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CASE REPORT

Acute quadriplegia in a young man secondary to prothrombin *G20210A* mutation

R Sawaya[1], Z Diken[1] and R Mahfouz[2]

[1]*Department of Internal Medicine, Division of Neurology, American University Medical Center, Beirut, Lebanon and*
[2]*Department of Pathology and Laboratory Medicine, American University Medical Center, Beirut, Lebanon*

Study design: We present the case of an 18-year-old man, previously healthy, who presented with acute quadriplegia and respiratory failure. Physical examination was compatible with a high cervical anterior spinal cord lesion.
Objective: We plan to evaluate the cause of such a neurological presentation in a healthy young man.
Setting: American University Medical Center, Beirut, Lebanon.
Methods: The patient underwent routine blood hematological and chemistry work-up, hypercoagulable profile studies, genetic profile for thrombophelias, radiographic studies of the brain and cervical cord, cerebrospinal analysis and extensive electrophyisological studies.
Results: Magnetic resonance imaging and magnetic resonance angiogram of the brain, carotid and intracranial vessels were normal. Cerebral angiography was normal. Magnetic resonance imaging of the cervical cord revealed lesion of the anterior segment of the cervical cord between C2 and C5 levels. Hypercoagulable profile studies were normal. Electrophysiological studies confirmed an isolated lesion of the descending cortico–spinal tracts. DNA analysis revealed the presence of a *G20210A* mutation-causing hyperprothrombinemia.
Conclusion: We conclude that a *G20210A* mutation causing-hyperprothrombinemia can cause anterior spinal artery thrombosis and anterior spinal cord infarction with the resultant neurological deficits in otherwise healthy patients.
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Keywords: anterior spinal artery; spinal cord infarction; prothrombenemia; G20210A allele

Introduction

Anterior spinal cord infarction can be caused by ischemia of idiopathic causes, aortic surgery, systemic arteriosclerosis, hypoperfusion, vasculitis, hematological disorders and trauma.[1–5] Our case report reveals a prothrombin *G20210A* mutation as the cause of an anterior spinal cord infarction. Treatment for such conditions remains supportive and the prognosis for functional recovery is guarded.

Case report

We report the case of an 18-year-old man, previously healthy, non-smoker, who presented with acute onset, severe neck and suboccipital pain, which progressed to complete quadriplegia and respiratory insufficiency. Neurological examination revealed the patient to be awake, responsive to orders by blinking and moving the eyeballs or drawing out the tongue. Cranial nerves were all intact, except for the spinal accessory nerves which were paralyzed bilaterally. No movement could be elicited spontaneously, voluntarily or in response to pain in both arms and legs. He had missing deep tendon reflexes in the four extremities with no Babinski signs and no sensation of light touch or pain below the neck. He had normal vibratory and position sense in the upper and lower extremities by appropriate response with blinking. He had a lax anal sphincter.

Studies revealed normal blood count, prothrombin time, partial thromboplastin time, erythrocyte sedimentation rate, C-reactive protein, creatinine and electrolytes, liver and thyroid function tests, negative antinuclear antibody test, double-stranded DNA and anti-cardiolipin antibodies. Cerebrospinal fluid analysis was normal.

Magnetic resonance imaging and magnetic resonance angiogram of the brain and cervical vessels were normal. Cerebral angiography was normal. Magnetic resonance imaging of the cervical spine showed diffuse abnormal signal intensity on the T2-weighted images involving the ventral portion of the spinal cord extending from C2 to C5 level (Figure 1).

Electrophysiological studies revealed normal peripheral nerves, neuromuscular junction and posterior spinal cord function. Motor-evoked potentials were abnormal.

Correspondence: Dr R Sawaya, Department of Internal Medicine, Division of Neurology, American University Medical Center, PO Box: 113–6044/C-27, Beirut, Lebanon.
E-mail: rs01@aub.edu.lb
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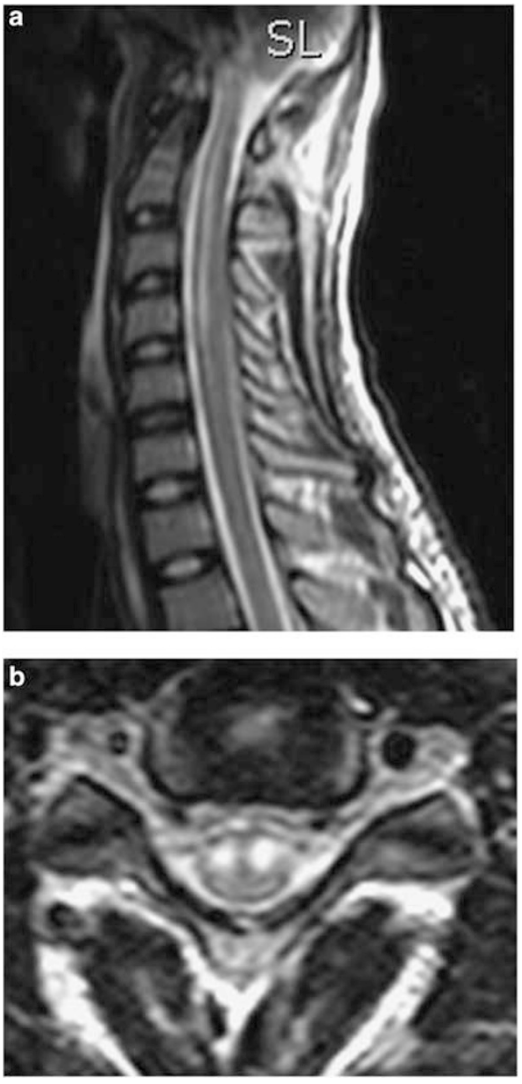

Figure 1 (**a**) Sagital magnetic resonance imaging, T2-weighted image, of the cervical spinal cord, revealing a hyperintense lesion of the anterior cord extending from C2 to C5 vertebra. (**b**) Axial magnetic resonance imaging, T2-weighted image, of the cervical spinal cord, revealing two hyperintense lesions, representing infarcts of the anterior horn territories.

Thrombosis profile, including antinuclear antibody test, anti-cardiolipin antibody, protein C, protein S, prothrombin time, partial thromboplastin time, lupus anti-coagulant, was normal. DNA analysis revealed the patient to be heterozygous for the *G20210A* mutation in the *Factor II* (prothrombin) gene, homozygous for the V34L mutation of *Factor XIII*, heterozygous for the *−455 G>A* mutation in the *beta-fibrinogen* gene and heterozygous for the *A1298C* mutation in the *MTHFR* gene, although he was normal for other genes.

Discussion

Anterior spinal artery occlusion with infarction of the ventral cord is estimated to occur in 1.2% of all central nervous system strokes.[3] It presents with acute paralysis of the muscles below the lesion, with loss of sensation for pain and temperature with preservation of the dorsal column functions of vibratory and position sense, loss of deep tendon reflexes in the acute period and loss of sphincter control.

The literature describes many causes for spinal cord infarction, most of them are isolated cases of hypotension, aortic disease, atherosclerosis, meningitis, vasculitis, trauma and up to 75% labeled as idiopathic.[5] We believe that idiopathic cases of spinal cord infarction should be rather labeled as cryptogenic because of underdiagnosis of gene mutations causing a hypercoagulable state, resulting in spinal cord infarction.

Protein S deficiency and the *20210A* allele mutation of the *prothrombin* gene have been reported in single cases of spinal cord infarction in the pediatric age group. Our patient did not have a protein S deficiency.[4]

Hyperprothrombinemia is a result of a G to A transition at nucleotide *20210* allele in the prothrombin gene causing overexpression of prothrombin creating the hypercoagulable state. The prothrombin *20210* allele is frequently found in the rare patient, with unexplained spinal cord infarction and suspicion of a localized arterial thrombosis. Patients with combined genetic deficits are at higher risk for thrombosis than patients with a single-gene defect.[3]

The importance of the case we are presenting is that the diagnosis would have been missed, and the genetic counseling of siblings not possible, had the specific gene mutation (*G20210A*) not been tested for. This case report further stresses on the fact that the *prothrombin* gene mutation is associated with spinal cord infarcts in young adults. Specific gene testing should, thus, be performed in specific scenarios and it does not suffice to screen with a thrombosis profile.

We conclude that gene mutations can be the cause for the unexplained, undiagnosed cases of acute spinal cord infarction, especially in the young age group. The gene mutation is the predisposing factor for arterial thrombosis, irrespective of additional risk factors such as diabetes mellitus, hypertension, smoking and oral contraceptive use. Siblings of patients with spinal cord infarction secondary to a gene mutation are advised to be screened for this predisposition.

Conflict of interest

The authors declare no conflict of interest.

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