; sensitivity 44.5%, specificity 78.2%). In contrast, platelet count and PLR showed poor discriminatory ability (AUC=0.545 and 0.509, respectively;  $p > 0.05$ ). For testicular torsion vs control, none of the CBC-derived parameters reached statistical significance. All AUC values were close to 0.5, indicating poor diagnostic performance and limited utility for distinguishing torsion from healthy controls. When comparing epididymo-orchitis vs testicular torsion, the pattern was reversed. Both NLR (cut-off=3.12) and IG count (cut-off=0.08) exhibited strong discriminative performance (AUC=0.781

Table 3. Age-adjusted multivariable logistic regression models

Comparison	Variable	$\beta$	OR	95% CI	p-value*
Epididymo-orchitis vs Control					
NLR	0.157	1.17	1.05	1.31	0.005
IG count	0.817	2.26	1.10	4.63	0.027
Testicular torsion vs Control					
—	—	—	—	—	>0.05 (ns)
Epididymo-orchitis vs Testicular torsion					
NLR	0.190	1.21	1.09	1.35	<0.001
IG count	1.03	2.80	1.34	5.84	0.006

\*Logistic Regression Analysis (age-adjusted), Backward stepwise. Epididymo-orchitis vs Control: AUC=0.76, McFadden  $R^2=0.21$ , Testicular torsion vs Control: AUC=0.63, McFadden  $R^2=0.09$ , Epididymo-orchitis vs Testicular torsion: AUC=0.83, McFadden  $R^2=0.26$ . OR, odds ratio; CI, confidence interval; AUC, area under the curve;  $R^2$ , McFadden's pseudo- $R^2$ ; IG, immature granulocyte; NLR, neutrophil-to-lymphocyte ratio; ns, not significant.

[95% CI 0.705–0.857] and 0.730 [95% CI 0.642–0.818], respectively; both  $p < 0.001$ ), while WBC, and neutrophil count also achieved good diagnostic accuracy (AUCs=0.720 [95% CI 0.650–0.790], 0.740 [95% CI 0.670–0.810], respectively;  $p < 0.001$  for all). PLR and PLT again demonstrated limited or nonsignificant performance. Overall, these findings suggest that NLR and IG count are the most consistent indicators for differentiating infection-related epididymo-orchitis from ischemia-driven testicular torsion, while WBC and neutrophil count may also provide supportive diagnostic information. Routine indices such as PLT and PLR, however, show minimal additional diagnostic value. Figures 2 and 3 present ROC curves for epididymo-orchitis versus control and epididymo-orchitis versus testicular torsion, respectively.

After adjustment for age and backward elimination of non-significant variables, distinct predictors were identified for each comparison (Table 3). For epididymo-orchitis vs control, both NLR (OR=1.17, 95% CI 1.05–1.31,  $p=0.005$ ) and IG count (OR=2.26, 95% CI 1.10–4.63,  $p=0.027$ ) remained independently associated with disease presence, whereas other CBC indices lost significance. For testicular torsion vs control, no variable reached statistical significance after age adjustment, indicating limited diagnostic value of CBC-derived parameters for torsion when compared with healthy controls. In contrast, for epididymo-orchitis vs testicular torsion, the NLR (OR=1.21, 95% CI 1.09–1.35,  $p < 0.001$ ) and IG count (OR=2.80, 95% CI 1.34–5.84,  $p=0.006$ ) independently discriminated infection-related inflammation from ischemic pathology. Model performance was acceptable, with AUCs of predicted probabilities ranging from 0.72 to 0.83 and McFadden's  $R^2$  values between 0.18 and 0.26. These findings suggest that NLR and IG count are the strongest hematologic indicators for differentiating epididymo-orchitis from testicular torsion, while other CBC parameters provide limited additional diagnostic contribution.

## DISCUSSION

This study evaluated the diagnostic utility of CBC-derived parameters, particularly IGs, in differentiating epididymo-orchitis from testicular torsion in patients presenting with acute scrotal pain. The principal findings demonstrated that both the NLR and IG count were independently associated with epididymo-orchitis, whereas no CBC-derived variable showed significant diagnostic value for testicular torsion. Furthermore, NLR and IG count achieved the highest discriminative performance in distinguishing infection-related epididymo-orchitis from ischemia-driven torsion, outperforming traditional markers such as leukocyte count, platelet count, and PLR.

Acute scrotum is a time-critical emergency in which accurate differentiation between epididymo-orchitis and testicular torsion is essential to prevent irreversible testicular damage. Although Doppler US is the diagnostic gold standard, its accuracy can be affected by operator experience, equipment

quality, and the timing of evaluation, particularly in early or intermittent torsion.<sup>17,81</sup> This study reinforces the emerging role of CBC-derived inflammatory indices as accessible and cost-effective adjuncts to clinical assessment and imaging in acute scrotal conditions. The significant rise of NLR and IG count in the epididymo-orchitis group supports the hypothesis that these markers reflect the early inflammatory cascade associated with infection, whereas their limited elevation in torsion aligns with a primarily ischemic mechanism. These findings are consistent with previous research showing that NLR and IG values correlate more strongly with infectious than ischemic etiologies.<sup>1,2,7,9</sup> Conversely, testicular torsion does not consistently trigger a marked systemic inflammatory response, particularly during the initial ischemic phase. Some studies have reported mild increases in leukocyte or neutrophil counts in testicular torsion, particularly when detorsion or reperfusion occurs, although the evidence remains inconsistent.<sup>2,7</sup> The absence of such changes in our torsion subgroup likely reflects the short symptom duration (< 12 hours) at presentation, before reperfusion injury develops. Although NLR and IG demonstrated moderate diagnostic performance in differentiating epididymo-orchitis from testicular torsion, their AUC values indicate that these markers should not be used as standalone diagnostic tools. Instead, they may serve as supportive adjuncts to clinical evaluation and imaging modalities, particularly in cases where diagnostic uncertainty exists. Importantly, these parameters should not replace clinical judgment or imaging findings in surgical decision-making but may provide additional supportive information in the acute scrotum setting. When comparing testicular torsion with healthy controls, however, no hematologic parameter showed meaningful diagnostic discrimination. This finding is consistent with the pathophysiologic mechanism of the disease. Torsion is primarily an ischemic process; therefore, the associated systemic inflammatory response is limited in the early phase. Some studies have suggested mild increases in inflammatory indices in torsion, mainly during reperfusion or delayed presentations, but these changes are neither specific nor consistent.<sup>2</sup> The relatively short symptom duration (< 12 hours) in our patient population may also explain the lack of hematologic response in torsion cases.

In previous studies, PLR did not consistently differentiate testicular torsion from epididymo-orchitis, with some authors reporting no significant differences in PLR between groups, while platelet indices such as mean platelet volume (MPV) appeared more promising in specific settings. Similar observations have been reported in studies, in which PLR failed to demonstrate significant discriminatory power between torsion and epididymo-orchitis, possibly due to its susceptibility to changes in platelet activity during systemic inflammation.<sup>2,4,7,10–13</sup> According to the literature, our study showed that PLR and PLT demonstrated limited or nonsignificant performance.

A key advantage of this study is its comparatively large sam-

ple size, standardized hematologic measurements, and direct comparison between torsion, epididymo-orchitis, and control groups. Even so, some limitations must be recognized. Because the study was retrospective and conducted in a single center, there is a possibility of selection bias, and the smaller number of torsion cases reflects the lower incidence of this condition. Although lower number reflects the real-world incidence of testicular torsion, it may limit statistical power, particularly for ROC curve analyses and multivariable regression models. Therefore, the results should be interpreted with caution, and further studies with larger, multicenter cohorts are warranted to validate our findings. In cases of testicular torsion, patients often present early due to acute and severe pain, which may limit the development of a measurable systemic inflammatory response at the time of admission. Additionally, prior antibiotic use before hospital presentation, particularly in patients with epididymo-orchitis, may alter inflammatory parameters and introduce variability in hematological findings. As information regarding pre-hospital antibiotic use and symptom duration was not consistently available, these factors could not be adjusted for in the analysis and should be considered when interpreting the results. Another methodological consideration is the use of pairwise binary comparisons rather than hierarchical or multinomial modeling. Although appropriate for evaluating marker performance under defined conditions, this approach may not fully reflect the sequential decision-making process in emergency practice, where exclusion of testicular torsion is the primary diagnostic priority. Future multicenter studies with larger cohorts may benefit from hierarchical modeling strategies that better mirror real-world clinical workflows.

## CONCLUSION

Hematologic parameters, particularly the NLR and IG, demonstrated moderate diagnostic utility in distinguishing epididymo-orchitis from testicular torsion, but their ability to differentiate testicular torsion was limited. NLR and IG count appear to be practical, accessible, and cost-effective indicators that may help distinguish epididymo-orchitis from testicular torsion. Integrating these hematologic parameters into the early evaluation of patients with acute scrotal symptoms, together with clinical examination and Doppler US, has the potential to improve diagnostic accuracy and support timely decision-making. Future studies should prioritize multicenter studies to validate these findings across diverse populations and healthcare settings. Additionally, research should focus on identifying standardized cutoff values for the NLR and IG, exploring the impact of symptom duration and infection severity, and integrating these markers into comprehensive diagnostic protocols to enhance clinical decision-making.

**Ethics Committee Approval:** This study was approved by the SBU İstanbul Training and Research Hospital Clinical Research Ethics Committee (Date: 25.02.2025, Decision No: 22).

**Peer-review:** Externally peer-reviewed.

**Authorship Contributions:** Concept: O.D., Ozlem. D., A.T.; Design: O.D., Ozlem. D., A.T.; Supervision: O.D., Ozlem. D., A.T., E.K., H.A.A.; Resource: O.D., Ozlem. D., A.T., E.K., H.A.A.; Materials: O.D., Ozlem. D., A.T.; Data collection and/or processing: E.K., H.A., O.D., Ozlem. D., A.T.; Analysis and/or interpretation: O.D., Ozlem. D., E.K., H.A.A.; Literature review: O.D., Ozlem. D., E.K., H.A.A.; Writing: O.D., Ozlem. D., A.T., E.K.; Critical review: Ozlem. D., O.D. A.T., E.K., H.A.A.

**Conflict of Interest:** None declared.

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## ORİJİNAL ÇALIŞMA - ÖZ

**Epididimo-orşit ile testiküler torsiyonun ayırıcı tanısında immatür granülosit ve nötrofil/lenfosit oranının tanısai değeri**

**AMAÇ:** Testis torsiyonu önemli bir ürolojik acil durumdur ve erken teşhis çok önemlidir. Bu çalışmada, akut skrotum ile başvuran hastalarda epididimo-orşit ve testiküler torsiyonun ayırıcı tanısında hematolojik parametrelerin, özellikle immatür granülosit (IG) düzeyinin tanısai değerini değerlendirmek amaçlandı.

**GEREÇ VE YÖNTEM:** Bu retrospektif kohort çalışmasına, Ocak 2020–Aralık 2024 tarihleri arasında akut skrotal ağrı nedeniyle başvuran ve Doppler ultrasonografi veya cerrahi eksplorasyon ile tanısı doğrulanan 301 erkek hasta dahil edildi. Hastalar epididimo-orşit (n=200), testiküler torsiyon (n=37) ve kontrol (n=64) olmak üzere üç gruba ayrıldı. Tam kan sayımı parametreleri (lökosit, nötrofil, lenfosit, trombosit, IG, NLR, PLR) değerlendirildi. Gruplar arası karşılaştırmalar Kruskal–Wallis ve Dwass–Steel–Critchlow–Fligner testleri ile yapıldı. ROC analizi ile AUC, duyarlılık ve özgüllük değerleri hesaplandı. Yaşa göre düzeltilmiş çok değişkenli lojistik regresyon analizi ile bağımsız belirteçler tanımlandı.

**BULGULAR:** Epididimo-orşit grubunda NLR (cut-off=2.19, AUC=0.644, p<0.001) ve IG düzeyleri (cut-off=0.06, AUC=0.590, p=0.011) kontrol grubuna göre anlamlı derecede yüksekti. Torsiyon grubunda hiçbir parametre anlamlı ayırt edici değeri göstermedi. Epididimo-orşit ile torsiyon karşılaştırmasında ise NLR (AUC=0.781, p<0.001) ve IG (AUC=0.730, p<0.001) en yüksek tanısai performansa sahipti. Lojistik regresyon analizinde NLR (OR=1.17, 95% GA 1.05–1.31, p=0.005) ve IG (OR=2.26, 95% GA 1.10–4.63, p=0.027) epididimo-orşitin bağımsız belirteçleri olarak bulundu.

**SONUÇ:** İmmatür granülosit sayısı ve NLR, akut skrotumda epididimo-orşit ile testiküler torsiyonun ayırıcı tanısında yararlı hematolojik biyobelirteçlerdir. Bu kolay erişilebilir parametrelerin klinik değerlendirme ve görüntüleme yöntemlerine eklenmesi, tanısai doğruluğu artırabilir ve acil serviste hızlı karar vermeyi destekleyebilir.

**Anahtar sözcükler:** Epididimo-orşit; immatür granülosit; testiküler torsiyon.

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