

Diagnostic Value of Inflammatory and Hematological Blood Markers in the Diagnosis of Acute Aortic Dissection: A Case-Control Study

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Abstract

Objective: This study aimed to investigate the discriminative value of lactate, C-reactive protein (CRP), systemic immune-inflammation index (SII), platelet, neutrophil, leukocyte, INR, and creatinine parameters in the diagnosis of AAD.

Materials and Methods: This cross-sectional study included 33 patients diagnosed with AAD (patient group) and 33 patients without dissection (control group). Age, sex, and lactate, CRP, SII, platelet, neutrophil, leukocyte, INR, and creatinine values were compared between the two groups.

Results: Age (57.67 ± 12.76 vs 59.55 ± 14.54 years) and sex distribution (72.7% vs 84.8% male) were similar between the 33 patients and 33 controls included in the study. In the patient group, lactate ($2.00 [1.30-3.60]$ mmol/L), leukocyte ($10.34 [8.30-13.80] \times 10^9/L$), neutrophil ($7.27 [5.54-11.70] \times 10^9/L$), and INR ($1.23 [1.11-1.35]$) values were significantly higher than in the control group, while the platelet count was lower (198.52 ± 49.05 vs $255.88 \pm 79.71 \times 10^9/L$). CRP and creatinine levels were similar between groups; the systemic immune-inflammation index (SII) tended to be slightly higher in the patient group.

Conclusion: Low platelet count together with high lactate, leukocyte, neutrophil, and INR values are the main findings distinguishing patients with acute aortic dissection from controls, with low platelet count emerging as the most prominent parameter. These easily accessible and cost-effective blood markers may serve as valuable tools that complement imaging and support the diagnostic process when clinical suspicion is present; however, they should be evaluated together with clinical findings and imaging rather than in isolation. Multicenter, larger-sample prospective studies are needed to confirm these findings.

Keywords: Aortic Dissection, Diagnosis, Biomarker, C-Reactive Protein, Lactate, Systemic Immune-Inflammation Index, Platelet, Creatinine

Introduction

Aortic dissection is a true cardiovascular emergency characterized by separation of the media layer of the aortic wall from the intima, in which blood enters the vessel wall through an intimal tear and forms a false lumen, resulting in high mortality and morbidity. If untreated, the disease is often fatal within the first 24–48 hours, with mortality increasing by approximately 1–2% per hour. Early and accurate diagnosis is therefore critical for patient survival.

Although the most common symptom of aortic dissection is sudden-onset tearing chest and back pain, it can also present with atypical findings such as syncope, abdominal pain, dizziness, neurological signs, and pulse deficit. Because symptoms can be so wide-ranging, diagnosis is frequently delayed or confused with acute coronary syndrome, gastrointestinal disease, and

cerebrovascular disease. Although gold-standard imaging modalities (computed tomography angiography, transesophageal echocardiography, magnetic resonance imaging) are used for diagnosis, the cost, accessibility, and dependence on clinical suspicion of these methods can make rapid decision-making difficult in emergency settings [1,8].

Blood markers are attracting increasing interest as complementary diagnostic tools in situations where imaging is insufficient or not rapidly available. In their systematic review, Chen et al. reported that numerous serum markers have been evaluated in the literature for the diagnosis of aortic dissection, but none alone has achieved sensitivity and specificity high enough to replace gold-standard imaging methods; nevertheless, these markers stand out as rapid, low-cost tools that support clinical evaluation [8].

Georgiadou et al. likewise noted in their recent review that the diagnostic and prognostic value of next-generation biomarkers in aortic dissection has become an increasingly expanding area of

research [1]. Inflammation has been shown to play a central role in the pathogenesis of aortic dissection. Infiltration of inflammatory cells into the dissected and weakened aortic wall leads to changes in various inflammatory and hematological markers in the systemic circulation [1,8].

Aim of the Study

The aim of this study was to compare lactate, C-reactive protein (CRP), systemic immune-inflammation index (SII), platelet, neutrophil, leukocyte, INR, and creatinine parameters between patients diagnosed with acute aortic dissection and control patients without dissection, and to determine the discriminative value of these easily accessible blood markers in the diagnosis of aortic dissection.

Results

In this single-center, retrospective case-control study, a total of 66 patients were included: 33 patients diagnosed with aortic dissection (patient group) and 33 patients who presented during the same period and were found not to have dissection (control group). The mean age was 57.67 years in the patient group and 59.55 years in the control group, with no significant difference between groups, indicating that the two groups were comparable in terms of basic demographic characteristics. There were 24 male patients in the patient group and 28 in the control group, with no significant difference in sex distribution between groups either. The similarity of the groups in age and sex distribution suggests that the blood parameter differences observed between them can largely be attributed to the underlying pathology.

The demographic characteristics and blood parameters of the patient and control groups are presented in Table 1. Lactate, leukocyte, neutrophil, and INR values were higher in the patient group than in the control group. In contrast, the platelet count was significantly lower in the patient group than in the control group. C-reactive protein, creatinine, and age were similar between groups; the systemic immune-inflammation index (SII) tended to be slightly higher in the patient group. Overall, low platelet count together with high lactate, leukocyte, neutrophil, and INR values were the main findings distinguishing the aortic dissection group from the control group.

Table 1: Demographic Characteristics and Blood Parameters of the Patient and Control Groups

Variable	Patient group (n=33)	Control group (n=33)
Age (years)	57.67 ± 12.76	59.55 ± 14.54
Sex (Male), n (%)	24 (72.7)	28 (84.8)
Lactate (mmol/L)	2.00 [1.30–3.60]	1.30 [1.10–1.70]
CRP (mg/L)	3.50 [3.13–32.00]	7.90 [3.22–15.00]
Leukocyte (10 ⁹ /L)	10.34 [8.30–13.80]	8.56 [7.30–9.65]
Neutrophil (10 ⁹ /L)	7.27 [5.54–11.70]	5.39 [4.63–6.70]
Platelet (10 ⁹ /L)	198.52 ± 49.05	255.88 ± 79.71
INR	1.23 [1.11–1.35]	1.07 [0.99–1.16]
Creatinine (mg/dL)	0.99 [0.74–1.23]	0.90 [0.70–1.07]
SII	1,053,281 [705,266–1,831,559]	769,446 [483,043–1,072,879]

CRP: C-Reactive Protein; **SII:** Systemic Immune-Inflammation Index.

In recent years, composite inflammatory indices derived from neutrophil, lymphocyte, and platelet counts such as the systemic immune-inflammation index (SII) and the systemic inflammatory response index (SIRI) have been increasingly investigated in aortic dissection for both diagnostic and prognostic purposes. Xie et al. reported that the preoperative SIRI value was valuable in predicting clinical outcomes in patients with acute type A aortic dissection undergoing surgical treatment [2]. Zhao et al. demonstrated the prognostic value of SII after thoracic endovascular aortic repair in type B aortic dissection [4]. Chen et al. reported that SII predicted clinical outcomes in patients with uncomplicated type B aortic dissection undergoing optimal medical therapy [6]. Xin et al., in a study of 597 patients with acute aortic dissection, showed that SII at admission was associated with in-hospital mortality [7]. In our study, SII tended to be slightly higher in the patient group compared with the control group (1,053,281 vs 769,446); this direction partially overlaps with the SII elevation reported predominantly in a prognostic context in the literature, but the difference did not reach a significant level, likely owing to our study's diagnostically focused design and relatively small sample size.

Data on this subject remain relatively limited in our country. A retrospective analysis conducted by Sarıtaş et al. at a training and research hospital described the clinical and demographic characteristics of patients with aortic dissection but did not focus on diagnostic blood markers [9]. A recent study by Bildik et al. made an important contribution to this limited domestic literature by showing that low platelet count and older age were independent predictors for the diagnosis of aortic dissection [10]. Our findings—particularly that low platelet count together with high lactate, leukocyte, neutrophil, and INR values distinguished the aortic dissection group from the control group—are consistent with those of Bildik et al., and contribute to this limited domestic literature by evaluating additional parameters such as lactate, CRP, SII, leukocyte, and INR together.

Discussion

C-Reactive Protein

CRP is an inexpensive, widely used inflammatory marker synthesized mainly in hepatocytes via interleukin-6. In a systematic review of 711 patients, Vrsalović and Vrsalović Presečki reported that elevated CRP levels at admission were associated with both in-hospital and mid-term mortality, with a median CRP value of 13 mg/L across studies [5]. In their systematic review of blood biomarkers in aortic dissection, Chen et al. likewise emphasized that although CRP is inexpensive and easily accessible, it can also rise in numerous systemic inflammatory conditions, particularly infection, and its specificity therefore remains limited [8].

In our study, CRP values did not differ significantly between the patient and control groups. The prognostic value of CRP summarized above is mainly related to disease course and mortality; in a diagnostic (early) context, its discriminative power may remain limited because the inflammatory response may not yet be fully developed. This finding is consistent with the low specificity issue highlighted in the review by Chen et al. and with the view that relying on CRP alone may not be sufficient for the diagnosis of acute aortic dissection [8].

Lactate

Lactate is a rapid and cost-effective indicator of tissue perfusion and malperfusion/ischemia. Wang et al. showed that dynamic lactate levels were valuable in predicting 30-day mortality in patients undergoing surgical repair for acute type A dissection,

with lactate values measured in the hours after intensive care unit admission being particularly strong predictors [3]. While these findings suggest that lactate is more closely related to disease severity and prognosis, its contribution to the diagnostic process at admission also merits investigation. On the other hand, lactate is not specific to aortic dissection; it can also rise in many other emergency conditions such as sepsis and mesenteric ischemia, which limits its diagnostic specificity when used alone [1,8]. In our study, lactate values were higher in the patient group (median 2.00 vs 1.30 mmol/L). This finding suggests that elevated lactate may be a useful indicator supporting the diagnosis of aortic dissection, but it should be interpreted together with clinical findings and imaging.

Platelet

Platelets play an important role in aortic dissection because of the thrombosis and consumption coagulopathy that begin in the false lumen. After an intimal tear in dissection, the release of subendothelial tissue factors and activation of the coagulation cascade can lead to platelet consumption and a decrease in platelet count. In their review, Chen et al. also noted that platelet count stands out among the markers evaluated for aortic dissection because of its direct relationship with the coagulation system [8]. In their diagnostically focused study, Bildik et al. reported that low platelet count supported the diagnosis of aortic dissection and that platelet count and older age were independent risk factors for diagnosis [10]. In our study, similarly, the platelet count was significantly lower in the patient group (198.52 vs 255.88) and was the most prominent parameter distinguishing the patient group from the control group. These results were consistent with the findings of Bildik et al. that low platelet count supports the diagnosis of aortic dissection and that platelet count is an independent risk factor for diagnosis [10]. Thrombosis and consumption coagulopathy developing in the false lumen during dissection are thought to contribute to the decrease in platelet count; the fact that platelet count was the most prominent discriminative parameter between groups in our study suggests that this mechanism may already be measurably active in the early period.

Neutrophil and Systemic Immune-Inflammation Index (SII)

Neutrophils, which constitute a major portion of circulating leukocytes, are cells that contribute to vascular wall damage by secreting inflammatory mediators. SII, a composite marker (neutrophil $\times$ platelet / lymphocyte), combines inflammatory and immune status into a single index. Xin et al. showed that SII at admission was independently associated with in-hospital mortality in 597 patients with acute aortic dissection [7]. Similarly, Zhao et al. reported that a high SII value was associated with poor prognosis after thoracic endovascular aortic repair in type B aortic dissection, and Chen et al. reported that SII predicted clinical outcomes in patients with uncomplicated type B aortic dissection undergoing optimal medical therapy [4,6]. In the study by Xie et al., SIRI (systemic inflammatory response index), another composite index closely related to SII, was shown to have prognostic value in patients undergoing surgical treatment for acute type A dissection [2]. A common feature of these studies is that SII and similar indices have predominantly been evaluated in a prognostic (mortality-related) context, while data on their diagnostic (discriminative) value are more limited.

Bildik et al. reported that SII was lower in the aortic dissection group compared to the control group, and that neutrophil and leukocyte counts did not differ significantly between groups [10]. This was attributed to patients being captured in the early period before the inflammatory response had fully developed. In our study, the neutrophil count was higher in the patient group; this

finding differs from the result reported by Bildik et al. and appears more consistent with the direction reported in mortality-focused international studies (that higher neutrophil count and SII are associated with worse outcomes). SII tended to be slightly higher in the patient group. This may be related to our study having been conducted with smaller groups than other studies and to its single-center, diagnostically focused design [4-7].

Creatinine, Leukocyte and Coagulation Markers (INR)

Creatinine is a marker reflecting renal function and possible malperfusion. In our study, creatinine values did not differ significantly between the patient and control groups. This finding may indicate that creatinine is more closely related to prognosis, while its diagnostic discriminative value at admission is not significant.

Leukocyte count is a commonly used indicator of systemic inflammatory response. While Xin reported that leukocyte count was higher in patients who died, in a diagnostic context Bildik found no significant difference in leukocyte, neutrophil, and lymphocyte counts between the aortic dissection group and the control group, attributing this to patients being captured in the early period before the inflammatory response had fully developed [7-10]. In our study, the leukocyte count was higher in the patient group. Leukocytosis may be interpreted as an indicator of the inflammatory response in the aortic wall; nevertheless, its use alone does not yield a meaningful result. Georgiadou et al. also emphasized in their editorial that no single marker is expected to achieve sufficient sensitivity and specificity for the diagnosis of aortic dissection, and that the real value lies in evaluating multiple markers together [1].

Coagulation markers, on the other hand, are related to the thrombosis, consumption coagulopathy, and decreased fibrinogen that develop in the false lumen in aortic dissection; activation of the coagulation system is prominent in the acute phase of the disease. In our study, INR values were higher in the patient group. Elevated INR may be regarded as a reflection of coagulation activation and consumption coagulopathy developing in the false lumen during the acute phase of aortic dissection. In this respect, INR, together with low platelet count, is thought to be a complementary marker reflecting changes in the coagulation system.

Limitations of the Study

Our study has several limitations. First, it was conducted with relatively small groups using a single-center, retrospective design, so the results differed from those of larger studies. Second, only blood values at admission were analyzed; changes during follow-up were not evaluated. Third, since certain conditions that could affect blood parameters were not excluded, it should be kept in mind that many comorbid conditions may influence these values. Fourth, other composite inflammatory indices such as SIRI and the monocyte-to-lymphocyte ratio, or coagulation markers such as D-dimer, were not evaluated in our study; given the growing international interest in these markers their inclusion in future studies would be beneficial [2-7]. Finally, domestic data on this subject remain limited in our country; apart from the descriptive retrospective analysis by Sarıtaş and the diagnostically focused study by Bildik few studies exist in this area, and the present study aims to contribute to this limited domestic literature. Multicenter, larger-sample prospective studies are needed to confirm these findings [9-10].

Conclusion

Acute aortic dissection is a fatal cardiovascular emergency in which early diagnosis is lifesaving. Easily accessible and cost-

effective blood markers are valuable tools that can support the diagnostic process when clinical suspicion is present. In this case-control study, lactate, leukocyte, neutrophil, and INR values were found to be higher, and platelet count lower, in patients with aortic dissection. Low platelet count was the most prominent parameter distinguishing the patient group from the control group. These markers should be evaluated together with clinical findings and imaging rather than in isolation. Multicenter, larger-sample prospective studies are needed to further clarify this issue.

Thirty-three patients diagnosed with aortic dissection were compared with 33 control patients. Lactate, leukocyte, neutrophil, and INR values were higher, and platelet count lower, in the patient group compared with the control group. No significant difference was observed between groups in terms of CRP, creatinine, or age. Low platelet count was the most prominent parameter distinguishing the patient group from the control group.

Low platelet count together with high lactate, leukocyte, neutrophil, and INR values supports the diagnosis of aortic dissection. These easily accessible blood parameters can be considered as auxiliary markers supporting diagnosis when clinical suspicion is present, with low platelet count being the most prominent finding distinguishing the patient group.

References

1. Georgiadou P, Sbarouni E, Eleftheriades J (2024) Editorial: Novel biomarkers in acute aortic dissection. *Front Cardiovasc Med* 11: 1457521.
2. Xie LF, Xie QG, Gao WP, Wu QS, Lin XF, et al. (2024) The prognostic value of preoperative systemic inflammatory response index in predicting outcomes of acute type A aortic dissection patients underwent surgical treatment. *Front Immunol* 15: 1388109.
3. Wang Z, Li K, Xu J, Cheng X, Wang D (2022) Construction of a lactate-related prognostic signature for predicting prognosis after surgical repair for acute type A aortic dissection. *Front Physiol* 13: 1008869.
4. Zhao Y, Jiang J, Yuan Y, Shu X, Wang E, et al. (2023) Prognostic value of the systemic immune inflammation index after thoracic endovascular aortic repair in patients with type B aortic dissection. *Dis Markers* 2023: 2126882.
5. Vrsalović M, Vrsalović Presečki A (2019) Admission C-reactive protein and outcomes in acute aortic dissection: a systematic review. *Croat Med J* 60: 309-315.
6. Chen R, Su S, Wang C, Liu Y, Huang W, et al. (2024) Systemic immune-inflammation index predicts the clinical outcomes in patients with acute uncomplicated type-B aortic dissection undergoing optimal medical therapy. *BMC Cardiovasc Disord* 24: 7.
7. Xin Y, Lyu S, Wang J, Wang Y, Shu Y, et al. (2025) Predictive value of inflammatory indexes in in-hospital mortality for patients with acute aortic dissection. *BMC Cardiovasc Disord* 25: 323.
8. Chen H, Li Y, Li Z, Shi Y, Zhu H (2023) Diagnostic biomarkers and aortic dissection: a systematic review and meta-analysis. *BMC Cardiovasc Disord* 23: 497.
9. Sarıtaş A, Güneş H, Kandış H, Çıkman M, Çandar M, et al. (2011) Retrospective analysis of patients with aortic dissection admitted to our clinic. *JAEM* 10: 152-155.
10. Bildik B, Yılmaz G, Atış ŞE, Çekmen B (2024) Blood parameters that can be used in the diagnosis of acute aortic dissection. *Anadolu Klin* 29: 7-12.