

Reversible Parkinsonian Features in Deep Cerebral Venous Sinus Thrombosis

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Can J Neurol Sci. 2013; 40: 740-742

Deep cerebral venous sinus thrombosis (DCVST) accounts for 3-8% of all patients with CVST¹ and results in infarction of thalami, basal ganglia, diencephalon, midbrain and limbic cortex. Patients with DCVST usually manifest with coma and pupillary and ocular movement abnormality with poor outcome but partial syndrome can rarely occur. The extent of thrombosis, collateral formation, and duration of thrombosis determine the clinical picture of DCVST. Because of the involvement of thalamus, basal ganglia and mid brain, movement disorders are possible. In the medical literature, there are only four case reports of parkinsonian features in DCVST¹⁻⁴. During the last ten years, we have managed 12 patients with DCVST, two of whom had parkinsonian features. We report these patients with parkinsonian features due to DCVST and review the literature.

Patient #1: A 55-year-old office worker presented with a three months history of headache, excessive sleepiness and cognitive decline. He had formed visual hallucinations and urinated in inappropriate places for the last one month. He had been treated for hypertension, diabetes mellitus and hypothyroidism for the previous five years. On examination, the patient was confused and his Glasgow Coma Scale score was 14. There was no focal neurological deficit. Tendon reflex and plantar responses were normal. His blood counts, serum chemistry, antinuclear antibody and screening for prothrombotic condition (protein C, protein S, serum homocysteine, lupus anticoagulant, anticardiolipin antibody, factor V Leiden mutation) were normal. Serum thyroid stimulating hormone level was elevated (14.52 mIU/L) but T3 and T4 levels were normal. Thyroid peroxidase antibody was negative. Cranial computed tomogram (CT) scan revealed bilateral thalamic, left internal capsule and globus pallidus involvement. Cranial magnetic resonance imaging (MRI) revealed hemorrhagic infarction involving both thalami, left internal capsule, globus pallidus and subthalamic nuclei. MRV revealed non visualization of vein of Rosenthal, internal cerebral vein, vein of Galen and straight sinus (Figure 1A-D). Magnetic resonance angiography was normal. The patient was treated with low molecular weight heparin followed by oral anticoagulant. He became conscious on the 5th hospital day and was discharged on day 20. In the 2nd week, he developed pill rolling tremor, masking of face, hypophonia, micrographia (Figure 2), rigidity and bradykinesia. He had a short shuffling gait with stooped posture and reduced arm swing. His Unified Parkinson's Disease Rating Scale (UPDRS) total score was 61 and Mini Mental State Examination (MMSE) score was 17. The primary deficits in MMSE were in recall and calculation. He returned to work 15 days after discharge. After 2.5 months, he developed difficulty in walking. Repeat MRI revealed worsening of radiological

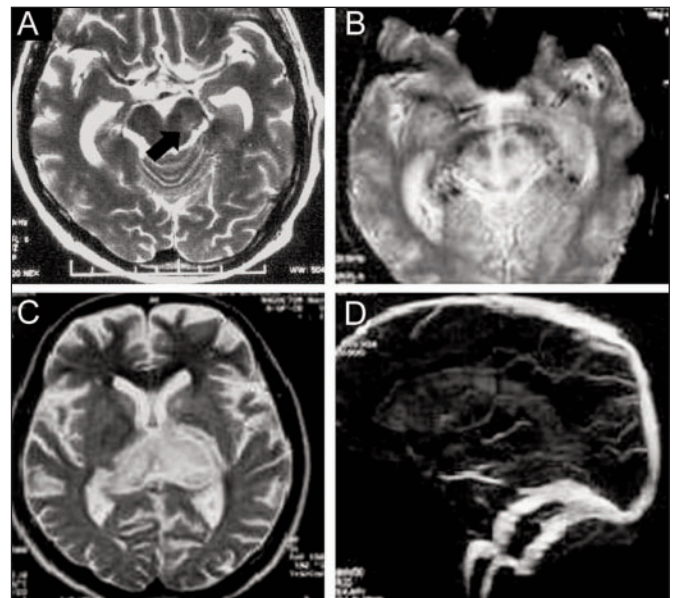


Figure 1A-D: Cranial MRI of patient #1 shows involvement of A) left substantia nigra (black arrow), B) bilateral subthalamic nuclei and C) bilateral thalami. D) His MRV shows non visualization of deep cerebral venous system.

findings with additional involvement of left substantia nigra (Figure 1A). His international normalized ratio (INR) was suboptimal (1.4) and he was treated with low molecular weight heparin followed by oral anticoagulant to maintain the INR between 2 and 3. Gradually he improved and at six months his MMSE was 27 with impaired recall. The parkinsonian features also subsided (UPDRS total score 3) without receiving dopaminergic or anticholinergic drugs. At 2.5 years, he was asymptomatic and his MMSE was 30 though MRV did not show recanalization of deep venous system and MRI revealed bilateral thalamic lesion. The MRI abnormality in the other areas disappeared.

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RECEIVED FEBRUARY 22, 2013. FINAL REVISIONS SUBMITTED MARCH 21, 2013.
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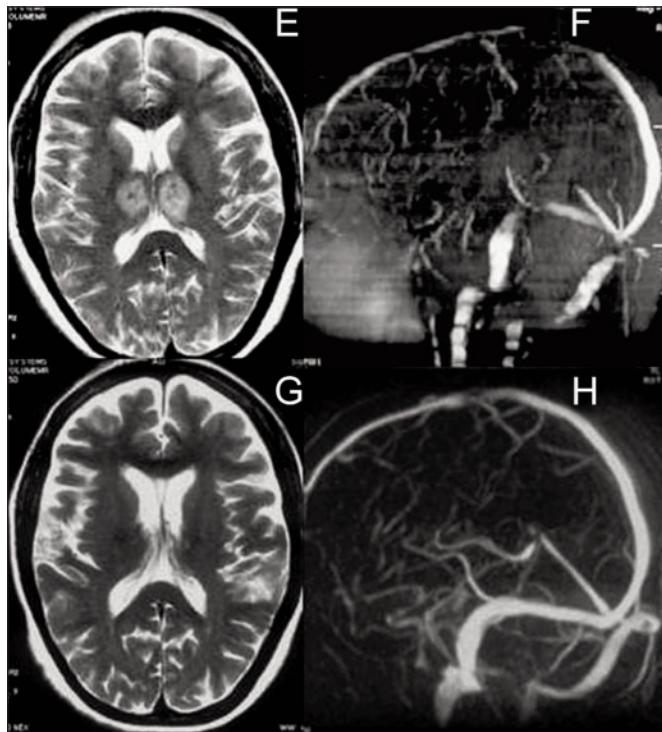


Figure 1E-H: MRI of patient #2 shows involvement of E) bilateral thalami and her MRV shows F) nonvisualization of deep cerebral venous system except straight sinus. Repeat MRI at 1.5years shows G) disappearance of thalamic lesion and F) recanalization of deep venous system although she had persisted down gaze palsy and demetia.

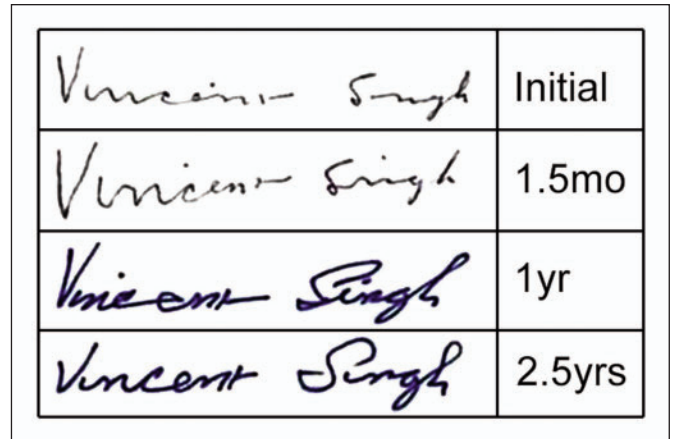


Figure 2: Hand writing of the patient #1 showing micrographia which normalized at follow up.

Patient # 2: A 53-year-old female was admitted with acute onset of altered sensorium. She had rheumatic heart disease with atrial fibrillation, hypothyroidism and diabetes mellitus. She was treated with enoxaparin 60 mg sc for atrial fibrillation. On the second day, she became deeply comatose. Her pulse was 120/min, irregularly irregular, blood pressure 140/90 mm Hg, pupils were normal and there was no focal neurological deficit. Tendon reflexes were normal and plantar response flexor. Cranial MRI revealed bilateral hemorrhagic infarcts in thalamus and MRV revealed non visualization of deep venous system (Figure 1E-H). Blood counts, serum chemistry, protein C, protein S, serum homocysteine, lupus anticoagulant, anticardiolipin antibody, factor V Leiden mutation, serum folate, serum vitamin B₁₂, anti nuclear antibody and anti dsDNA were

Table: Clinical and radiological findings in the patients with parkinsonian features due to deep cerebral venous sinus thrombosis

S. no	Author	Age/sex	Clinical features	CT/MRI/MRV	Follow Up
1.	Murray et al 2000 [1]	62/F	Tremor R arm, hypophonia, micrographia, bradyphrenic, bradykinesia, gait abnormality	CT: Hyperdensity mid brain tegmentum MRI: haemorrhagic changes BL thalamus, BL putamen, R caudate MRV: Non visualization of internal cerebral vein, vein of Rosenthal, vein of Galen, straight, L transverse and sigmoid sinus and internal jugular vein	3 month: parkinsonian features improved. MRV improved MRI: residual T2 lesion,
2.	Jenkins et al 2001 [2]	52/F	Headache, fatigue, confusion Rest tremor, bradykinesia, slow gait	MRV: Nonvisualization of internal cerebral vein, vein of Rosenthal, vein of Galen, straight sinus, L transverse sinus. MRI: BL lentiform, R caudate, BL thalami, non specific WM changes	3 days repeat MRV: improved 6 month: parkinsonian features disappeared
3.	Lee et al 2002 [3]	43/M	Micrographia, hypophonia, bradykinesia	MRI: BL thalami & BG. MRV: no flow in the vein of Galen and internal cerebral veins.	6 weeks: Clinical: Recovered MRI & MRV: normal
4.	Al-Hashmi et al 2010 [4]	57/F	Headache, hypophonia, micrographia, rigidity, bradyphrenia, gait abnormality	MRI: Periventricular & subcortical WM lesion. MRV: occlusion of the transverse sinuses and distal internal cerebral veins, minimal flow within the vein of Galen, & congested cortical and subcortical veins and straight sinus	2 months: Parkinsonian features improved except minimal unsteadiness on tandem gait & slowing of finger movements. 1 month MRI/MRV: marked improvement

R=right, BL=bilateral, F=female, BG=basal ganglia, MRV=magnetic resonance venography, WM=white matter

negative. Her platelet counts dropped from 217,000/mm³ to 125,000/mm³, hence enoxaparin was replaced by fondaparinux. On day 15, she was conscious and able to walk. She had masking of face, hypokinesia, hypophonia, stooped posture and short shuffling gait with reduced arm swing. She had restricted down gaze which persisted till 1.5 months follow-up when she was dependent because of severe dementia (MMSE score 10) but her parkinsonian features subsided. Repeat MRI was normal and MRV revealed recanalization of deep venous sinus.

DISCUSSION

In the present study, both the patients with DCVST had parkinsonian features and dementia. The parkinsonian features improved in both but dementia persisted in one. These two patients provide an opportunity to compare clinically similar but prognostically diverse outcome of DCVST. Both the patients had typical parkinsonian features characterized by masking of face, rigidity, tremor, bradykinesia, short shuffling gait and lack of arm swing. Unlike idiopathic Parkinson disease, both these patients presented acutely and had bilateral parkinsonian features with dementia. Ironically the patient who completely recovered had extensive MRI lesions involving bilateral thalami, diencephalon, left internal capsule, globus pallidus and substantia nigra. The parkinsonian features in this patient is easy to explain because of the involvement of substantia nigra, diencephalon and striatum. The striatonigral dopaminergic pathway is responsible for Parkinson disease. The second patient who had persistent dementia had only thalamic lesions which were hemorrhagic. The hemorrhagic changes in the first patient were apparent only in GRE sequence whereas in the second patient these were apparent on T1 and T2 sequences suggesting greater severity of hemorrhagic necrosis/infarction. In the follow-up MRI, the thalamic T2 hyperintensity persisted in the first patient but the lesions in the other areas disappeared which may suggest congestion or edema due to DCVST. In the second patient, thalamic lesions disappeared in the follow-up imaging but deep venous system was recanalized. She persisted with severe dementia and down gaze palsy suggesting poor correlation of clinicoradiological recovery. The clinical picture of DCVST is determined by the extent of thrombosis; collateral formation and the acuteness of illness. The first patient had longer duration of illness (three months vs one day) and a slower course which might have allowed better collateral formation than the second patient.

Transient forms of parkinsonian features have also been reported in Japanese encephalitis patients who have only thalamic involvement⁵. In DCVST, parkinsonian features have been reported in four patients. Three patients had bilateral thalamic and basal ganglia involvement and one had bilateral periventricular and subcortical white matter lesions. MRV revealed non visualization of deep system in all and extension to left transverse sinus in three patients. The clinical and MRV findings improved in all these patients at variable time periods¹⁻⁴. The details of these patients are provided in the Table. The involvement of substantia nigra has not been mentioned in these patients. One of our patients had substantia nigra involvement and his deep system did not recanalize for 18 months although he improved completely. In the other patient, MRI and MRV became normal but she was dependent for activities of daily living due to dementia.

Thalamus, striatum, hypothalamus and limbic areas are the substrate for a wide variety of movement disorders and behavioral abnormalities. Deep cerebral venous sinus thrombosis involves these structures but there is a paucity of reports on movement disorders. It is possible that these manifestations in DCVST are dwarfed by more acute and dramatic clinical pictures of coma, decerebration, ocular and pupillary abnormality and seizures. In our patients, parkinsonian features were apparent as the patients recovered from coma. It is concluded from this study that in the patients with DCVST, parkinsonian features are reversible but dementia may be persistent and may not be dependent on radiological recovery.

ACKNOWLEDGEMENT

The authors thank Mr. Rakesh Kumar Nigam for secretarial help.

REFERENCES

1. Murray BJ, Llinas R, Caplan LR, Scammell T, Pascual-Leone A. Cerebral deep venous thrombosis presenting as acute micrographia and hypophonia. *Neurology* 2000;54:751-3.
2. Jenkins M, Hussain N, Lee D, Jog MS. Reversible parkinsonism and MRI diffusion abnormalities in cortical venous thrombosis. *Neurology* 2001;57:364-6.
3. Lee SH, Chang H, Kim YS. Deep cerebral venous thrombosis showing parkinsonism such as micrographia, hypophonia and bradykinesia. *J Korean Neurol Assoc.* 2002;20:187-90.
4. Al-Hashmi A, Nguyen OF, Glikstein RS, Schipper HM. Cerebral venous thrombosis presenting as subacute parkinsonism. *Can J Neurol Sci.* 2010;37:684-6.
5. Misra UK, Kalita J. Movement disorder in Japanese encephalitis. *J Neurol* 2010;91:108-20.