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May-Thurner Syndrome with Double Compression of the Iliac Vein: Lessons Based on a Case Report

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Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
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Conflict of interest: None declared

Patient: Female, 73-year-old
Final Diagnosis: May-Thurner syndrome with double stenosis of the left common iliac vein
Symptoms: Acute onset of worsening dyspnea, with lymphedema of the left lower limb
Medication: —
Clinical Procedure: —
Specialty: Diagnostics, Laboratory • Radiology

Objective: Rare disease

Background: May-Thurner syndrome, also known as Cockett's syndrome, is characterized by vascular alterations due to stenosis of the left iliac vein, usually caused by compression against the vertebral column by the right iliac artery. Doppler ultrasound represents the first level of examination for the study of this vascular pathology, and allows a very accurate study of the lower-limb vessels. We describe an unusual presentation with double stenosis of the left common iliac vein.

Case Report: A 73-year-old woman came to the clinic for acute onset of worsening dyspnea, with lymphedema of the left lower limb, and was examined using ultrasound and multidetector computed tomography. The Doppler ultrasound exam showed 2 compressions of the common iliac vein by the right and left iliac artery due to a combination of osteophytosis of the vertebral column and reduced distance between the left iliac vein and the spine.

Conclusions: May-Thurner syndrome should be suspected in patients with symptoms of venous stasis of the left lower limb. Doppler ultrasound identified stenosis of the common iliac vein and the consequent flow changes. Failure to diagnose and treat May-Thurner syndrome could expose patients to very serious risks to their health.

Keywords: Cardiovascular Abnormalities • May-Thurner Syndrome • Multidetector Computed Tomography • Ultrasonography, Doppler, Color

Abbreviations: **LCIV** – left common iliac vein; **MTS** – May-Thurner syndrome; **RCIA** – right common iliac artery; **MDCT –** multidetector computed tomography; **MRI** – magnetic resonance imaging; **LCIA** – left common iliac artery; **PSV** – peak speed velocity; **RCIV** – right common iliac vein; **AA** – abdominal aorta; **L5** – fifth lumbar vertebra

Full-text PDF: https://www.amjcaserep.com/abstract/index/idArt/928957

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Background

May-Thurner syndrome (MTS) was described in 1957 by May and Thurner as a vascular anomaly due to stenosis of the left common iliac vein (LCIV) caused by the contiguous iliac artery pushing the LCIV against the vertebra [1]. The disease is also known as Cockett's syndrome [2]. If the space separating the iliac arteries from the spine is narrowed, either congenitally or acquired, it can cause venous compression (**Figure 1A, 1B**). Stenosis results when chronic pulsing of the arterial vessel leads to accumulation of elastin and collagen in the vein, causing a progressive hardening and reduction of the lumen with consequent venous stasis and chronic thrombosis [3]. Ultrasound is the first-level exam for patients with MTS, and allows a very accurate study of the iliac vessels. Multidetector computed tomography (MDCT) can also be used in these patients to exclude any utero-adnexal neoplasms [4], abdominal aortic dilations [5], uterine myoma [6], spinal listhesis [7], pulmonary embolism [8], or cerebral embolism [9]. MDCT can also show the compression of the LCIV as well as the venous thrombosis [10]. Magnetic resonance imaging (MRI) can highlight the alterations brought about by MTS, and can be used in cases of renal insufficiency to avoid the nephrotoxicity of the contrast agents used in MDCT [11]. In MTS, the stenosis of the LCIV is almost always caused by RCIA. We describe a case with LCIV double stenosis of the common iliac arteries due to the combination of an osteophytosis of the spine and reduced distance between the LCIA and the vertebral column.

Case Report

A 73-year-old woman came to our clinic for acute onset of worsening dyspnea, with lymphedema of the left lower limb. The patient initially underwent MDCT angiography of the pulmonary arteries and deep vessels of the legs using a 64-slice CT device and was subsequently subjected to ultrasound examination performed with a Toshiba ultrasound system, using a 3.5 MHz transducer with B-mode ultrasound and Doppler ultrasound techniques. The ultrasound was performed with the patient in supine position for the study of the arterial and venous vessels. Ultrasound examination was performed by an operator with 20 years of experience. The following were measured in detail: pre- and post-stenotic LCIV peak speed velocity (PSV); flow ratio (FR) obtained from the difference between the speed peak after (**Video 1**) and before (**Video 2**) stenosis; the thickness of the iliac-vertebral space measured between the arterial wall and the adjacent vertebra; and diameter and

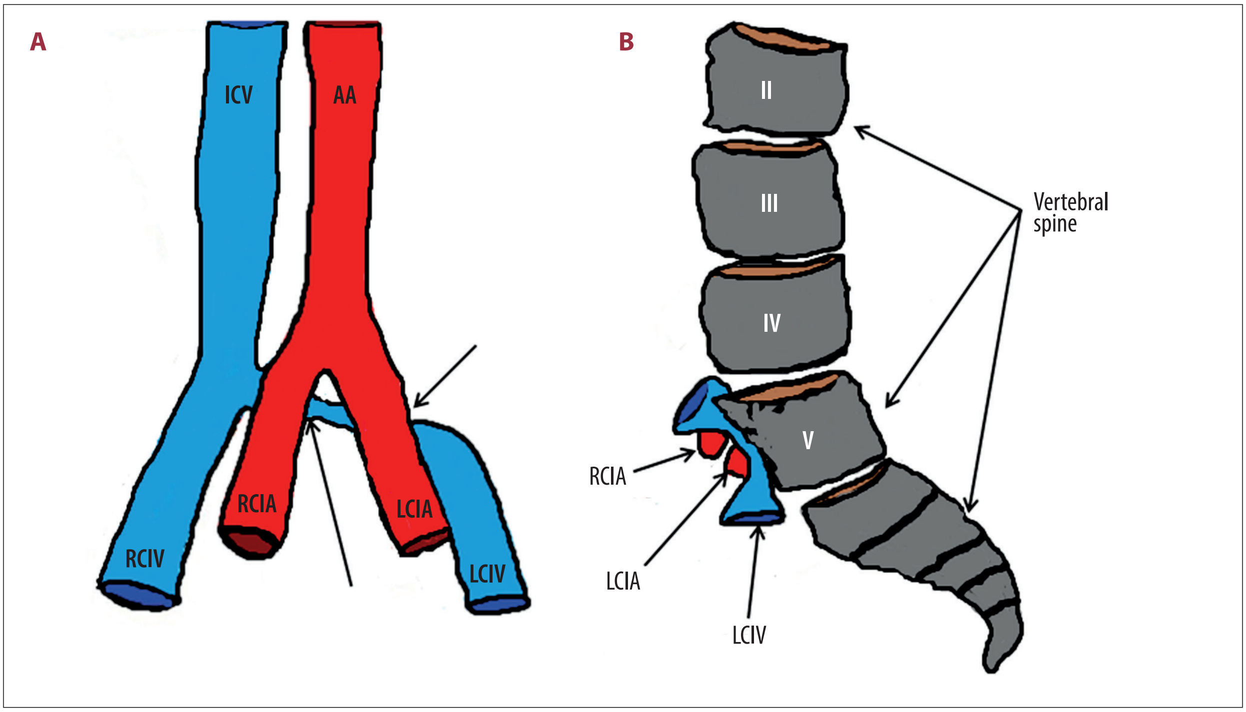

Figure 1. Scheme describing the main anatomical structures involved in the present case of May-Thurner syndrome. (**A**) Diagram showing the relationship between the common iliac arteries and the common iliac veins in a coronal plane. In this scheme, we highlight the 2 points in which the LCIV was compressed (arrows). (**B**) Diagram showing the relationship between the common iliac arteries, the LCIV, and the vertebral spine in a sagittal plane. AA – abdominal aorta; ICV – inferior vena cava; RCIV – right common iliac vein; LCIV – left common iliac vein; LCIA – left common iliac artery; RCIA – right common iliac artery.

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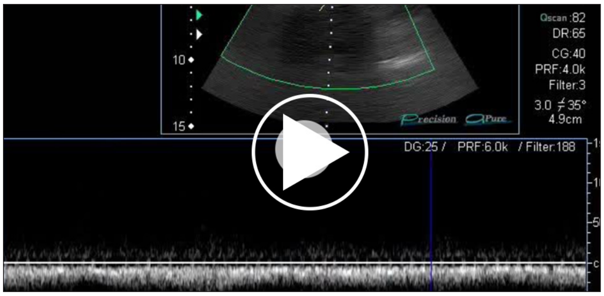
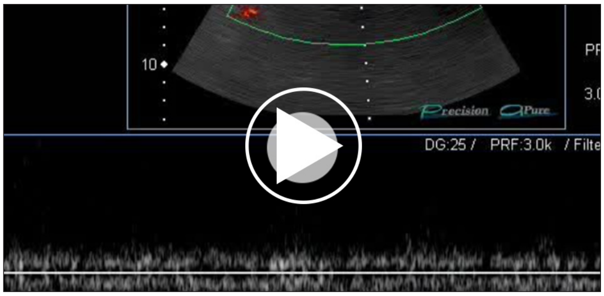


Video 1. Duplex Doppler ultrasound measurement of the peak speed velocity in the post-stenotic tract of the left common iliac vein.



Video 2. Duplex Doppler ultrasound measurement of the peak speed velocity in the pre-stenotic tract of the left common iliac vein.

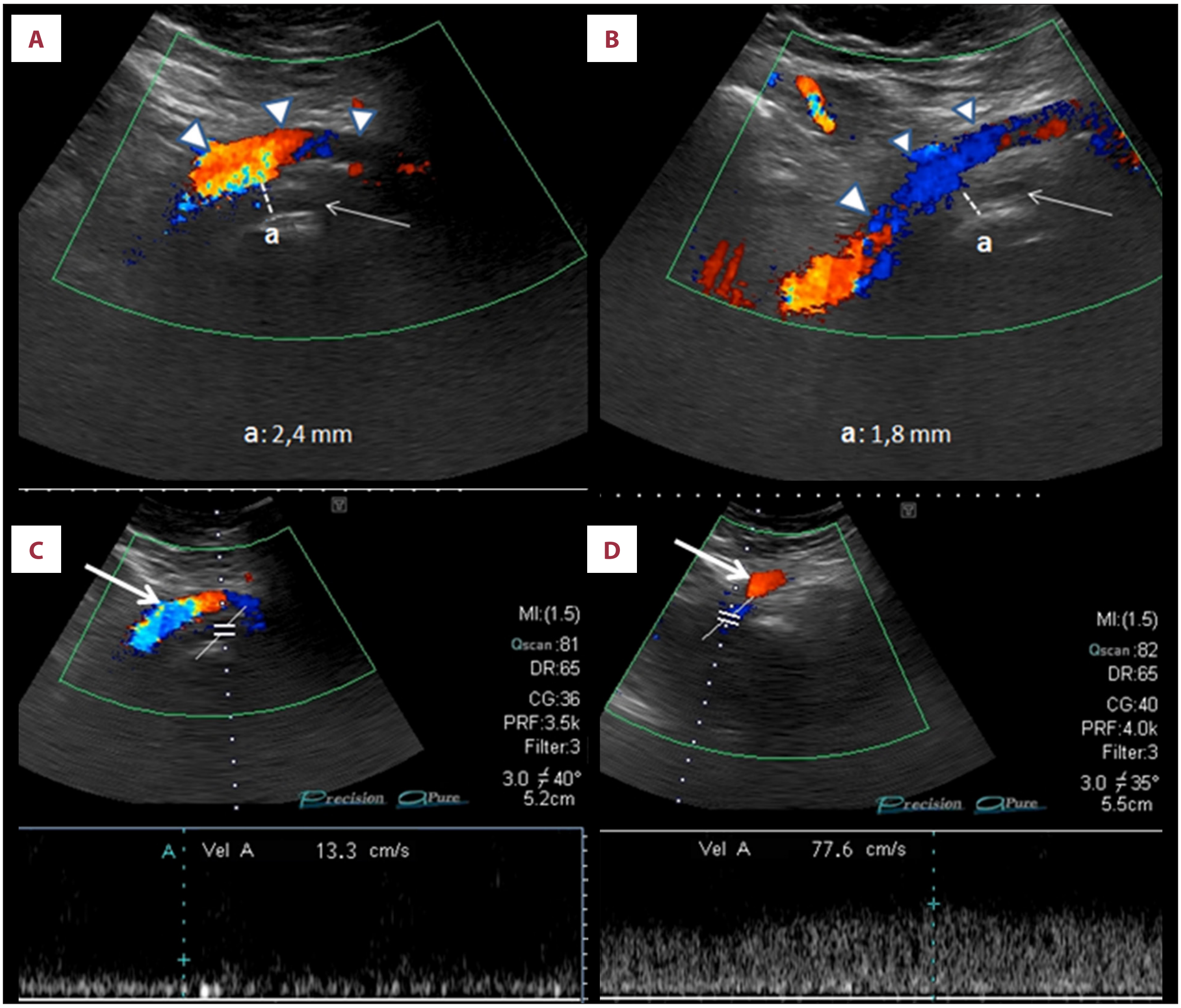


Figure 2. Longitudinal ultrasound scan of the LCIV and common iliac arteries. (**A**) Measurement of minimum distances (a: 2.4 mm) between the RCIA (arrow heads) and the vertebral spine. Arrow indicates the thrombotic tract of the LCIV. (**B**) Measurement of minimum distances (a: 1.8 mm) between the LCIA (arrow heads) and vertebral spine. Arrow indicates the LCIV. (**C**) Duplex Doppler ultrasound for measurement of PSV in the pre-stenotic tract of the LCIV. Arrow indicates right common iliac artery. (**D**) Duplex Doppler ultrasound measurement of PSV in the post-stenotic tract of the LCIV. Arrow indicates left common iliac artery. LCIV – left common iliac vein; LCIA – left common iliac artery; RCIA – right common iliac artery; PSV – peak speed velocity.

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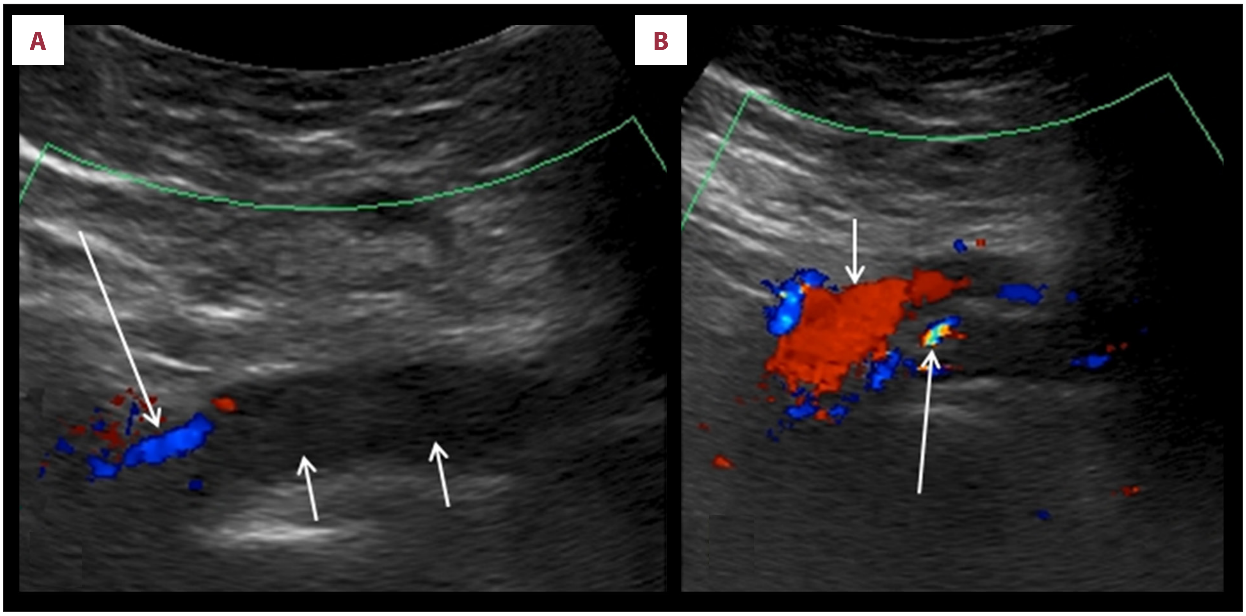

Figure 3. Color Doppler ultrasound of the LCIV. (**A**) Thrombotic tract with absence of chromatic signals (short arrows). Flux signals in pre-stenotic tract (long arrow). (**B**) Turbulent flow in the LCIV, with chromatic aliasing (long arrow) in the post-stenotic tract. Short arrow indicates left common iliac artery. LCIV – left common iliac vein.

Table 1. Summary of clinical results.

	Ipsilateral PSV	Pre-stenotic PSV	Post-stenotic PSV	Flow ratio	Minimum distance between iliac artery and vertebral soma
Left common iliac vein		13.3 cm/s	77.6 cm/s	5.83	
Right common Iliac vein	28.6 cm/s				
Right common iliac artery					2.4 mm
Left common iliac artery					1.8 mm

PSV – peak speed velocity.

flow of the RCIV for comparison. The following results were obtained: First, the LCIV color Doppler ultrasound showed 2 stenoses, one sustained by an osteophyte of the fifth lumbar vertebra that reduced the space between the RCIA and the spine and the other due to reduced space between the LCIA and the fifth lumbar vertebra. Second, the duplex Doppler ultrasound of the LCIV showed a flow with low PSV in the portion of the vein upstream of the venous compression and an increase in PSV downstream of the venous compression (**Figure 2A-2D**). Color Doppler ultrasound also showed a partial thrombosis of the LCIV, which extended from the stenosis for a distance of 2 cm toward the iliac bifurcation (**Figure 3A, 3B**). The flow ratio of the LCIV was 5.83. The results are summarized in **Table 1**. Chest MDCT angiography examination showed enhancement defects in some branches of the right pulmonary artery compatible with pulmonary embolism (**Figure 4A, 4B**), double stenosis of the LCIV (**Figure 4C, 4D**), partial thrombosis of the LCIV, and reduction of the iliac-vertebral space (**Figure 5**). No morphological or flowmetric changes were detected in the arterial vessels or RCIV by either ultrasound or MDCT. In our case, the patient was prescribed drug therapy: 15 mg oral rivaroxaban twice daily for the first 4 weeks, followed by 10 mg oral rivaroxaban and 100 mg aspirin once daily for the next 6 months.

Discussion

Ultrasound allowed us to identify the stenosis and partial thrombosis of the LCIV, and also made it possible to very accurately measure the minimum distances between the iliac arteries and the spine, which showed a more severe stenosis by the LCIA. There is still no cut-off value in the literature on the iliac-vertebral space below which MTS occurs, which would be very useful for the diagnosis, as in the case of other vascular

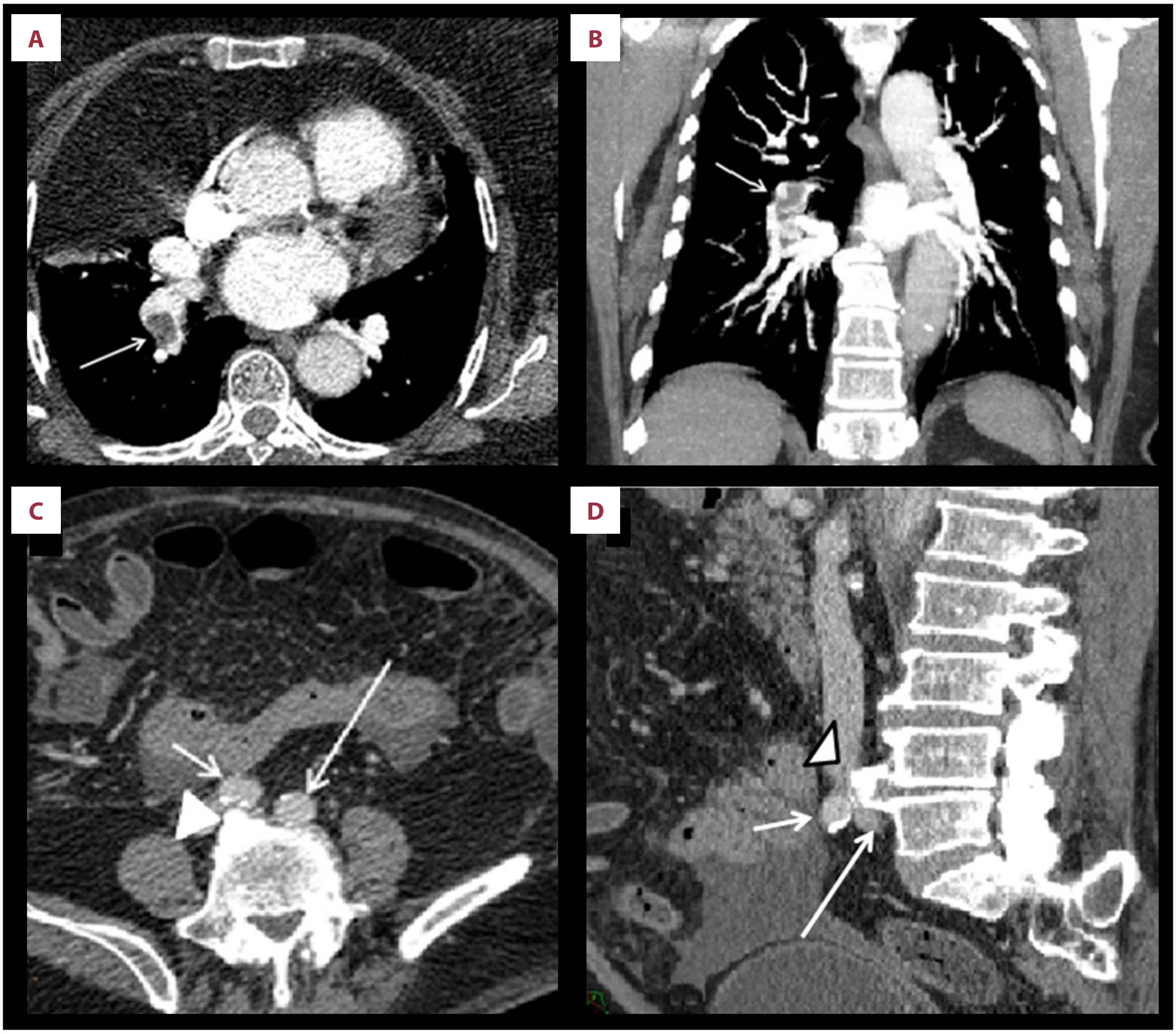

Figure 4. MDCT angiography indicating pulmonary embolism. (**A**) In the axial reconstruction, an enhancement defect is visible, affecting the right pulmonary artery (arrow). (**B**) In the coronal reconstruction, some enhancement defects are better highlighted (arrow). (**C**) In this axial reconstruction, the RCIA (short arrow) and the LCIA (long arrow) are visible, which are compressing the LCIV against the osteophyte (arrow head) and against the body of the fifth lumbar vertebra, respectively. (**D**) This sagittal reconstruction shows the RCIA (long arrow) compressing the LCIV (short arrow) against an osteophyte (arrow head) of the fifth lumbar vertebra (L5; arrow head). MDCT – multidetector computed tomography; RCIA – right common iliac artery; LCIA – left common iliac artery; LCIV – left common iliac vein.

compression syndromes [12]. The measurements of the PSV values in the LCIV performed with duplex Doppler ultrasound were very important because they allowed us to have information on the degree of stenosis through the calculation of flow ratio. The flow ratio value was necessary to determine the correct therapy, which requires adjustment to the severity of the stenosis. To be considered hemodynamically significant, a venous stenosis must have a flow ratio greater than 2.5 cm/s [13], which corresponds to 50% stenosis. In the present case, the stenosis was very severe; greater than 70%, and was certainly one of the causal factors of the thrombosis. Doppler ultrasound can be limited by excessive intestinal meteorism and obesity, which can hinder the complete visualization of the iliac veins in 20-50% of patients, and by deeply positioned common iliac veins, which reduces the sensitivity of the method. The treatment of first choice for MTS patients is generally the combined use of drugs (thrombolytic and anticoagulants) and endovascular stenting. In our case, long-term thrombolytic and anticoagulant drug treatment was not accompanied by endovascular stenting due to the reduced iliac-vertebral space, especially at the level of the osteophytosis, which did not guarantee a good long-term stent seal. The diagnosis of

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Figure 5. MDCT angiography. In this axial reconstruction, we can see the 2 compressions of the LCIV caused by the right and left common iliac arteries and the measurements (dashed lines) of the minimum distance between the vertebral spine and the aforementioned vessels. Long arrow indicates the osteophyte of the fifth lumbar vertebra; short arrow indicates the LCIV. MDCT – multidetector computed tomography; LCIV – left common iliac vein.

MTS is almost always made after the appearance of venous stasis in the left lower limb. In asymptomatic patients, the finding of a compression of the LCIV is often random and the discovery usually occurs following routine computed tomography or ultrasound examinations; in these patients we suggest measuring the degree of stenosis of the LCIV for possible long-term anticoagulant prophylaxis if the value is close to or greater than 50%. MTS is not a well-known disease; it has only been observed in 2-3% of cases of vein thrombosis of the lower limbs. As 60% of all MTS cases involve the left venous circulation, the incidence of MTS is probably higher than the documented cases would suggest.

Conclusions

In cases such as the present case described here, ultrasound examination is important because duplex Doppler confers the ability to estimate the degree of stenosis of the LCIV. We recommend thorough examination of the LCIV with Doppler ultrasound in all patients with left-limb symptoms, especially those with risk factors such as pregnancy [14] or prolonged immobilization, to exclude MTS. Failure to diagnose and treat MTS could expose patients to very serious risks to their health.

Acknowledgements

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Conflict of Interest

None.

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