ARAŞTIRMA MAKALESİ / *RESEARCH ARTICLE*

Hospitalized Recurrent Deep Vein Thrombosis: Demographic, Clinical, and Laboratory Insights from a Single-Center Retrospective Study

Hastaneye Yatırılan Reküren Derin Ven Trombozlu Hastalarda: Tek Merkezli Retrospektif Bir Çalışmadan Demografik, Klinik ve Laboratuvar Bilgileri

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ABSTRACT

Aim: *This study aimed to analyze the demographic, clinical, and laboratory characteristics of hospitalized patients with recurrent deep vein thrombosis (rDVT) and to identify associated risk factors and treatment outcomes.*

Material and Methods: *A retrospective review was conducted on 45 patients hospitalized with rDVT between October 2021 and October 2023. Patients with active cancer, hematological or rheumatological diseases, immunosuppression, or organ failure were excluded. Demographic data, clinical characteristics, venous Doppler imaging, and emergency laboratory results were analyzed. Patients were grouped based on proximal or distal thrombus location, infection burden, and hospital length of stay. Statistical analyses included Student's t-test, Mann-Whitney U test, and Spearman correlation.*

Results: *The median age of the study population was 72 years, with a higher prevalence in males (55.6%). Key risk factors included major surgery within two years (40%), diabetes mellitus (37.8%), and hormone replacement therapy (22.2%). Proximal thrombus was identified in 51% of patients, with males predominantly affected, while females showed higher rates of distal thrombus. Median hospital stay was five days, and longer stays were associated with elevated inflammatory markers, including CRP and uric acid levels. A significant correlation between D-dimer and uric acid was observed (r=0.40, p=0.005). Dual therapy with low molecular weight heparin and rivaroxaban was more common in proximal thrombus cases.*

Conclusion: *This study highlights the distinct clinical and laboratory characteristics of hospitalized rDVT patients, with gender– and location-specific differences influencing management strategies. The positive correlation between D-dimer and uric acid suggests a potential role of uric acid as a biomarker in resource-limited settings. Further research is warranted to address the genetic and hereditary aspects of rDVT.*

Key words: *recurrent deep vein thrombosis; risk factors; thrombus location; anticoagulation therapy; laboratory biomarkers*

ÖZET

Amaç: *Bu çalışmada hastanede yatan tekrarlayan derin ven trombozlu (rDVT) hastaların demografik, klinik ve laboratuvar özelliklerinin analiz edilmesi ve ilişkili risk faktörlerinin ve tedavi sonuçlarının belirlenmesi amaçlanmıştır.*

Gereç ve Yöntemler: *Ekim 2021 ve Ekim 2023 tarihleri arasında rDVT ile hastaneye yatırılan 45 hasta üzerinde retrospektif bir inceleme yapıldı. Aktif kanser, hematolojik veya romatolojik hastalıklar, immünosüpresyon veya organ yetmezliği olan hastalar çalışma dışı bırakıldı. Demografik veriler, klinik özellikler, venöz Doppler görüntüleme ve acil laboratuvar sonuçları analiz edildi. Hastalar proksimal veya distal trombüs yerleşimi, enfeksiyon yükü ve hastanede kalış süresine göre gruplandırıldı. İstatistiksel analizler Student's t-testi, Mann-Whitney U testi ve Spearman korelasyonunu içeriyordu.*

Sonuçlar: *Çalışma popülasyonunun medyan yaşı 72 idi ve erkeklerde daha yüksek bir prevalans vardı (%55,6). Temel risk faktörleri arasında iki yıl içinde geçirilmiş büyük cerrahi (%40), diabetes mellitus (%37,8) ve hormon replasman tedavisi (%22,2) vardı. Hastaların %51'inde proksimal trombüs tespit edilmiş olup, bu durumdan ağırlıklı olarak erkekler etkilenirken, kadınlarda daha yüksek oranda distal trombüs görülmüştür. Medyan hastanede kalış süresi beş gündü ve daha uzun kalış süresi CRP ve ürik asit düzeyleri dâhil olmak üzere yüksek enflamatuvar belirteçlerle ilişkiliydi. D-dimer ile ürik asit arasında anlamlı bir korelasyon gözlenmiştir (r=0,40, p=0,005). Düşük molekül ağırlıklı heparin ve rivaroksaban ile ikili tedavi proksimal trombüs olgularında daha yaygındı.*

Sonuç: *Bu çalışma, hastanede yatan rDVT hastalarının farklı klinik ve laboratuvar özelliklerini vurgulamakta ve cinsiyet ile bölgeye özgü farklılıkların yönetim stratejilerini etkilediğini göstermektedir. D-dimer ve ürik asit arasındaki pozitif korelasyon, ürik asidin kaynakların sınırlı olduğu ortamlarda bir biyobelirteç olarak potansiyel rolüne işaret etmektedir. RDVT'nin genetik ve kalıtsal yönlerini ele almak için daha fazla araştırma yapılması gerekmektedir.*

Anahtar kelimeler: *tekrarlayan derin ven trombozu; risk faktörleri; trombüs yerleşimi; antikoagülasyon tedavisi; laboratuvar biyobelirteçleri*

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Introduction

Deep vein thrombosis (DVT) is a significant global public health concern that can lead to serious complications, particularly pulmonary embolism. When delays in diagnosis and treatment occur, especially in emergency departments, DVT can result in severe outcomes associated with high mortality and morbidity rates[1]. The annual global incidence of DVT is approximately 1.6–1.8 cases per 1000 individuals, varying based on age, sex, and other individual risk factors[2]. Deep vein thrombosis is not only critical in its initial occurrence but also due to its recurrent nature. Recurrent DVT (rDVT) complicates treatment and leads to long-term health issues. Studies have demonstrated that the inability to control underlying risk factors significantly increases the recurrence rates of thromboembolism, thereby substantially elevating mortality risk[1,3].

Deep vein thrombosis is a venous thromboembolic disease that manifests with unilateral leg pain, swelling, redness, edema, increased warmth, and tenderness in the affected extremity[4]. Following an initial DVT episode, rDVT may occur in a provoked or unprovoked manner. Provoking factors include major surgery (operations lasting more than 30 minutes), prolonged immobility or hospitalization for three or more days, hormone replacement therapy, active cancer, chronic inflammatory diseases, chronic cardiac diseases, pregnancy, and genetic predisposition[5]. Despite appropriate and sufficient anticoagulant therapy, approximately one-quarter of primary DVT cases experience recurrent DVT within five years[6]. Early prediction of rDVT risk emphasizes the integration of clinical characteristics such as patient age, sex, and thrombus location with laboratory and imaging findings[7]. The primary challenge in managing recurrent DVT lies in distinguishing whether the current symptoms stem from an exacerbation of post-thrombotic syndrome or a newly developed venous thrombosis[8].

To address this issue, our study aims to evaluate rDVT as an isolated disease, excluding venous thromboembolism-related DVT-pulmonary embolism relationships. This study seeks to generate a comprehensive dataset solely focused on rDVT by analyzing the demographic characteristics, risk factors, clinical follow-up, treatment processes, and emergency department laboratory results of hospitalized rDVT patients, as opposed to those managed with outpatient treatment.

Materials and Methods

Study Design and Patient Selection

This retrospective study was conducted with the approval of the Nigde Omer Halisdemir University Ethics Committee (approval date and protocol number: 2024/01-29). Patients who presented to the emergency department between October 1, 2021, and October 1, 2023, and were assigned venous thrombosis-related ICD codes (I82, I82.1, I82.8, and I82.9) were identified through the hospital records and automation system (KARMED). The epicrisis files of these patients were reviewed, and those hospitalized with a diagnosis of rDVT were included in the study. Patients with active cancer, those undergoing chemotherapy, individuals with known hematological and/or rheumatological diseases, immunocompromised patients, those with renal or hepatic failure, and individuals with conditions that could adversely affect coagulation and clotting parameters or alter DVT outcomes were excluded from the study. Additionally, patients with missing data or an unconfirmed diagnosis of rDVT were also excluded. Initially, 358 patients were screened based on ICD codes, and after applying inclusion and exclusion criteria, 45 patients were included in the final analysis (Fig. 1).

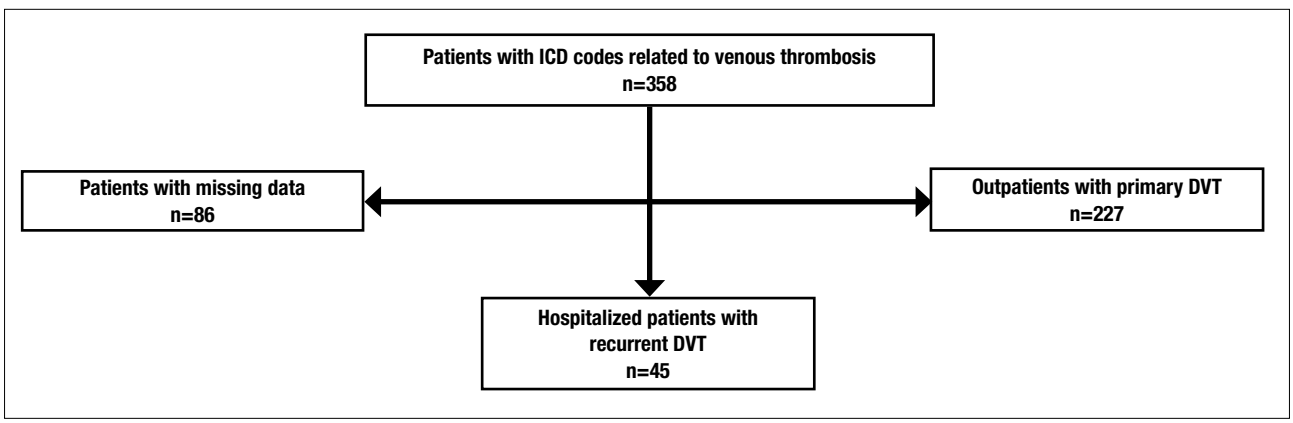

Figure 1. *Distribution of patients diagnosed with deep vein thrombosis (DVT).*

Variable Selection and Data Collection

Demographic Characteristics and Risk Factors: Data were collected on gender, age, and risk factors for DVT (previous major surgery, diabetes mellitus [DM], coronary artery disease [CAD], and hormone replacement therapy).

Imaging and Treatments: Venous Doppler ultrasonography (USG) results were categorized into proximal (femoral) and distal (popliteal) thrombosis. Treatment approaches were classified as monotherapy (low-molecular-weight heparin) or dual therapy (low-molecular-weight heparin + rivaroxaban).

Hospitalization: Length of hospital stay (in days) was categorized based on the median duration: ≥median as "long stay" and <median as "short stay.

Infection Burden: Patients were grouped based on median C-reactive protein (CRP) levels: ≥median as "high infection burden" and <median as "low infection burden."

Emergency Department Laboratory Data: Hematological and Coagulation Parameters: D-dimer, platelet count (PLT), mean platelet volume (MPV), red cell distribution width (RDW), and international normalized ratio (INR).

Inflammatory and Biochemical Markers: CRP, white blood cell (WBC) count, hemoglobin (Hb), neutrophil count, blood urea nitrogen (BUN), creatinine, alanine aminotransferase (ALT), aspartate aminotransferase (AST), calcium (Ca), sodium (Na), potassium (K), and albumin levels were analyzed.

Statistical Analysis

Categorical variables were presented as frequency and percentage. Uric acid, MPV, Hb, Ca, and K were presented as mean ± SD, while other continuous variables were expressed as median and interquartile range (IQR 25–75). Student's t-test, Mann-Whitney U test, One-Way ANOVA, and Kruskal-Wallis test were used to examine the relationships between continuous and categorical variables. The relationships between categorical variables were analyzed using Chi-square and/or Fisher's exact test. Spearman correlation analysis was applied to examine the correlation between D-dimer and uric acid, blood urea nitrogen, RDW, age, WBC, and INR. Additionally, linear regression analysis was conducted between uric acid and MPV. Statistical analyses were performed using IBM Statistical Package for Social Sciences (SPSS) program for Windows, version 27.0 (IBM Corp., Armonk, NY, USA). A p-value of <0.05 was considered statistically significant.

Results

Demographic and Descriptive

Data A total of 45 patients (25 males, 55.6%; 20 females, 44.4%) were included in the study. The median age of the patients was 72 years (IQR: 58.5–82), with a median age of 74 years in males and 68 years in females. Among the risk factors, 18 patients (40%) had a history of major surgery within the past two years, 17 patients (37.8%) had DM and/or CAD, and 10 patients (22.2%) had a history of hormone replacement therapy. Venous Doppler ultrasonography detected femoral vein thrombosis in 23 patients (51%) and popliteal vein thrombosis in 22 patients (49%). Thirty-three patients (73%) experienced rDVT while on anticoagulant therapy. After hospitalization, 29 patients (64.4%) received dual therapy, whereas 16 patients (35.6%) were treated with monotherapy. The median hospital stay was 5 days, with 26 patients (57.8%) hospitalized for 5 days or longer. A total of 23 patients (51.1%) had a CRP level at or above the median value of 25.2 (Table 1). Emergency laboratory results of the patients are shown in Table 2.

Table 1. *Demographic and descriptive characteristics of patients*

Variables		N=45 %
Age, IQR (25–75)		72 (58.5–82)
Gender		
	Male	25 (55.6)
	Female	20 (44.4)
Risk factors		
	Surgical intervention	18 (40)
	Comorbid diseases	17 (37.8)
	Hormone replacement	10 (22.2)
Location of thrombosis		
	Femoral	23 (51)
	Popliteal	22 (49)
Active anticoagulant use		
	Yes	33 (73)
	No	12 (27)
Treatment		
	LMWH	29 (64.4)
	LMWH+Rivaroxaban	16 (35.6)
Length of hospital stay		
	Long	26 (57.8)
	Short	19 (42.2)
Infection burden		
	High	23 (51)
	Low	22 (49)

* shown as median, IQR: inter quartile range, LMWH: low molecular weight heparin.

Table 2. *Emergency department laboratory results of patients*

Parameters	Results
D-dimer, ng/mL (IQR)	2592 (1213–8075)
Uric acid, mg/dl ± SD	6.19±2.16
INR (IQR)	1.11 (1.03–1.25)
PLT, 10^3/mcL (IQR)	215 (173.5–278.5)
MPV, fL ± SD	10.55±1.12
RDW, % (IQR)	14.8 (13.7–16.55)
CRP, mg/L (IQR)	25.2 (9.2–86.35)
WBC, 10^3/uL (IQR)	9.83 (7.56–13.42)
Hb, g/dL ± SD	12.66±2.4
Neutrophil, 10^3/mcL (IQR)	7.73 (5.35–11)
Urea, mg/dl (IQR)	44 (31.5–64.5)
Creatine, mg/dl (IQR)	0.9 (0.7–1.16)
ALT, U/L (IQR)	15 (11.5–28)
AST, U/L (IQR)	22 (18–32)
Ca, mg/dl ± SD	8.74±0.56
Na, mmol/L (IQR)	139 (136–141)
K, mmol/L ± SD	4.32±0.63
Albumin, g/L (IQR)	38 (33–42)

IQR: inter quartile range, SD: standard deviation, INR: international normalized ratio, PLT: platelet, MPV: mean platelet volume, RDW: red cell distribution width, CRP: C-reactive protein, WBC: white blood cell, Hb: hemoglobin, ALT: alanine aminotransferase, AST: aspartate aminotransferase, Ca: calcium, Na: sodium, K: potassium.

Gender

rDVT due to hormonal therapy was more common in females than in males. In contrast, the presence of DM and/or CAD posed a higher risk for rDVT in males (p<0.001). Femoral vein thrombosis was more frequent in males, whereas popliteal vein thrombosis was more common in females (p=0.002). Females were predominantly treated with LMWH, whereas males received a combination of LMWH and rivaroxaban (p=0.002). The median D-dimer level (p<0.001) and mean uric acid level (p=0.026) were significantly higher in males than in females (Table 3).

Table 3. *Statistically significant results between genders*

Variables	Female (n=20)	Male (n=25)	p
DM ± CAD	4 (7.6)	13 (9.4)	<0.001[a]
Hormone replacement	10 (4.4)	0 (5.6)	
Femoral thrombosis	5 (10.2)	18 (12.8)	0.002[a]
Popliteal thrombosis	15 (9.8)	7 (12.2)	
LMWH	12 (7.1)	4 (8.9)	0.002[a]
LMWH+Rivaroxaban	8 (12.9)	21 (16.1)	
D-dimer Mean Rank	11.28	32.38	<0.001[b]
Uric acid Mean ± SD	5.4±1.83	6.82±2.23	0.026[c]

[a] categorical variables are given as observed (expected) using the Chi-square test, [b] Mann-Whitney U test, [c] Student's t-test, LMWH: low molecular weight heparin, DM: diabetes mellitus, CAD: coronary artery disease, SD: standard deviation.

Thrombus Location and Risk Factors

Patients with femoral vein thrombosis were more frequently treated with dual therapy (p=0.048). These patients were older than those with popliteal vein thrombosis (p=0.024) and had higher median D-dimer levels (p<0.001). Patients with a history of major surgery or DM and/or CAD were older than those who had rDVT due to hormone replacement therapy (p<0.001). Popliteal vein thrombosis was more common in patients undergoing hormone replacement therapy (p=0.012). D-dimer levels were significantly higher in patients with a history of surgery (p=0.014) and DM and/or CAD (p=0.002) compared to those undergoing hormone replacement therapy (Table 4).

Table 4. *Significant results according to thrombus location and risk groups*

Variables	Femoral (n=23)	Popliteal (n=22)	Hormone (n=10)	Comorbid (n=17)	Surgical (n=18)	p
Monotherapy	5 (8.2)	11 (7.8)				0.048[a]
Double therapy	18 (14.8)	11 (14.2)				
Hormone replacement	1 (5.1)	9 (4.9)				0.012[a]
DM ± CAD	10 (8.7)	7 (8.3)				
Major surgery	12 (9.2)	6 (8.8)				
Age mean rank	27.3	18.5				0.024[b]
D-dimer mean rank	30.33	15.34				<0.001[b]
Age average rank			8.4	27.18	27.17	0.001[c]
D-dimer average rank			10.30	28.41	24.94	0.014[1]/0.002[2] [c]

[a] categorical variables are given as observed (expected) using the Chi-square test, [b] Mann-Whitney U test, [c] Kruskal-Wallis test, [1] surgical intervention-hormone replacement, [2] comorbid diseases-hormone replacement, DM: diabetes mellitus, CAD: coronary artery disease.

Table 5. *Relationship of laboratory results with infection burden, length of hospital stay and treatment protocols*

Parameters	High infection (n=23)	Low infection (n=22)	Long stay (n=26)	Short stay (n=19)	Mono therapy (n=16)	Double therapy (n=29)	p
INR Mean Rank	27.7	18.09	27.6	16.71			0.014[1]/0.006[2 a]
ALT Mean Rank	27.11	18.7					0.032[a]
Uric acid Mean ± SD	6.95±2.33	5.4±1.67			5.37±1.9	6.64±2.19	0.014[3]/0.049[4 b]
Ca Mean ± SD	8.57±0.59	8.91±0.49					0.046[b]
Urea Mean Rank			27.4	16.97			0.008[a]
D-dimer Mean Rank					13.91	28.02	<0.001[a]

[a] Mann-Whitney U test, [b] Student's t-test, [1] Infection-INR, [2] Hospital stay-INR, [3] Infection-Uric acid, [4] Therapy-Uric acid, INR: international normalized ratio, ALT: alanine aminotransferase, Ca: calcium, SD: standard deviation.

Table 6. *Correlation and lineer regression analysis*

		Uric acid	Urea	RDW	Age	WBC	INR
D-dimer (N=45)	r*	0.40	0.357	0.328	0.327	0.317	0.300
	p	0.005	0.016	0.028	0.028	0.034	0.045
Dependent variable	Constant	B	SE	%95 CI		R	p
MPV	Uric acid	9.53	0.49	8.54–10.52		0.318	<0.001

* Spearman correlation coefficient, SE: standard error, CI: confidence interval, RDW: red cell distribution width, WBC: white blood cell, INR: international normalized ratio, MPV: mean platelet volume.

Infection Load, Hospital Stay, and Treatment Groups

In patients with a high infection load, INR (p=0.014), ALT (p=0.032), and uric acid levels (p=0.014) were significantly higher, while calcium levels were lower (p=0.046). Patients with a longer hospital stay had significantly higher urea (p=0.008) and INR (p=0.006) levels compared to those with a shorter hospital stay. Patients receiving dual therapy had significantly higher median D-dimer levels (p<0.001) and mean uric acid levels (p=0.049) than those receiving monotherapy (Table 5).

Correlation and Regression Analyses

A moderate positive correlation was observed between D-dimer and uric acid levels (r=0.40, p=0.005). There was a weak positive correlation coefficient in the linear regression analysis between uric acid and MPV levels. Additionally, weak correlations were found between D-dimer and urea (r=0.357, p=0.016), RDW (r=0.328, p=0.028), age (r=0.327, p=0.028), WBC (r=0.317, p=0.034), and INR (r=0.300, p=0.045) (Table 6).

Discussion

rDVT is a complex clinical entity where the interplay of patient-specific risk factors, thrombus location, laboratory parameters, and tailored treatment strategies plays a pivotal role in guiding effective management and improving prognostic outcomes.

Although the exact cause is unknown, the risk of rDVT is 2 to 4 times higher in men than in women[9]. Similarly, in our study, there was a predominance of male patients. While some literature suggests that the incidence of rDVT increases particularly in patients over the age of 65, another perspective argues that aging has an adverse effect only on the development of DVT and that its impact on rDVT remains unclear[10,11]. According to our results, there is a positive correlation between age and rDVT. The decrease in physical activity and the higher prevalence of comorbid conditions with advancing age may explain this finding.

Individuals with a history of DVT have a 30–40% probability of experiencing rDVT within ten years after the initial diagnosis[12]. Acquired or hereditary risk factors for rDVT include immobilization, genetic conditions such as protein S deficiency, major surgery, estrogen-containing hormone therapies, obesity, chronic inflammatory diseases, atrial fibrillation, CAD, and hypertension[13–15]. Since our study was retrospectively designed, data regarding patients' genetic factors, hereditary risk factors, and body mass index were not accessible. However, our analysis identified hormone replacement therapy as a significant risk factor for rDVT in women, while DM and CAD were significant risk factors in men. This finding may be explained by hormone supplementation in premenopausal or menopausal women, whereas in men, the presence of DM and CAD, which increase in incidence with age, contributes to chronic inflammatory processes.

Additionally, the median age of male patients was higher than that of female patients.

Al Yami et al. found that proximal DVT localization was more common in rDVT patients. They also noted that proximal DVT localization was more frequently observed in men[16]. Hansson et al. identified proximal vein thrombosis localization as an independent risk factor for the development of rDVT[17]. Similarly, we frequently detected proximal DVT localization and observed a predominance of male patients in this group. According to our findings, the increased oxidative stress and inflammatory process due to the presence of DM and CAD –conditions more prevalent in men– along with the higher frequency of dual therapy usage in male patients with proximal DVT, may be associated with this process.

The diagnostic approach for primary acute DVT involves a holistic evaluation that includes clinical suspicion, elevated D-dimer levels, and compression USG[18]. In the context of rDVT, however, there are two differing perspectives regarding the use of D-dimer in the diagnostic process. One perspective suggests that an elevated D-dimer level, along with suspicious physical examination findings for DVT, predicts rDVT[19]. The other perspective argues that since these patients have previously experienced DVT, their baseline D-dimer levels are higher than those of the normal population, and they may be on anticoagulant therapy, making D-dimer evaluation less reliable[20]. Our analysis revealed a median D-dimer measurement of approximately 2600 ng/ml in our patients. Nearly three-quarters of our cases experienced rDVT while on anticoagulant therapy. This finding raised questions about treatment efficacy and/or patient adherence to treatment following primary DVT. However, one clear observation from our data is that male patients exhibited significantly higher D-dimer levels than female patients. We attribute this finding to the older age of male patients and to the fact that major surgery, DM, and/or CAD –recognized as primary risk factors for rDVT in men– were more prevalent in this group. Additionally, the higher D-dimer levels observed in patients receiving dual therapy for proximal vein thrombosis compared to those on monotherapy for distal vein thrombosis suggest an association with this process.

When examining the relationship between emergency department laboratory parameters and rDVT, the most striking result was the moderate positive correlation between D-dimer and uric acid levels. Elevated levels of D-dimer and uric acid have been demonstrated in acute gout attacks, familial Mediterranean fever attacks, and the remodeling process of heart failure patients[21–23].

Similar to our findings, Ren et al.[24] also reported lower uric acid levels in women and in patients with distal vein thrombosis. Furthermore, in the presence of an enhanced thrombotic process and systemic inflammation, uric acid and mean platelet volume (MPV) are correlated[25,26]. We found that approximately 10% of MPV elevation could be explained by elevated uric acid levels. Based on these results, we believe that in emergency departments where D-dimer measurement is unavailable, uric acid –a routine emergency department biochemical parameter– may be utilized in the suspicion of rDVT.

Patients with DVT may experience local or systemic infections due to thrombophlebitis and lymphangitis, presenting with extremity pain, swelling, and erythema. As the infective process progresses, these patients require more healthcare resources[27]. Since all of our patients had rDVT, they were already in a state of chronic inflammation due to their underlying condition. Consequently, more than 50% of our cases exhibited a high infection burden. These patients posed a greater burden on the healthcare system due to prolonged hospitalization.

Endothelial system activation, immune system activation, and increased neutrophil, platelet, and cytokine activity due to thrombosis play significant roles in the pathogenesis of DVT. During this process, protein catabolism leads to elevated blood urea nitrogen levels, and coagulation disorders may develop[28]. In line with the literature, our patients with a high infection burden demonstrated higher blood urea nitrogen and INR levels. Additionally, these patients exhibited elevated uric acid and ALT levels as well as hypocalcemia. This phenomenon may be explained by a systemic inflammatory response secondary to rDVT.

Limitations

The primary limitations of our study include its single-center design and retrospective nature, which precluded access to patients' genetic analyses and hereditary risk factors.

Conclusion

In this study, valuable insights were obtained regarding rDVT by analyzing the demographic characteristics, clinical follow-up, and treatment processes of hospitalized patients. rDVT was observed more frequently in elderly males. In females, hormone replacement therapy, and in males, the presence of DM and CAD emerged as significant risk factors contributing to recurrence.

Notably, significant laboratory correlations between D-dimer and uric acid levels revealed the potential benefits of uric acid as a biomarker in emergency situations where access to comprehensive diagnostic tools is limited. Additionally, due to the relationship between high infection burden and prolonged hospital stays, we emphasize the need for proactive management of systemic inflammatory responses to optimize healthcare resource utilization.

Current study highlights the importance of classifying rDVT patients based on clinical and laboratory findings to improve treatment strategies. However, further research is needed to explore genetic and hereditary aspects that fall beyond the scope of this single-center retrospective study.

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