

## A Case Report of Acute Cerebrovascular Accident in Children

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### Abstract

Stroke is defined as the sudden occlusion or rupture of cerebral arteries or veins resulting in focal cerebral damage and neurological deficits. Types of stroke resulting from vascular occlusion are arterial ischemic stroke and those resulting from vascular rupture are called hemorrhagic stroke. Stroke in children is relatively rare and frequently results in a lack of recognition and delay in diagnosis. The etiologies of stroke in children are multifactorial. In our present case the patient who is 13 yrs old and presented with symptoms suggestive of acute CVA. The child recovered within 4-5 days and was discharged in improved neurological status.

**Keywords:** Stroke; Arterial Ischemic Stroke; Sinovenous Thrombosis; Hemorrhagic Stroke; Antithrombotic Therapies.

### Introduction

Stroke or CVA is rare in children. Heart disease whether it is congenital or acquired, metabolic and hematological disorders and vasospastic conditions like migraine are more often associated with childhood strokes. The treatment of stroke in children has been primarily directed toward treating underlying causes. Anticoagulant therapy appears to be increasing in pediatric ischemic Stroke. Mortality after stroke in children ranges from 20% to 30% depending on the location and the underlying cause. Residual neurological dysfunction is present in more than 50% of survivors. Stroke is a major cause of disability and death in children. 10% of children suffering stroke die, and at least 50% of survivors are left with neurological disabilities, learning difficulties or seizures. Arteriopathies and cardiac disease are the commonest risk factors for childhood Arterial Ischemic Stroke (AIS). The cause of perinatal AIS is poorly understood, despite affecting 1 in 4000 newborns. Sinus & venous thrombosis due to head and neck infections are one of the causes in AIS and AV malformation has been found to be the cause of hemorrhagic stroke. Infants, children and young adults account for less than 5% of all strokes. The incidence of stroke in the 0 to 14 yrs age group was

found to be 2.5 cases per 100,000 per year. Out of these 25.2 % were of ischemic stroke and 75.6% is of hemorrhagic stroke. In India the incidence is quite high of around 13 to 33 cases per 100,000 per year. It has also been found that around 20-30 % of all infants born prematurely below 35 weeks of gestation have some forms of intraventricular or cerebral matrix hemorrhage.

### Case History

A 13 yr old female was brought to the emergency department by her parents with complain of weakness of the Right Upper and Lower limbs gradually increasing since 4 hours. The patient is unable to walk or stand by herself and tends to fall while trying to do so. There is also mild slurring of the speech and deviation of the tongue to the left. There is no h/o any fever, cough, cold, loose motions, rash or joint pain. She was absolutely fine in the morning and then suddenly started complaining of weakness in the Right Upper and Lower Limb. No history of any trauma, fall, seizure in the past. The patient is not on any regular medication and has no h/o any hypertension, vision problems, sinusitis or upper respiratory tract infection. There was no travel history

and no h/o any recent vaccination. Birth history- Insignificant and normal vaginal delivery and no birth trauma. Developmental history – Normal, Diet history– on balanced Vegetarian diet; patient was fully vaccinated, and did not give any history of major illness in the past. Anthropometry- looking well built and well nourished. The vital parameters were Pulse – 88 /m Regular; BP- 100/60 mm Hg; RR- 24/m; Spo2 -100% in RA; RBS- 102 mg/dl; Temp- Normal; Cardiac monitor – Normal Sinus rhythm; Examination of the HEENT, PUPILS; CHEST, abdomen and CVS were normal. CNS examination revealed that patient had dysarthria; signs of right 7<sup>th</sup> nerve palsy and right sided hemiparesis and hypotonia of the right upper and lower limbs. Patient was otherwise fully conscious and oriented, GCS 15/15 and right Plantar response was indeterminate.

After initial stabilization, the patient was sent for MRI brain which showed an acute infarct in the Left MCA territory.

Baseline laboratory investigations sent from Emergency Department were normal – TLC 11.4, Hb 12.3, PCV 37.4, platelet 271, Neutrophil 82.3, ESR- 11mm/hr, urea 12.8, creatinine 0.4, Na+139, K+4.2, Chloride 106, Calcium 9.8, Cholesterol 118, Triglyceride 132, HDL 30.9, LDL 73.3, VLDL 26.4. T4 0.63, T3 3.42, TSH 2.21. PT 12.9, INR 1.19, PTT 27.1. Special tests sent after admission revealed a very low Protein C level though ANA, Anti Phospholipids Ab (IgG, IgM), Homocystine Level, Factor V, Protein S, Antithrombin III and Lupus Anticoagulant were all normal.

Patient was treated conservatively with supportive medications physiotherapy & and Neuroscience Rehabilitation. By the 5<sup>th</sup> day, the patient regained near normal muscle tone in all limbs and fair voluntary control in Rt. Upper and lower limb. Berg balance score 44/56. Patient discharged on Aspirin with near normal Recovery.

## Discussion

The primary pathophysiology of CVA is either Ischemic or Hemorrhagic. Also infection and substrate failure leads to damage to the fragile brain parenchyma in children. The main extent of damage to the brain is due to the impairment of the vascularity and metabolic demands of the brain tissue. The brain receives its blood supply from the carotid and the vertebro-basilar circulation. There are certain regions in the brain like the diencephalon which are supplied by the end arteries and the anastomosis are not

efficient and hence have a dreadful consequence when these end arteries are occluded. There are certain areas of the brain which lies between the any two major arteries and are called the watershed zones. These zones are affected by the decrease in cerebral perfusion pressure.

Two types of brain injury are there which include the Primary Injury and the Secondary Injury. The Primary injury is due to cellular damage caused by direct insult and the Secondary Injury is the cascade of events which are ignited by the primary insult. There can also be focal hemorrhage following ischemia. There is a central area or core where there is severe ischemia and there is a surrounding area called the penumbra which can recover if the perfusion is restored. This will result in better recovery. There is also a gross difference between the adult and the infant/children brain. The lactic acid produced as a result of ischemia causes more damage to the adult brain than the neonatal brain. This is thought to be due to the greater permeability of the immature brain to the lactate as a result it cannot accumulate locally and causes less damage.

### *Common Causes of CVA in Children*

1. *Congenital* e.g. congenital heart disease and Coarctation of aorta.
2. *Acquired* e.g. RHD, IE, cardiomyopathies, arrhythmias, myocardial infarction.
3. *Vasculitis/Vasculopathies* e.g. Infections, migraine, fibro muscular dysplasia.
4. *Hematological & hypercoagulable states* e.g. Sickle cell disease, polycythemia, Infections, Leukemia, Protein C&S deficiency, Antithrombin III deficiency, Factor V Leiden deficiency, nephritic syndrome.
5. *Metabolic causes* e.g. Homocystineuria, Ehler Danlos syndrome, Marfan's syndrome.
6. *Trauma* e.g. Blunt trauma.

*This case report shows that Stroke in Children is due to Protein C deficiency which is also not a very common entity and the timely diagnosis and treatment led to complete recovery.*

## Conclusion

Although Acute Strokes in children are rare but still it is an emergency condition. So as Emergency physician any such presentation should be

considered with evidence based approach. The patient with such presentation needs extensive work up and should be evaluated as an inpatient.

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