

Acute Ischemic Stroke in a Pediatric Patient

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Abstract

Acute ischemic stroke in a pediatric patient is a complex disease with a variety of etiologies that differ from adults. Though rare, they are a real phenomenon with potentially devastating consequences. Stroke is relatively rare in children, but can lead to significant morbidity and mortality. Understanding that children with strokes present differently than adults and often present with unique risk factors will optimize outcomes in children. Despite an increased incidence of pediatric stroke, there is often a delay in diagnosis, and cases may still remain under- or misdiagnosed. Clinical presentation will vary based on the child's age, and children will have risk factors for stroke that are less common than in adults. Management strategies in children are extrapolated primarily from adult studies, but with different considerations regarding short term anticoagulation and guarded recommendations regarding thrombolytics. Although most recommendations for management are extrapolated from adult populations, they still remain useful, in conjunction with pediatric-specific considerations. Available literature, which is limited to case reports and retrospective reviews of databases, clouds this topic with both positive and negative outcomes.

Keywords: Acute Ischemic Stroke; Children; Anticoagulation; Thrombolysis.

Introduction

Acute ischemic stroke (AIS) in a pediatric patient is a rare medical emergency with an incidence of only 2-3 per 100,000 [1,2]. Cognitive and behavioral sequelae frequently arise with social implications and effects on daily living. The etiologies of stroke in a child are more varied than in adults and are not always due to acute clot formation or hemorrhage.

Literature on this topic, including the use of anti-thrombotic therapy for children presenting with AIS, is sparse [3]. Studies in the adult population show anti-thrombotic drugs, including aspirin, are effective when administered using recommended guidelines. The role of thrombolytics is controversial with conflicting evidence [4,5].

Case Report

An 10-year-old Kiran male presented to the ED with sudden onset of headache, left-sided weakness and left facial palsy. His vital signs were within normal limits. Left arm and leg strength were 2/5 with a noticeable facial droop.

Cardiac exam showed a regular rate and rhythm with no murmurs. Chest was clear and abdomen was soft. No petechiae were noted on his skin. Fingertick blood glucose was normal. A MRI scan of the head showed acute non hemorrhagic infarcts right fronto

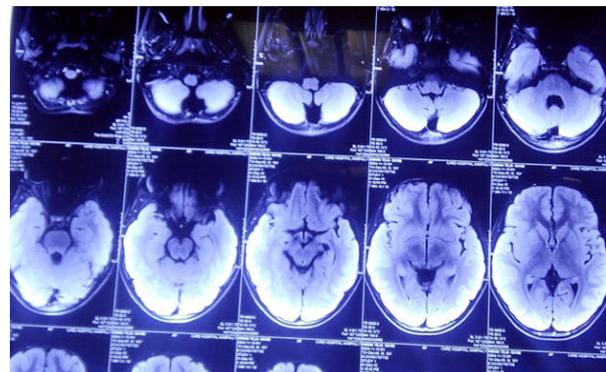


Fig. 1:

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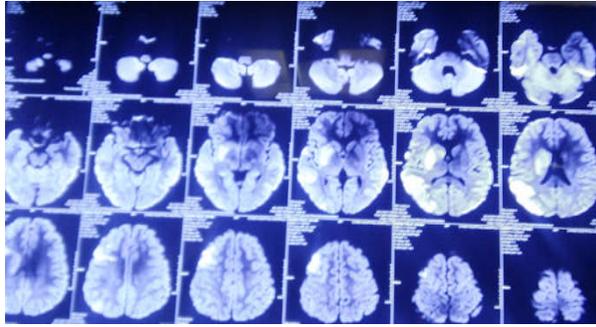


Fig. 2:

parieto occipital cortical and subcortical white matter, right caudate nucleus and lentiform nucleus and right centrum semiovale presumptive diagnosis of acute ischemic stroke

The patient was given aspirin, empiric intravenous antibiotics and medications in the ED. A thorough work-up ensued in the pediatric intensive care unit. An MRA of the brain and lumbar puncture was not done, The carotid Doppler and echocardiogram were normal. The CBC, chemistry panel, liver enzymes, cardiac enzymes and urine drug screen were normal, as were the SLE panel, Protein C and S, Factor V Leiden, anti-phospholipid antibodies, anti-thrombin III and coagulation profile, metabolic screening tests, blood and CSF cultures. The patient remained stable for the first two days and regained some motor strength. His hospital stay was complicated by a worsening headache. The clinical signs demonstrated rise in the intracranial pressure that resolved following treatment with mannitol. After four days of testing and rehabilitation, the etiology for his ischemic stroke remained elusive. The patient expended significant time and effort with a physical therapist. Upon discharge, he had regained the ability to walk and was able to move his left arm above his head and signs of facial palsy were disappeared.

Discussion

AIS in a pediatric patient is defined as a stroke occurring between the ages of one month and 18 years. This relatively rare condition varies geographically with occurrence at 2-3 per 100,000 patients. By contrast, the overall incidence rate for total stroke (first-ever and recurrent of all ages) was 269 per 100,000 population. Eighty percent of adult strokes are due to ischemia. While ischemic strokes in adults are usually thrombotic or embolic in nature, they may also be caused by hypoperfusion states. Cryptogenic strokes comprise 30 to 40% of all adult ischemic strokes and approximately 50% in children.

Acute ischemic strokes in children most commonly

occur between the ages of 1-5 years and least commonly in the extremes (< 1 year and > 15 years). Focal neurological signs occur in three-quarters of patients, with hemiplegia the most common. Despite the fact that infection accounts for 26% of cases, fever is present only 11% of the time. The risk factors for stroke in children are congenital heart disease, infection, prothrombotic disorders, trauma, acquired and congenital vascular disease, sickle cell disease, metabolic disorders and mitochondrial disease. Vascular disease alone accounts for one-third of cases, while metabolic disorders and prothrombotic disorders comprise 18% and 13% of cases respectively. Trauma makes up an additional 11% of cases. At least one risk factor is present in 90% of patients with almost 25% of patients having more than one. There appears to be demographic variation with a predilection for both gender and ethnicity. A seasonal variation may exist, as the disease most commonly occurs during the summer and least commonly during the winter. African-Americans have a significantly higher risk of suffering from both ischemic stroke and hemorrhagic strokes. Males carry a significantly higher risk of suffering all stroke subtypes compared to females.

ED management of a child suffering from an ischemic stroke should focus on stabilization and transfer to an appropriate facility for specialty care. Stabilization begins with securing the airway, providing supplemental oxygen, establishing IV access and monitoring vitals signs and mental status. An emergent CT of the head in the ED should not be delayed. An ECG, CXR and lab work should be sent, including a complete blood count, blood and CSF cultures, chemistry, liver enzymes, cardiac markers, coagulation factors, urine analysis and urine drug screen. Empiric intravenous antibiotics and antivirals, maintenance fluid with an isotonic, non-dextrose containing fluid must be initiated in the ED. Anti-platelet drugs are widely used in adults after literature has shown they reduce the rate of strokes. Although randomized controlled trials with children have not been conducted, anti-platelet drugs are used in some centers to reduce the recurrence rate of stroke. Adverse effects, such as severe bleeding or the precipitation of Reye's syndrome, are rare. The use of anti-thrombotic drugs remains controversial in the pediatric literature and is not the standard of care. However, anti-thrombotic drugs are being given to pediatric patients at some institutions despite a paucity of supporting literature. The benefits are unclear, and it seems their use is based on adult studies, case reports and expert opinion. One study showed 1.6% of pediatric AIS patients admitted between 2000 and 2003 received thrombolytic

therapy. The children receiving thrombolytics had significantly higher medical costs, were less likely to be discharged home and had higher overall mortality rates.

Images



On admission with left hemi paresis and facial palsy



On 3rd day with improvement in power

On the day of discharge



Conclusion

AIS in the pediatric patient is a rare but potentially devastating disease. The lack of research in this area is apparent. There is only anecdotal evidence for the use of antithrombotic drugs in the management of children with ischemic strokes, unlike the evidence for treating adult ischemic strokes. Due to the high rate of recurrence anti-platelet drugs should be considered and initiated in the ED.

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