An Unusual Presentation of Myeloproliferative Neoplasia

Case Report

Paula Hernández-Sanjuán[1], Lucía Gandía-Blanquer[1], Marina Vidal-Pelayo[1], Miguel Ángel Vázquez-Ronda[1,3], Alba Vilches-Moreno[2] and Jorge F. Gómez-Cerezo[1,3]

[1] *Servicio de Medicina Interna. Hospital Universitario Infanta Sofía, Fundación para la Investigación e Innovación Biomédica del Hospital Universitario Infanta Sofía y Hospital Universitario del Henares (FIIB HUIS HHEN), Madrid, Spain*
[2] *Servicio de Hematología. Hospital Universitario Infanta Sofía, Fundación para la Investigación e Innovación Biomédica del Hospital Universitario Infanta Sofía y Hospital Universitario del Henares (FIIB HUIS HHEN), Madrid, Spain*
[3] *Universidad Europea, Madrid, España*

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Abstract— Background: Acute myocardial infarction (AMI) in young individuals without traditional cardiovascular risk factors is rare and should prompt evaluation for unusual causes. One such infrequent etiology is chronic myeloproliferative neoplasms (MPNs). **Case Report:** We present the case of a 33-year-old man admitted with non-ST elevation acute coronary syndrome (NSTE-ACS). Coronary angiography revealed no obstructive lesions, leading to a diagnosis of MINOCA (myocardial infarction with non-obstructive coronary arteries). A chest CT scan ruled out acute aortic syndrome but detected thrombi in the aorta and right common iliac artery. Laboratory studies revealed persistent thrombocytosis for at least four years, suggesting a chronic MPN. Further investigations—including autoimmune and thrombophilia screening, JAK2 mutation testing, and bone marrow biopsy—confirmed the diagnosis of polycythemia vera. Anticoagulation therapy was initiated. MPNs are known to increase the risk of both venous and arterial thrombotic events, including AMI and large-vessel thrombosis. These complications are associated with high morbidity and mortality, even in the absence of conventional cardiovascular risk factors. Conclusion: In young patients presenting with AMI or arterial thrombosis without identifiable cardiovascular risk factors, especially when persistent hematologic abnormalities are found, an underlying myeloproliferative neoplasm should be considered. Early diagnosis is crucial to guide appropriate management and reduce the risk of recurrence. **Rev Med Clin 2025;9(1):e14042509005**

Keywords—Aortic thrombosis, Myocardial infarctino with non-obstructive coronary arteries, Chronic myeloproliferative neoplasia, Polycythemia vera

Resumen— Presentación Poco Frecuente de la Neoplasia Mieloproliferativa

Introducción: El infarto agudo de miocardio (IAM) en pacientes jóvenes sin factores de riesgo cardiovascular tradicionales es infrecuente y debe hacer sospechar causas atípicas. Una de ellas, poco común, son las neoplasias mieloproliferativas crónicas (NMP). Reporte de Caso: Presentamos el caso de un varón de 33 años ingresado por síndrome coronario agudo sin elevación del ST (SCASEST). La coronariografía no mostró lesiones obstructivas, por lo que se diagnosticó un MINOCA (infarto de miocardio sin lesiones obstructivas en las arterias coronarias). Una tomografía torácica descartó síndrome aórtico agudo, pero reveló trombos en la aorta y en la arteria ilíaca común derecha. Los análisis mostraron trombocitosis persistente durante al menos cuatro años, lo que hizo sospechar una NMP. Se solicitaron estudios de autoinmunidad y trombofilia, análisis de la mutación JAK2 y biopsia de médula ósea, que confirmaron el diagnóstico de policitemia vera. Se inició tratamiento anticoagulante. Las NMP se asocian a eventos trombóticos arteriales y venosos, incluyendo IAM y trombosis de grandes vasos, incluso en ausencia de factores de riesgo clásicos. Estas complicaciones conllevan una elevada morbimortalidad. **Conclusión:** Ante un IAM o trombosis arterial en pacientes jóvenes sin factores de riesgo cardiovascular, especialmente si existen alteraciones hematológicas persistentes, debe considerarse una neoplasia mieloproliferativa como posible causa. El diagnóstico precoz es clave para un manejo adecuado y la prevención de recurrencias. **Rev Med Clin 2025;9(1):e14042509005**

Palabras clave—Trombosis aórtica, Infarto al miocardio sin obstrucción de arterias coronarias, Neoplasia mieloproliferativa crónica, Policitemia vera

Introduction

This case report represents an atypical presentation of polycythemia vera (PV), characterized by an initial presentation of an acute coronary syndrome (ACS) and aortic thrombosis in a young patient. It poses a challenging diagnosis since these complications of a myeloproliferative disorder are uncommon and present with high morbidity and mortality rates. The limited literature and the absence of consensus on the treatment of these complications make this an unusual case in daily clinical practice.

Case Report

A 33-year-old man, an occasional cannabis smoker with no cardiovascular risk factors, arrived at the Emergency Department experiencing continuous oppressive pain in the left hemithorax at rest and paresthesias in the left upper and lower limbs for approximately two hours. His family history included a mother who had an acute myocardial infarction between the ages of 30-40 years.

Upon arrival at the emergency room, he was afebrile, with arterial hypertension (177/116 mmHg), a heart rate (HR) within the normal range (83 bpm), and an oxygen saturation (SatO2) of 96% at baseline. Cardiopulmonary auscultation revealed no murmurs or other added sounds, no abdominal pain, or lower limb edema. Neurologically, his language was preserved with normal oculomotor movements, muscle strength, and sensitivity without alterations, and no meningeal signs or neurological focus.

The electrocardiogram (Figure 1) showed a sinus rhythm (75 bpm), a 45º axis, and asymmetric negative T waves in II, III, aVF, V5-V6, suggesting subepicardial inferolateral ischemia. The chest X-ray (Figure 2) showed no evidence of disease.

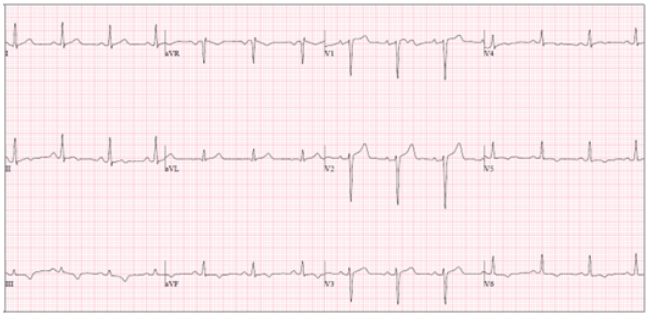

Figure 1: Electrocardiogram on arrival to the emergency room.

Blood tests (Table 1) revealed a hemoglobin at the high limit of normal (17 g/dl, normal range 13.5-17.2 g/dl),

Contact data: Paula Hernández-Sanjuán, 1Servicio de Medicina Interna. Hospital Universitario Infanta Sofía, Fundación para la Investigación e Innovación Biomédica del Hospital Universitario Infanta Sofía y Hospital Universitario del Henares (FIIB HUIS HHEN), Madrid, Spain., Phone number: (+34) 66 330 6663, phsanjuan@salud.madrid.org

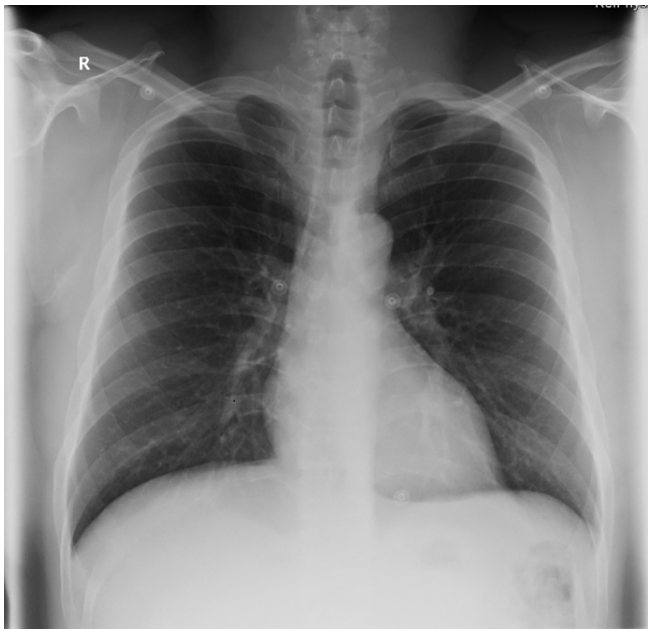

Figure 2: Chest X-ray on arrival to the emergency room.

thrombocytosis of 792,000/mcL (normal range 140,000-370,000/mcL) and elevated markers of myocardial damage. Troponin levels were measured, with a first determination of 505 pg/mL and a second determination 3 hours later of 747 pg/mL (normal range 0-60 pg/mL).

Parameter	Value	Normality Range
Leukocytes	11,370mcL	3,900-12,200mcL
Hemoglobin	17gr/dL	13.5-17.2g/dL
Hematocrit	52.4%	39.5-50.5&
Platelets	792,000mcL	140,000-370,000mcL
CPK	582U/L	46-171U/L
Troponin I	505pg/mL	0-60pg/mL
Creatinine	1.09mg/dl	0.6-1.2mg/dl
C-reactive protein	2.1mg/L	0-5mg/L

Table 1: Blood tests.

Given the possibility of a non-ST-elevation acute coronary syndrome (NSTE-ACS), a transthoracic echocardiogram was performed, showing no segmental contractility alterations, valvulopathies, or pericardial effusion with an ejection fraction preserved. The study was extended with a coronary angiography, finding no obstructive lesions in the epicardial coronary vessels, therefore compatible with a possible myocardial infarction with no obstructive coronary arteries (MINOCA).

Due to the patient presenting with chest pain, a hypertensive crisis, and elevated myocardial damage markers upon arrival, an aortic CT scan was performed to rule out an acute aortic syndrome. It showed no evidence of acute aortic syndrome, but isolated filling defects were identified in the tran-

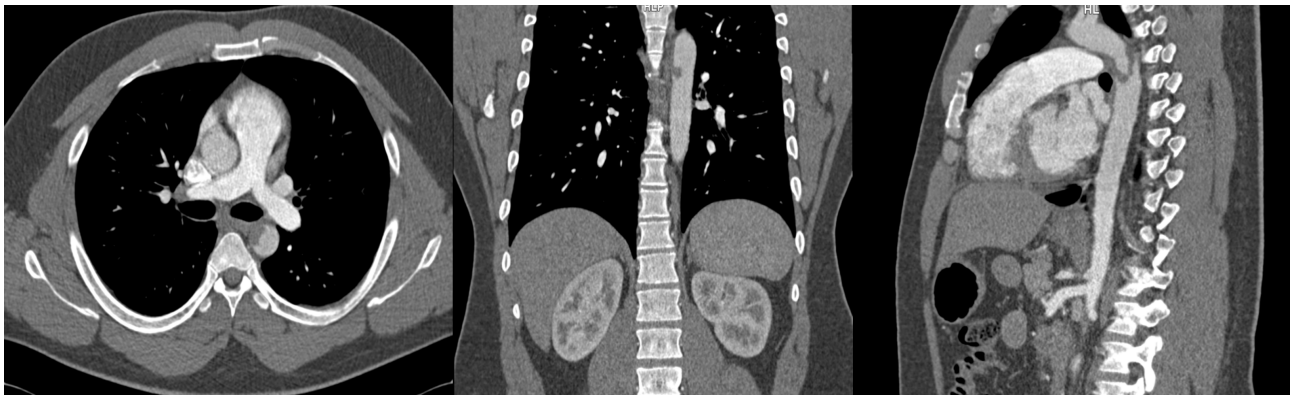

Figure 3: CT images in the transverse, coronal and sagittal planes showing eccentric partial thrombosis at the level of the arch of the aorta and descending aorta.

sition area of the aortic arch/descending thoracic aorta (Figure 3 and in the right distal common iliac (Figure 4), all compatible with eccentric partial thrombosis at these levels. To characterize the arterial thrombi described on the chest CT and given the absence of lesions at other levels, the study was completed with an aortic magnetic resonance imaging (MRI), which showed a normal-sized aorta, without mural thickening, and with eccentric filling defects in the proximal descending thoracic aorta.

Regarding the detected thrombocytosis, the patient's previous blood tests were reviewed, showing persistent thrombocytosis since 2019 (Figure 5), with previous platelet counts of up to 658.000/mcL, and with hemoglobin levels always in the high limit of normal.

Due to the findings in the imaging tests carried out so far, as well as the presence of persistent thrombocytosis for years, studies for thrombophilia, autoimmunity, serology, peripheral smear, and genetic studies were requested to determine possible precipitating causes of the patient's current condition. No alterations in immunity or findings of thrombophilia were detected except for one positive lupus antibody in a single determination. Serology for HIV, syphilis, HBV, HCV, Coxiella burnetii, and Rickettsia were negative. In the peripheral blood smear, platelets showed discrete anisocytosis, slight lymphocyte activation, and a normocytic,normochromic red series were observed.

The genetic study for the main mutations of myeloproliferative neoplasia was positive for the JAK2 V617F gene mutation and negative for CALR and MPL mutations. A bone marrow biopsy was performed to confirm the probable myeloproliferative neoplasia, showing a 75% hypercellularity with increased megakaryocytic and granulocytic series, with increased immature precursors CD117+ and erythroid. Based on these characteristics and the analytical data, a diagnosis of chronic myeloproliferative neoplasia, including essential thrombocythemia, can be made. However, the increase in the rest of the series and the size of the megakaryocytes do not exclude the possibility of polycythemia vera with a thrombocythemic onset ("masked").

Finally, he was diagnosed with polycythemia vera according to the current diagnostic criteria by the World Health Organization in 2017. As he presented with hemoglobin >16.5 g/dl, hematocrit >49%, erythropoietin below reference levels (levels < 1.50 mU/ml, range 3.70 - 31.50 mU/ml); bone marrow biopsy with trilinear hypercellularity (erythroid, granulocytic, and megakaryocytic proliferation) (Figure 6); and the presence of the JAK2V617F mutation, meeting all diagnostic criteria.

Anticoagulation with low molecular weight heparin was started when arterial thrombosis was evidenced on the CT scan. Subsequently, after confirmation of polycythemia vera, hydroxyurea was added to the treatment, and heparin was replaced by oral anticoagulation indefinitely.

At the follow-up, the patient underwent periodic blood tests every 1-2 months, with the last platelet count of 431,000/mcL (Figure 7). He remains asymptomatic and maintains good treatment adherence.

Discussion

Myeloproliferative disorders or chronic myeloproliferative neoplasia (MPN) encompass a group of diseases characterized by abnormal proliferation of myeloid pluripotent progenitor cells, including polycythemia vera. This disease is characterized by excessive proliferation of erythroid precursors, granulocytes, and megakaryocytes with a primary increase in erythrocyte mass and a secondary decrease in erythropoietin.

The onset of this disease is usually gradual, with a mean age at diagnosis of 60 years, with a higher prevalence in men compared to women in a ratio of 8:1. The clinical manifestations of PV are varied and include headache, general malaise, dizziness, tinnitus, visual disturbances, paresthesia, erythromelalgia, abdominal pain, constitutional syndrome, bleeding, and thrombosis-related symptoms. Patients often present with aquagenic pruritus. Physical findings may include facial plethora, hepatosplenomegaly, conjunctival injection, superficial thrombophlebitis, and hypertension.[1]

The most frequent complications include hemorrhagic events as well as venous and arterial thrombotic events. The

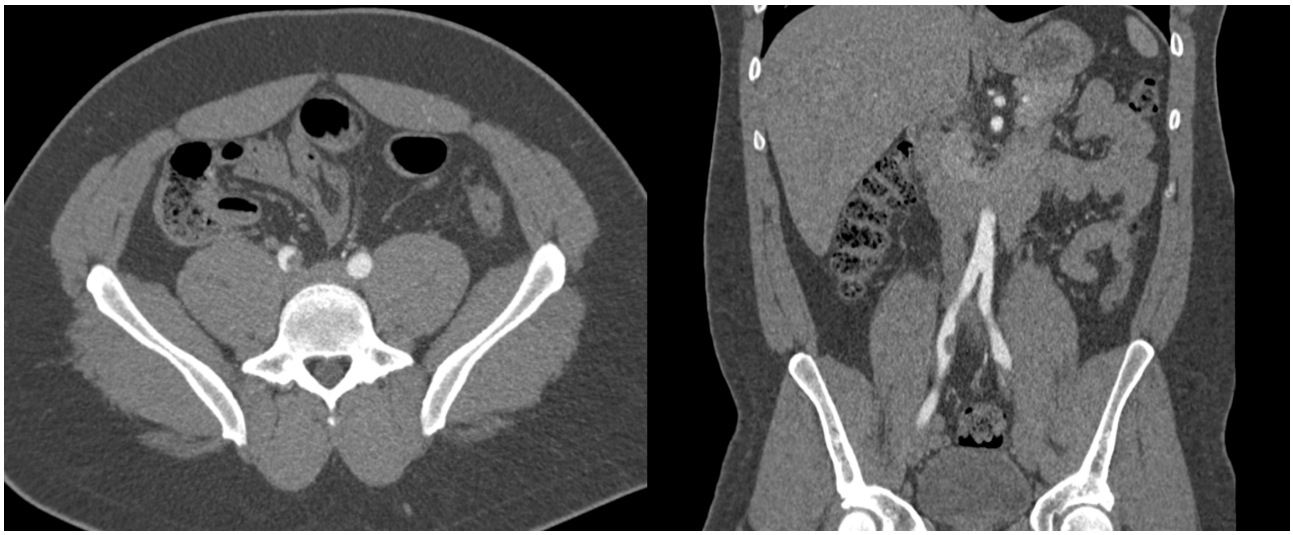

Figure 4: CT images in the transverse and coronal plane showing eccentric partial thrombosis at the level of the right distal common iliac artery.

pathogenesis of thrombotic phenomena is multifactorial, although two fundamental mechanisms have been described that favor a state of hypercoagulability: the expression of a prothrombotic phenotype of abnormal blood cells and the proinflammatory state derived from the release of cytokines by neoplastic cells.[2]

After a literature search on PubMed about myeloproliferative neoplasia and aortic thrombosis, most reported cases were related to essential thrombocythemia (ET) and aortic thrombosis, with very few referring to polycythemia vera.

Several studies have observed that the incidence of arterial and venous thrombotic events before or at the diagnosis of PV is 17-20% and 9-12%, respectively.[3] Arterial thrombotic events are the main cause of morbidity and mortality and include, in order of frequency, ischemic stroke (established stroke and transient ischemic stroke), ischemic heart disease, and peripheral arteriopathy [2], as opposed to essential thrombocythemia where the involvement is usually more at the microcirculation level.[4]

Less common is the onset of a myeloproliferative disorder in the form of thrombosis of atypical location, such as at the aortic level. It has been documented that the presence of the JAK2V617F mutation is associated not only with an increased incidence of thrombotic events,[4] but also with the occurrence of thrombi of unusual location.

This mutation is present in more than 95% of PV cases and up to 60% of ET cases, increasing the thrombotic risk by altering hemostasis and favoring a hypercoagulable state.[5] Conversely, it has been determined that up to 15% of patients with portal venous thrombosis and up to 50% of patients with Budd-Chiari syndrome present the JAK2V617F mutation. In these cases, the presence of a myeloproliferative neoplasia should be suspected and the screening process initiated, even if there are no abnormalities in the blood count. In the case of PV, according to a Spanish registry, out of a total of 890

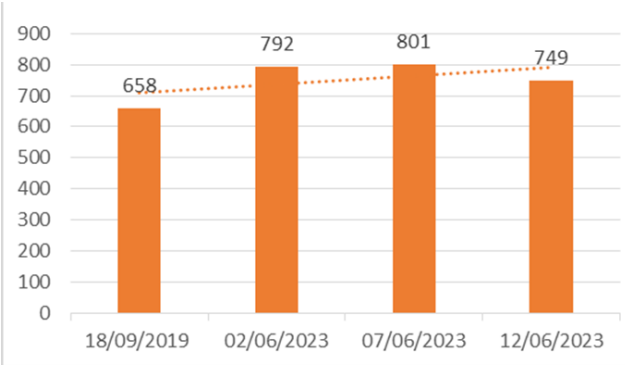

Figure 5: Platelet count expressed in 10^3/L from 2019 until patient's admission.

patients with PV, 20% of the patients had a history of thrombosis and 9% had a thrombotic event at the time of diagnosis of this MPN.[1]

As for coronary events in patients with diagnosed PV, they can become common with a rate of up to 11.4% at a 10-year follow-up.[6] However, the presentation of PV in the form of AMI (acute myocardial infarction) is truly atypical. Acute myocardial infarction in myeloproliferative disease is attributed to the formation of a coronary thrombus as a consequence of thrombocytosis and hematologic hyperviscosity.[6] In a study that included 439,716 patients with ACS, it was observed that 2,104 (0.5%) also had a hematological malignancy, with myelodysplastic/myeloproliferative disorders predominating among them (27.7%) .[7]

On the other hand, in those young patients, without a known hematological neoplasia, who present with an acute coronary syndrome without cardiovascular risk factors (hypertension, diabetes, dyslipidemia) or with associated large vessel thrombosis, a myeloproliferative disorder as a possible causative factor must be ruled out.

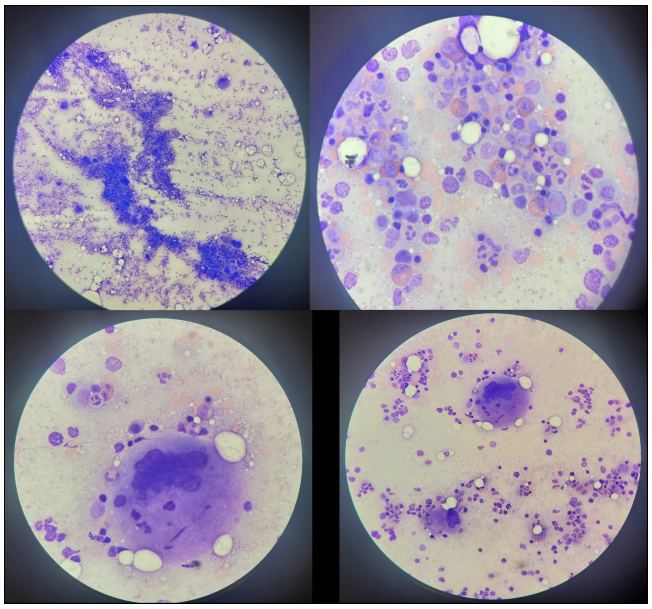

Figure 6: X20 magnification microphotography with Wright staining showing abundant megakaryocytes in an extension of hypercellular bone marrow.

It should be especially suspected if the patient has no risk factors, presents an anterior or left ACS, without an atherosclerotic lesion, and elevation of any of the hematologic series. It would be advisable to repeat the analysis after the acute process, and if the alteration persists iit is due to a myeloproliferative neoplasia.[4,8]

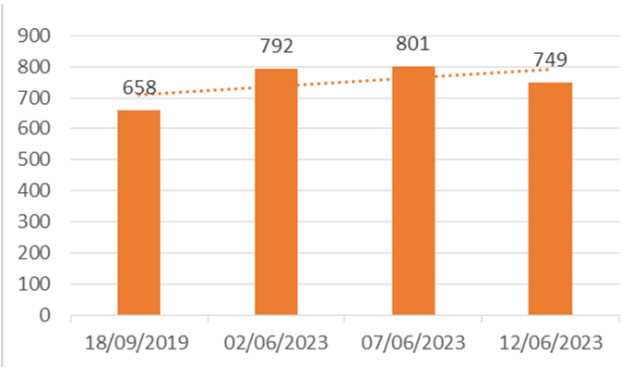

Figure 7: Platelet count (expressed in en $10^3/L$) *from diagnosis to the present*.

Therefore, aortic thrombosis and AMI are events that, although very rare in patients with MPN (the vast majority of which are described in patients with essential thrombocytosis), may lead to death, and therefore it is essential to suspect them. This case is of great interest not only because of the age of presentation but also because of the atypical onset of MINOCA and aortic thrombosis in a patient with a long-standing untreated polycythemia vera myeloproliferative neoplasia.

The treatment of PV varies according to age and thrombotic events, dividing patients into high-risk and low-risk.[9] Patients over 60 years or those with a history of thrombotic events are considered high-risk patients, so treatment is based on low-dose aspirin and the use of first-line cytoreductive agents such as hydroxyurea, busulfan, or alpha interferon.

As for its complications, there is no clear consensus on the best approach to this type of event. Therapeutic options range from simple observation and anticoagulant medical treatment to urgent surgical intervention[10] either in the form of thrombectomy or endovascular exclusion.[11] A case published in 2022 about a patient with thrombosis at the level of the thoracic aorta secondary to polycythemia vera was treated conservatively with anticoagulation and the antiplatelet agent Iloprost together with aspirin, statins, and hydroxyurea, resolving the case successfully.[12]

There are few published cases in which large vessel thrombosis associated with MPN has been treated surgically. Thus, in some studies, it has been observed that surgery carries a lower risk of recurrence compared to anticoagulant treatment,[13] while others consider that surgical treatment should be reserved for patients in whom conservative treatment is contraindicated, such as patients with organ ischemia.[14] The latter is supported by the fact that, in most cases, complete resolution of the thrombus occurs only with anticoagulant treatment, and the surgical treatment of aortic thrombosis has been associated with a greater risk of cerebral bleeding, intestinal ischemia, and even the appearance of acute renal failure, thus favoring a non-surgical approach.[15]

Therefore, given that the medical treatment seems to be a safe and effective alternative in the treatment of arterial thrombi, also of large vessels, anticoagulant and cytoreductive treatment seems reasonable in our patient, although the evidence in this regard is scarce. Further studies are required to establish optimal and safe management in these cases.[16]

Conclusion

Polycythemia vera is an exceptional cause of aortic thrombosis due to its atypical location and acute coronary syndrome without atherosclerotic lesions.

However, we should suspect this entity in patients without cardiovascular risk factors, hypercoagulability states, or altered hematologic count who debut with these findings. The diagnostic suspicion, despite the low prevalence, implies a change in the prognosis of these patients given the high morbidity and mortality rates that it entails.

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Author Contributions

Author contributions: PHS, LGB, MVP wrote and revised the main manuscript. PHS, LGB prepared the figure. PHS, LGB reviewed the references. MAVR, JFGC and AVM reviewed all the manuscripts. All authors read and approved the final manuscript.

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AVAILABILITY OF SUPPORTING DATA

The dataset of the current study is available from the corresponding author upon motivated request.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Informed consent has been obtained from the patient.

CONSENT FOR PUBLICATION

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

COMPETING INTERESTS

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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