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Case Series

Cerebral Venous Thrombosis: A Case Series in the Dominican Republic

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Abstract

Cerebral venous thrombosis (CVT) involves the presence of a blood clot in the dural venous sinuses, the cerebral veins, or both. It accounts for 0.5% to 3% of all cerebrovascular diseases and primarily affects young adults; it is more frequent in women under the age of 50, approximately 75% of whom are of childbearing age. CVT has multiple etiologies, including the use of contraceptives, hematological or rheumatological disorders, and traumatic brain injury. It is a complex condition with a variable clinical presentation that may include headaches, intracranial hypertension syndrome, seizures, focal neurological deficits, or encephalopathy. The diagnostic protocol is primarily based on the clinical history, physical examination, and neuroimaging; the combination of magnetic resonance imaging (MRI) and magnetic resonance venography (MRV) is the gold standard. Depending on the patient's clinical profile, laboratory testing should include screening for lupus anticoagulant, anticardiolipin antibodies, Factor V Leiden mutation, prothrombin gene mutation, protein C and S levels, and MTHFR gene mutation. Early diagnosis and anticoagulation form the cornerstone of treatment, even in cases presenting with intracerebral hemorrhage; low-molecular-weight heparin is preferred during the acute phase, followed by a transition to oral anticoagulants. Direct oral anticoagulants have emerged as safe and effective alternatives to vitamin K antagonists, and advancements in endovascular neurology offer a promising treatment option for diseases of the cerebral venous system.

Keywords: *Thrombosis, Venous Sinuses, Hemophilia, Headache.*

Introduction

Cerebral venous thrombosis (CVT) is the presence of a blood clot in the Dural venous sinuses, the cerebral veins, or both. It accounts for 0.5% to 3% of all cerebrovascular diseases and primarily affects young adults—more frequently women under the age of 50, with approximately 75% being of childbearing age. CVT has multiple etiologies, including the use of contraceptives, hematological or rheumatological disorders, and head trauma. It is a complex condition with a variable clinical presentation, which may include headaches, intracranial hypertension syndrome, seizures, focal neurological deficits, or encephalopathy (1,2).

The diagnostic protocol should include neuroimaging studies, such as CT venography or magnetic resonance venography, which allow for the visualization of the venous thrombosis and the absence of an arterial distribution pattern in any observed cerebral parenchymal abnormalities. On a non-contrast head CT, a blood clot within a venous sinus or cerebral vein appears as an area of spontaneous hyperdensity. On a contrast-enhanced head CT, the "delta sign" may be observed; this consists of enhancement of the venous sinus wall without central enhancement of the clot, with the sinus walls appearing convex due to the presence of the intraluminal thrombus (1,2).

On brain magnetic resonance imaging (MRI), findings may include hyperintensity within a venous sinus (as seen in a coronal section of the superior sagittal sinus) on T1 and T2 weighted images (spin-echo sequences); an absence of intravascular venous signal on phase-contrast sequences; and a lack of intravascular or mural enhancement following gadolinium administration (the "delta sign"). T2* weighted gradient-echo (T2* GE) sequences are particularly useful for demonstrating signs of cortical venous thrombosis—appearing as hypointensity within a vein—as well as evidence of hemorrhage; however, the brain parenchyma may appear normal in one-third of cases. Cerebral venous thrombosis (CVT) is an uncommon condition with a complex diagnosis and management; magnetic resonance angiography (MRA) is the diagnostic modality of choice. The imaging protocol should include T1, T2, and T2* weighted sequences, FLAIR, DWI, non-contrast venographic sequences (such as 2D time-of-flight [TOF] or 3D phase-contrast), and a post-contrast 3D-T1 sequence (3,4).

Laboratory testing should include a complete blood count (CBC), blood chemistry panel, D-dimer, fibrinogen, homocysteine, lupus anticoagulant, anticardiolipin antibodies, Factor V Leiden mutation, prothrombin gene mutation, protein C and S levels, and the MTHFR gene mutation. Pregnancy, the postpartum period, and infections can be significant risk factors for the development of CVT; furthermore, any delay in diagnosis or treatment may negatively impact patient outcomes (4,5). Currently, anticoagulation with low-molecular-weight heparin is recommended during the acute phase, followed by the use of direct-acting anticoagulants. For patients with severe cerebral venous thrombosis (CVT) or cases refractory to medical treatment, current guidelines suggest considering mechanical thrombectomy; however, the literature lacks large randomized controlled trials, primarily because the standardization of endovascular therapy for CVT has not yet been established (4,5,6).

Objectives

To describe the clinical manifestations, sex, age, time to diagnostic confirmation, pathological findings on neuroimaging, associated risk factors, and treatment.

Materials and Methods

A prospective, observational, longitudinal study (case series) was conducted between May 2017 and May 2026. The study population consisted of patients diagnosed with cerebral venous thrombosis who met the inclusion criteria: adults aged 18 to 65 years who completed the established study protocol.

Results

Table 1. Objectives investigated in the study patients.

Clinical variable	Case No. 1	Case No. 2	Case No. 3	Case No. 4	Case No. 5	Case No. 6
Sex	Female	Female	Male	Female	Female	Female
Age (years)	34	38	54	60	25	23
Approximate time from onset of clinical presentation to definitive diagnosis	15 days	15 days	15 days	14 days	7 days	21 days
Associated risk factor	Use of oral contraceptives (OCPs)	Use of oral contraceptives (OCPs)	Unidentified	Unidentified	Thrombophilia: MTHFR C677T detected (heterozygous); antiphospholipid syndrome (APS); oral contraceptive use (OCPs)	Thrombophilia: Factor V R506Q; MTHFR C677T/ A1298C detected (heterozygous); use of oral contraceptives (OCPs)
Clinical manifestations	Headache, left homonymous hemianopsia, and left hemiparesis	Headache, nausea, and vertigo	Headache and vertigo	Headache, dysarthria, hemiparesis, and rigidity	Headache, seizures, mixed aphasia, quadriparesis, and coma	Headache, neck stiffness, and blurred vision

Table 1. Continued..

Clinical variable	Case No. 1	Case No. 2	Case No. 3	Case No. 4	Case No. 5	Case No. 6
CT/MRI/cerebral arteriography	Thrombosis of the transverse sinus and superior sagittal sinus (SSS), with a “dense” sign and involvement of cortical veins	Thrombosis of the transverse sinus, superior sagittal sinus (SSS), and cortical veins	Thrombosis of the left sigmoid sinus; hemorrhage in the medial region of the temporal lobe	Thrombosis of the right sigmoid sinus, right transverse sinus, and superior sagittal sinus (SSS)	Thrombosis of the right transverse sinus and SSS; hemorrhage and venous infarction in the left frontal and temporal lobes	Thrombosis of the straight sinus and left sigmoid sinus, with subarachnoid hemorrhage
Treatment	Enoxaparin sodium; rivaroxaban	Enoxaparin sodium; rivaroxaban	Apixaban	Enoxaparin sodium; apixaban	Enoxaparin sodium	Apixaban

Methylenetetrahydrofolate reductase (MTHFR)

Table 2. NIHSS and mRankin neurological scales applied to the patients in the study.

Clinical outcome	Case No. 1	Case No. 2	Case No. 3	Case No. 4	Case No. 5	Case No. 6
NIHSS at admission	3	2	0	9	37	1
mRS at admission	4	3	1	4	5	1
Hospital stay (days)	10	8	7	5	6	5
NIHSS at discharge	3	2	0	8	39	0
mRS at hospital discharge	3	2	0	4	6	0
Clinical evolution	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Deceased	Satisfactory

(NIHSS (National Institutes of Health Stroke Scale), modified

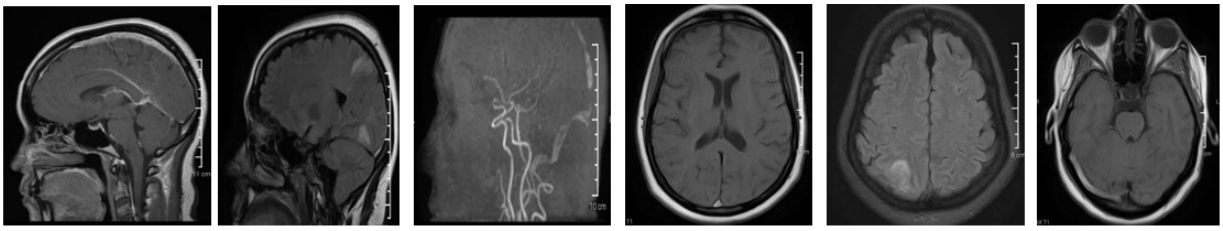


Figure 1. Case 1. Cerebral magnetic Resonance Angiography (MRA): T1, T2, and 3D-TOF sequences.

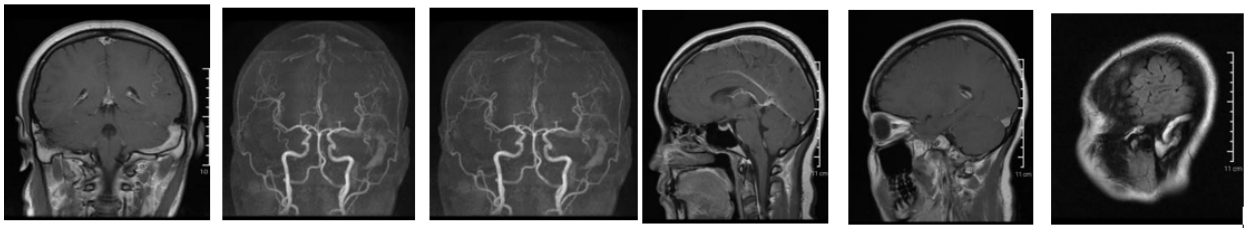


Figure 2. Case 2. Contrast-enhanced Cerebral magnetic Resonance Angiography (MRA): T1, 3D-TOF, and FLAIR sequences.

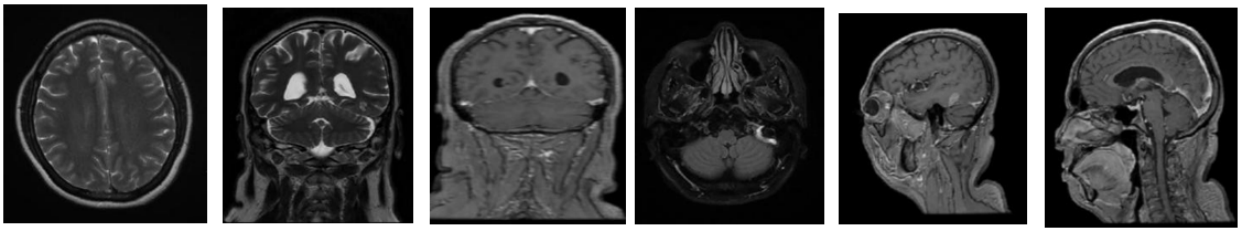


Figure 3. Case 3. Contrast-enhanced Cerebral magnetic Resonance (MRI): T2, T1, and FLAIR.

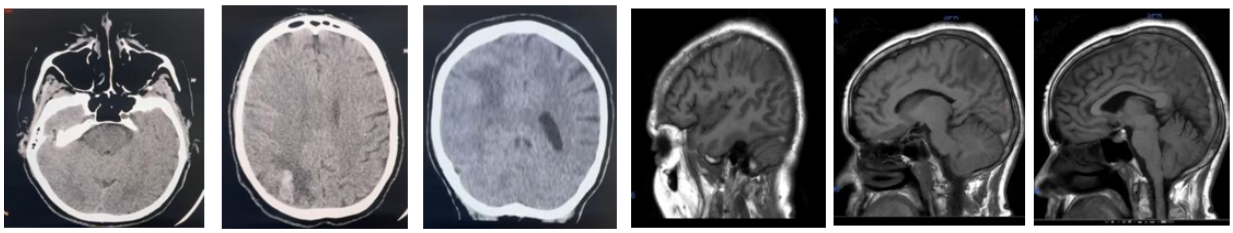


Figure 4. Case 4. Cerebral computed Tomography (CT); magnetic Resonance imaging (MRI); T1 sequences.

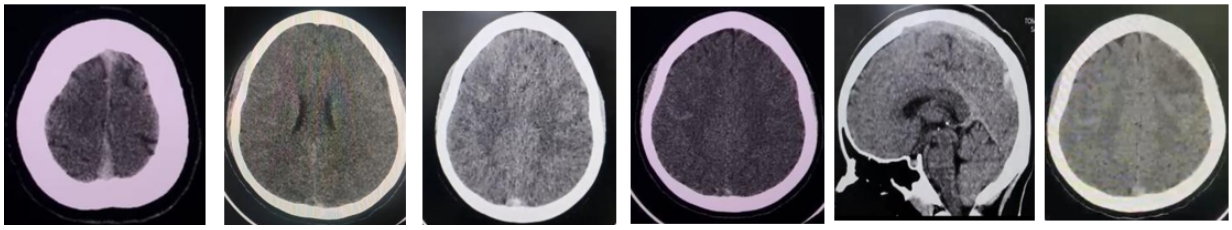


Figure 5. Case 5. Cerebral Computed Tomography (CT).

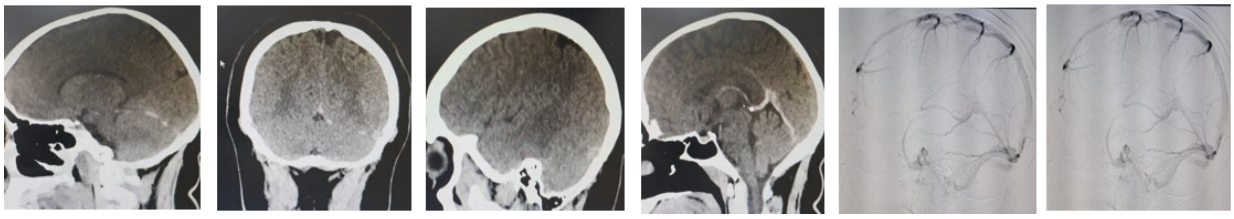


Figure 6. Case 6. Cerebral computed Tomography (CT); Digital cerebral Angiography.

Discussion

Based on the literature reviewed, there are few studies in our country that describe the characteristics of cerebral venous thrombosis. This study includes six cases: 5 (83%) female and 1 (17%) male. The patients ranged in age from 23 to 60 years. In 4 (67%) cases, the use of oral contraceptive pills was identified as a risk factor; in 2 (33%) cases, no risk factors or potential causative agents were identified; and in 2 (33%) cases, thrombophilia was identified as a risk factor. There was one death (17% of the cases studied). The demographic data from this research are similar to those reported in a case series from Argentina (4).

In brain imaging studies, we identified multiple direct and indirect signs of thrombosis in the cerebral veins, involving both the cortical and deep venous systems. The most frequently affected sinuses were the longitudinal and transverse sinuses. In 50% of the patients, signs of petechial hemorrhages were observed.

One patient (17%) presented with involvement of multiple sinuses (the superior sagittal sinus, the transverse sinus, and the ipsilateral jugular vein), as well as extensive venous infarction in the left frontal and parietal lobes and cortical hemorrhages; this led to diffuse cerebral edema, and the patient subsequently died. These findings are consistent with those described in a study by Zuluaga et al. (5). All patients (100%) received anticoagulant treatment—initially with enoxaparin sodium, followed by direct-acting oral anticoagulants (rivaroxaban or apixaban), depending on the patient's clinical profile.

Conclusions

The majority of the patients in the study were women, and all received anticoagulant treatment. The patients showed a favorable progression; only one patient—who arrived at the health center in a severe clinical state with complications—passed away. The remaining patients had a satisfactory outcome and experienced no neurological sequelae. In the Dominican Republic, we face technological limitations regarding the initial management of cerebral venous thrombosis.

This is a complex, difficult-to-diagnose condition that requires significant clinical expertise, as well as access to specific technology—such as CT scans, magnetic resonance angiography (MRA), or a catheterization laboratory (hemodynamics suite) for cerebral arteriography—along with immunological laboratory tests and other specialized studies to ensure a timely and accurate diagnosis. It is important to note that, given the current structure of our healthcare system, there are barriers that limit the population's access to these technological resources.

Endovascular therapy for neurological conditions has advanced in our country in recent years. Consequently, we are working to foster a specialized culture, strengthen clinical protocols, and eliminate barriers to patient access. These efforts are grounded in consensus among various medical specialties and international guidelines for the use of catheterization laboratories in the diagnosis and acute treatment of cerebral venous thrombosis—a condition where, in many cases, pathological signs are difficult to identify on standard brain imaging, necessitating further evaluation via angiography.

Conflicts of Interest

The author declare no competing financial, professional, or personal interests that could influence the work.

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