

DOWN SYNDROME WITH MOYAMOYA SYNDROME

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ABSTRACT

BACKGROUND

Moyamoya disease is a disorder of blood vessels in the brain, specifically the internal carotid arteries and the arteries that branch from them. The primary idiopathic form "moyamoya disease" has been distinguished from an associated form of "moyamoya syndrome," in which the arterial changes are seen among patients with various syndromes or other disease processes- Down syndrome, sickle cell anaemia, neurofibromatosis type-1, congenital heart disease, fibromuscular dysplasia, activated protein C resistance, or head trauma. There have been only 47 previous cases of moyamoya syndrome in association with Down syndrome reported in the world literature. Recently, we have come across a Case of Down's Syndrome with Moyamoya Syndrome. Because of its rarity we want to report our case.

KEYWORDS

Down Syndrome, Moyamoya Disease, Moyamoya Syndrome.

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BACKGROUND

Moyamoya disease is a disorder of blood vessels in the brain, specifically the internal carotid arteries and the arteries that branch from them.¹ These vessels, which provide oxygen-rich blood to the brain, narrow over time. Narrowing of these vessels reduces blood flow in the brain. In an attempt to compensate, new networks of small, fragile blood vessels form. These networks when visualised by a particular test called an angiogram resemble puffs of smoke that is "moyamoya."¹ It is an expression meaning "something hazy like a puff of smoke" in Japanese.

The primary idiopathic form "moyamoya disease" has been distinguished from an "associated form moyamoya syndrome," in which the arterial changes are seen among patients with various syndromes or other disease processes.^{2,3} Down syndrome, sickle cell anaemia, neurofibromatosis type-1, congenital heart disease, fibromuscular dysplasia, activated protein C resistance or head trauma. There have been only 47 previous cases of moyamoya syndrome in association with Down syndrome reported in the world literature.

CASE REPORT

A four-year-old male child, first issue of non-consanguineous marriage to a young healthy couple with uneventful antenatal and perinatal history presented to us with complaint of inability to swallow, nasal regurgitation and decreased movements of right side of body for last two days. According to mother patient was asymptomatic three days back, slept comfortably at night and in the morning he was not taking milk and not moving his right hand. For this, they consulted general practitioner in their locality and he referred them to us. During their way to hospital, patient had an episode of focal convulsion on right side of body for fifteen minutes, which was aborted by injection midazolam. There was no history of fever, rash, vomiting, deranged sensorium, trauma, loose motion and ear discharge.⁴

Patient had past history of left hemiconvulsion two years back, which was not associated with fever. No treatment was taken at that time.

Before illness patient was able to climb stairs with both feet per step, was able to speak five to six bisyllable words, simple sentence, helps to undress himself, feeds self by spoon without spilling, helps mother in household chores (DQ≈60%).

On examination, patient was conscious and sitting comfortably in mother's lap. He had brachycephaly with upwards slant palpebral fissures, protruding tongue, single palmar crease in right palm, short fifth finger and generalised hypotonia. He had pallor and cervical lymphadenopathy. Neurological examination revealed hemiparesis on right side of body with right facial palsy,

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weak gag reflex, bilateral upward plantar response, brisk knee and ankle reflexes, absent superficial abdominal reflexes on right side. No signs of meningeal irritation were present.^{5,6} Other system examination was unremarkable, normal.

With the provisional diagnosis of Downs' phenotype with cerebrovascular accident investigations were planned. Haemogram revealed microcytic hypochromic anaemia, which later came out as iron deficiency anaemia (low serum iron, raised TIBC and low ferritin). Renal and liver functions were normal.

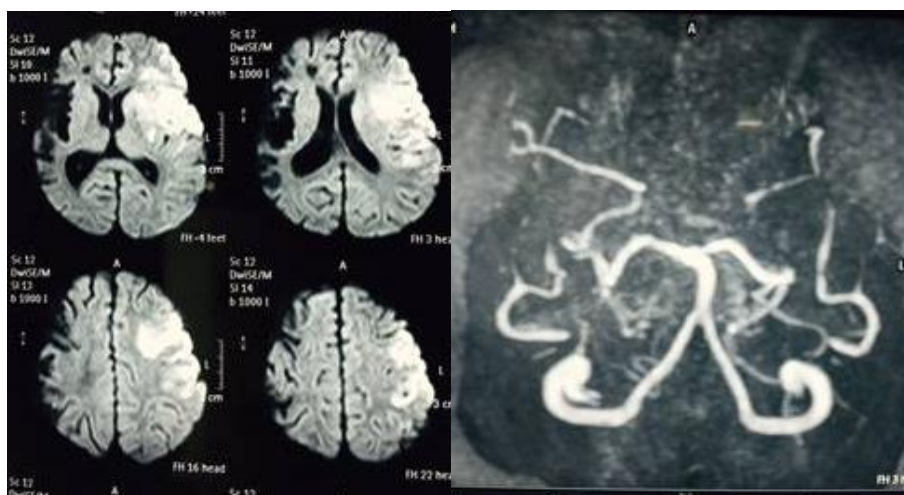
MRI Brain revealed confluent areas of acute infarct on left MCA territory with prominent chronic infarction in right

insula and perisylvian fronto-parietal lobes with parenchymal loss and FLAIR hyperintense gliosis. There is ex vacuo dilatation of right lateral ventricle.

MR Angiography brain revealed severe narrowing of intracranial part of bilateral ICA with markedly impaired flow into MCA and ACA. Features were suggestive of Moyamoya angiographic pattern. Karyotyping revealed Trisomy twenty one.

Patient was given low-dose aspirin with NG feeding and supportive care. His gag reflex recovered completely and there was partial recovery of hemiparesis and facial paralysis.⁷

Photographs- MRI and MR Angiograms depicting Characteristic Findings of Moyamoya Syndrome



Photograph 1

Photograph 2



Photograph 1

Photograph 2

DISCUSSION

The moyamoya arteriopathy was first described in a case report from Japan by Takeuchi and Shimizu in 1957. The typical angiographic appearance of the small, fragile, basal, collateral vessels prompted Suzuki and Takaku¹ to use the Japanese word "moyamoya," meaning "hazy, cloudy or puff of smoke." It is a non-inflammatory, non-vasculitic and non-atherosclerotic condition characterised by progressive

stenosis of intracranial arteries. The intracranial arteries usually involved are the terminal internal carotid artery and the proximal portions of the anterior cerebral and middle cerebral arteries. There is a slowly progressive occlusion, which permits the development of the unique small anastomotic collateral pathways causing the "puff of smoke" appearance on the angiogram or "cerebral basal rete mirabile." The disease is usually bilateral. Moyamoya

disease was first identified in Japan, where it is most prevalent, affecting about 5 in 100,000 individuals. The condition is also relatively common in other Asian populations. It is ten times less common in Europe. In the United States, Asian Americans are four times more commonly affected than whites. For unknown reasons, Moyamoya disease occurs twice as often in females as in males. Up to 15 percent of Japanese people with Moyamoya disease have one or more family members with the condition indicating that the condition can be passed through generations in families; however, the inheritance pattern is unknown.⁸ Research suggests that the condition follows an autosomal dominant pattern. The RNF213 gene provides instructions for making a protein for proper development of blood vessels. Changes in the RNF213 gene involved in Moyamoya disease replace single protein building blocks (amino acids) in the RNF213 protein.^{9,10} The effects of these changes on the function of the RNF213 protein contribute to the narrowing of blood vessels or the characteristic blood vessel growth of Moyamoya disease.^{9,10}

The pathogenesis of Moyamoya syndrome is unknown. The association of autoimmune antibody and HLA antibody has been documented concerning the pathogenesis of moyamoya disease.³ The age at onset of symptoms of moyamoya syndrome shows a bimodal distribution, peaking in the first decade at age of five years and in the fourth decade at age of 34 years. The majority of children with moyamoya syndrome present with ischaemic symptoms, whereas adults present with intraparenchymal, intraventricular or subarachnoid haemorrhage as well as stroke and transient ischaemic attacks. A fixed, unilateral, neurologic deficit is the most common initial finding.⁴ Although alternating hemiplegia may be seen in some patients,⁵ seizures and involuntary movement disorders may also occur in the paediatric population.⁶ There are relatively few reports of the occurrence of moyamoya syndrome in association with Down syndrome, although moyamoya syndrome has been reported to occur with a higher frequency in Down syndrome than in the general paediatrics population.⁷ The incidence of moyamoya syndrome in patients with trisomy 21 is approximately three times the general population.

CONCLUSION

Since association of Down syndrome with moyamoya syndrome has been reported to occur with a higher frequency than in the general paediatrics population, we suggest keeping a high index of suspicion and routine MR angiography screening in Down syndrome patients presenting with hemiparesis or any other neurological deficit.

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