

Characteristics of portal vein thrombosis patients in the Anatolian city of Isparta: a retrospective single-center study

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ABSTRACT

Aims: This study investigated the clinical profiles of patients diagnosed with portal vein thrombosis (PVT) in Isparta, Türkiye.

Methods: This study enrolled 68 PVT patients who presented to Süleyman Demirel University Faculty of Medicine between January 4, 2021, and December 31, 2024 (inclusive of both dates). Eligible participants were adults over 18 years of age with a confirmed diagnosis of PVT identified via ultrasonography, documented within patient records during the specified period, with the initial diagnosis occurring within the specified study period.

Results: Among the 68 patients diagnosed with portal vein thrombosis, tumor thrombus was identified in 4 patients (5.9%). Portal region primary malignancies were identified in 11 of 68 PVT cases (16.2%), including stomach cancer (n=3), hepatocellular carcinoma (n=4), cholangiocarcinoma (n=2), and pancreatic cancer (n=2). Of the 64 patients without tumor thrombus, 31 (48.4%) had comorbid liver cirrhosis, while 33 (51.6%) did not. Additionally, our study found that approximately 12.5% of patients without tumor thrombus had atrial fibrillation. The study also identified essential thrombocytosis or polycythemia vera in approximately 7.8% (5 patients) of PVT cases without tumor thrombus.

Conclusion: The findings emphasize the need for vigilance regarding the potential development of PVT during the follow-up of patients with liver cirrhosis. Malignancies arising in the portal venous drainage territory or adjacent organs represent notable risk factors for PVT development. In addition, in cases of unexplained portal vein thrombosis, particularly when accompanied by findings such as thrombocytosis or polycythemia, myeloproliferative neoplasms should also be included in the differential diagnosis.

Keywords: Portal vein thrombosis, clinical features, cirrhosis, myeloproliferative diseases

INTRODUCTION

Deep vein thrombosis (DVT) refers to the formation of blood clots within the deep venous system, encompassing conditions such as pulmonary venous thrombosis, popliteal venous thrombosis, and portal vein thrombosis (PVT). These thrombotic events pose significant clinical challenges due to their potential for severe complications. Ageno et al.,¹ in a study conducted in Northwestern Italy, documented the incidence of PVT at 3.78 per 100,000 men and 1.73 per 100,000 women, highlighting a notable gender disparity in prevalence. Further insights into the etiology of PVT are provided by Rajani et al.,² who found that approximately 40% of affected patients had underlying liver disease, 27% presented with malignancy, 22% exhibited thrombophilia factors, and 11% were diagnosed with myeloproliferative disorders. The same study revealed that 46% of PVT patients exhibited multiple concurrent risk factors, underscoring the multifactorial nature of this condition.² Advances in non-invasive imaging modalities, including Doppler ultrasonography (USG), magnetic resonance imaging (MRI) venography, and computed tomography (CT), have enhanced the diagnostic precision of PVT, facilitating timely intervention.

In the context of liver cirrhosis, PVT may emerge as a clinically significant complication encountered during disease progression. Nery et al.³ reported a 5-year cumulative incidence rate of PVT in patients with liver cirrhosis as 10.7%. The present study seeks to characterize the demographic and clinical profiles of patients diagnosed with PVT via ultrasonography in Isparta province. Specifically, we aim to examine the gender distribution, and associated comorbidities among these patients. Additionally, this investigation explores potential differences in age, gender, and key hematological parameters between individuals with liver cirrhosis and PVT and those with PVT in the absence of cirrhosis.

METHODS

The study protocol was approved by the Süleyman Demirel University Ethics Committee (Date: 20.02.2025, Decision No: 92/30). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

This study enrolled 68 patients who presented to Süleyman Demirel University Faculty of Medicine (Süleyman Demirel

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Research and Training Hospital) between January 4, 2021, and December 31, 2024 (inclusive of both dates). Eligible participants were adults over 18 years of age with a confirmed diagnosis of PVT identified via USG or Doppler USG, documented within patient records during the specified period, with the initial diagnosis occurring within the specified study period.

Exclusion criteria encompassed patients under 18 years of age, non-Turkish citizens, absence of portal vein thrombosis, and those who developed PVT following liver transplantation.

For each eligible patient, we documented demographic information including age at diagnosis and gender. Additionally, we recorded pre-existing chronic conditions diagnosed prior to or concurrent with PVT detection, with frequency distributions presented in tabular format. Clinical and laboratory parameters (including hemogram values) were assessed at diagnosis.

Finally, we conducted comparative analyses between two cohorts: patients with PVT and comorbid liver cirrhosis versus those with PVT without liver cirrhosis. These comparisons examined differences in gender distribution, age at diagnosis, and hemogram parameters between the groups.

Statistical Analysis

For data presentation, categorical variables were reported as frequencies (numbers) and percentages, while numerical variables were presented as mean±standard deviation, median with interquartile range (25th-75th percentiles), and minimum-maximum values. All data were organized in tabular format.

To assess normality distribution of numerical data, both Kolmogorov-Smirnov and Shapiro-Wilk tests were employed. The Kolmogorov-Smirnov test was applied for samples exceeding 50 observations, while the Shapiro-Wilk test was used for samples of 50 or fewer. Additionally, skewness and kurtosis values were examined for variables that did not initially meet normality criteria; values between -1.5 and +1.5 were considered to indicate acceptable normality (Tabachnick & Fidell, 6th edition).⁴ For normally distributed variables, parametric tests were applied and data were presented as mean±standard deviation. Non-normally distributed variables were analyzed using non-parametric methods and reported as median with interquartile range.

For between-group comparisons, the independent samples T test was utilized for normally distributed continuous variables, while the Mann-Whitney U test was employed for non-normally distributed continuous variables. The Chi-square test was used to analyze categorical data. To improve the accuracy of the test for small sample sizes, Yates' continuity correction was applied. All statistical analyses were performed using IBM SPSS Statistics for Windows, Version 22.0 (IBM Corp., Armonk, NY). Statistical significance was defined as p<0.05.

Given the retrospective nature of this study, data were sourced exclusively from electronic patient records and archived files at Süleyman Demirel University Faculty of Medicine. This included findings, diagnoses, patient characteristics, test results, follow-up notes, and medication reports accessed via the electronic patient data system to verify chronic conditions.

RESULTS

Among the 68 patients diagnosed with portal vein thrombosis, tumor thrombus was identified in 4 patients (5.9%). The underlying malignancies in these cases included cholangiocellular carcinoma (n=1), hepatocellular carcinoma (n=2), and gastric carcinoma (n=1). None of the study participants were pregnant at the time of diagnosis. Six patients had a documented history of venous thrombosis in other locations prior to developing portal vein thrombosis.

Of the 64 patients without tumor thrombus, three had previously undergone splenectomy. Among these splenectomized patients, one had a pre-existing diagnosis of immune thrombocytopenia (ITP), another had a history of atrial fibrillation (AF), and the third patient had multiple comorbidities including diabetes mellitus, hyperlipidemia, and hypertension prior to PVT diagnosis.

For the 64 patients without tumor thrombus, the mean age at diagnosis was 59.0±15.7 years (range: 20-91 years). The cohort comprised 33 females (51.6%) with a mean age of 58.2±16.2 years (range: 20-91 years) and 31 males with a mean age of 59.9±15.4 years (range: 23-86 years). No statistically significant difference in age was observed between gender groups (p=0.665). **Table 1** summarizes the comorbid conditions present at or before PVT diagnosis in these 64 patients.

Comorbid disease	n	%
Liver cirrhosis	31	48.44%
Atrial fibrillation	8	12.5%
Diabetes mellitus	21	32.81%
Hypertension	21	32.81%
Coronary artery disease	10	15.62%
Hypothyroidism	2	3.12%
Asthma	6	9.37%
Immune thrombocytopenia	1	1.56%
Essential thrombocytosis	3	4.68%
Polycythemia vera	2	3.12%
Parkinson's disease	1	1.56%
Gout	1	1.56%
Panhypopituitarism	1	1.56%
Fibromyalgia	1	1.56%
Polyarteritis nodosa	1	1.56%
Alzheimer's disease	1	1.56%
Ankylosing spondylitis	1	1.56%

Solid organ malignancies identified at or prior to the diagnosis of PVT among the 64 patients without evidence of tumor thrombus are detailed in **Table 2**.

Of the 64 patients without tumor thrombus, 31 (48.4%) had comorbid liver cirrhosis, while 33 (51.6%) did not. A comparison of demographic characteristics and hemogram parameters between these cirrhotic and non-cirrhotic groups is presented in **Table 3**.

Table 2. Solid organ malignancy histories in portal vein thrombosis cases

Solid organ malignancy	n	%
Stomach cancer	2	3.12%
Breast cancer	2	3.12%
Hepatocellular cancer	2	3.12%
Prostate cancer	2	3.12%
Pancreatic cancer	2	3.12%
Endometrial cancer	1	1.56%
Bladder cancer	1	1.56%
Cholangiocellular cancer	1	1.56%
Basal cell skin cancer	1	1.56%
Small lymphocytic lymphoma	1	1.56%

Table 3. Comparison of demographic characteristics and hemogram parameters according to the presence of liver cirrhosis at the time of portal vein thrombosis in portal vein thrombosis patients

Variables	Liver cirrhosis			p
	Number-percentage (%)		p	
	Yes (n=31)	No (n=33)		
Gender				
	Female	17 (54.8%)	16 (48.5%)	0.796 ¹
	Male	14 (45.2%)	17 (51.5%)	
Age (years)	63.8±12.4	54.5±17.3		0.017 ²
WBC (leukocyte) (x10 ³ /mm ³)	4.7 (3.35-5.85)	7 (4.4-9.3)		0.011 ³
Hemoglobin (g/dl)	11.4±2.6	12.3±2.6		0.199 ²
Hematocrit (%)	34.1±7.3	36.5±7.6		0.212 ²
Platelet (thrombocyte) (x10 ³ /mm ³)	95 (64.5-139)	182 (135-291)		0.000 ³

WBC: White blood count, ¹Chi-square test (with Yates's continuity correction), ²Independent samples T test, ³Mann-Whitney U test, WBC: White blood cell

Hematological parameter analysis revealed significant differences between patient groups. The median white blood cell (WBC) count was significantly lower in patients with liver cirrhosis [4.7 (3.35-5.85)×10³/mm³] compared to non-cirrhotic patients [7.0 (4.4-9.3)×10³/mm³] (p=0.011). Although mean hemoglobin levels were reduced in the cirrhosis group (11.4±2.6 g/dl versus 12.3±2.6 g/dl in non-cirrhotic patients), this difference was not statistically significant (p=0.199). Most notably, median platelet counts were substantially lower in cirrhotic patients [95 (64.5-139)×10³/mm³] than in those without cirrhosis [182 (135-291)×10³/mm³], representing a highly significant difference (p<0.001).

DISCUSSION

Ögren et al.⁵ reported that among PVT patients, 28% had cirrhosis, 3% had myeloproliferative disease, 23% had primary hepatobiliary malignancy, and 44% had secondary hepatobiliary malignancy. Our findings revealed a notably higher prevalence of liver cirrhosis, with approximately 48.5% of non-tumor thrombus PVT cases presenting with this condition. This elevated rate underscores the importance of conducting baseline evaluations for liver cirrhosis in all newly diagnosed portal vein thrombosis cases.

The study also identified essential thrombocytosis or polycythemia vera in approximately 7.8% (5 patients) of portal vein thrombosis cases without tumor thrombus. Despite one of these patients having concurrent atrial fibrillation, this prevalence remains noteworthy. These findings suggest that myeloproliferative neoplasms should be considered in the differential diagnosis of portal vein thrombosis, recognizing their propensity to cause thrombosis at atypical vascular sites.

Previous research by Pastori et al.⁶ and Horneham et al.⁷ has demonstrated an increased risk of venous thromboembolism in the early months following atrial fibrillation (AF) diagnosis. Furthermore, Wang et al.⁸ reported that atrial fibrillation is associated with elevated venous thromboembolism risk during long-term follow-up. Our study found that approximately 12.5% of patients without tumor thrombus had atrial fibrillation. Interestingly, in approximately 42% (5 patients) of these AF cases, PVT developed more than two years after the initial AF diagnosis. This observation highlights the importance of maintaining vigilance for venous thromboembolism, including portal vein thrombosis, throughout both early and late stages of atrial fibrillation management. Moreover, as demonstrated in our cohort, these AF patients may present with multiple chronic comorbidities, emphasizing the necessity of comprehensive care addressing all concurrent conditions in this high-risk population.

Pirisi et al.⁹ examined autopsy data from 72 hepatocellular carcinoma patients and reported PVT in 44% of cases. Similarly, Ali et al.¹⁰ documented a 42.4% frequency of PVT among hepatocellular carcinoma patients. In a larger study of 583 PVT cases without tumor thrombus, Prasad et al.¹¹ found concurrent malignancy in 236 patients (40.48%), with hepatocellular carcinoma, pancreatic cancer, colorectal cancer, and cholangiocarcinoma being the most frequently observed malignancies. Our findings align with these observations, as portal region primary malignancies were identified in 11 of our 68 PVT cases (16.2%), including stomach cancer (n=3), hepatocellular carcinoma (n=4), cholangiocarcinoma (n=2), and pancreatic cancer (n=2). Among these cases, tumor thrombus was present in 4 patients. The overall frequency of malignancy history in our non-tumor thrombus PVT cohort was approximately 23.4%, which is lower than the 40.48% reported by Prasad et al. When considered alongside the existing literature, our findings suggest that particular vigilance should be exercised regarding PVT risk in patients with malignancies of the portal drainage area or organs adjacent to the portal vein.

Limitations

As a retrospective study, our findings are subject to inherent limitations, including potential selection bias. Due to concerns regarding data completeness and the high likelihood of selective reporting in the available records, we did not analyze the frequencies of certain accompanying chronic diseases (such as hyperlipidemia, chronic kidney disease, benign prostatic hyperplasia, osteoporosis, and psychiatric conditions); this exclusion represents a shortcoming of our analysis. Furthermore, it was noted that thrombophilia testing was infrequently performed among the patient cohort. Consequently, these results could not be included in the study or analyses, constituting another important limitation.

CONCLUSION

As a result, these findings emphasize the need for vigilance regarding the potential development of portal vein thrombosis during the follow-up of patients with liver cirrhosis. Malignancies arising in the portal venous drainage territory or adjacent organs represent particularly outstanding conditions for portal vein thrombosis development. In cases of unexplained portal vein thrombosis, particularly when accompanied by findings such as thrombocytosis or polycythemia, myeloproliferative neoplasms should also be included in the differential diagnosis, and appropriate hematological investigations should be initiated when clinically indicated.

ETHICAL DECLARATIONS

Ethics Committee Approval

The study was carried out with the permission of the Süleyman Demirel University Ethics Committee (Date: 20.02.2025, Decision No: 92/30).

Informed Consent

Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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