



## November Up2Date

### Pediatric Stroke

#### **They are not little adults**

Most children with Acute Ischemic Stroke present with a GCS of 14 or greater and at least one focal neurologic sign, whereas hemorrhagic stroke typically presents with headache, vomiting and mental status change (1).

Two-thirds of pediatric patients presenting with stroke do not have screening indications according to adult protocols (2).

Childhood Acute Ischemic Stroke is fatal in approximately 3% of patients and is associated with both acute and long-term neurologic impairment in over 70% of cases (3).

Etiologies of pediatric stroke include: sickle cell disease, congenital heart disease, arterial dissection, prothrombotic conditions, preceding viral infections and one in four cases is idiopathic (3).

#### **They are sneaky little ones**

The median interval from symptom onset to Acute Ischemic Stroke diagnosis is 22.7 hours. Prehospital delay, symptom onset to hospital arrival, is 1.7 hours (4).

Initial neuroimaging can only diagnosis a stroke in the pediatric patient approximately 47% of the time (4).

The parents' delay in requesting medical help, the non abrupt onset of symptoms, altered level of consciousness, milder stroke severity, posterior circulation infarction and lack of

neuroimaging at a tertiary hospital were predictive factors in delayed Acute Ischemic Stroke diagnosis (4).

## Complications

The most frequent complication of pediatric stroke is seizure. Most clinical seizures occur within the first 24 hours of presentation and do not vary in stroke subtype (5). 22% of children with AIS present with seizures which are always accompanied by focal neurologic deficits. Younger age is a risk factor for seizures at presentation (6). Status epilepticus is common especially in infants. Epilepsy has a high likelihood of developing the next six months in children with seizures in the first 24 hours of stroke onset (5). Seizure at presentation is not associated with infarct location or etiology. Nonconclusive seizures may occur at any time during the acute period (6).

## Treatment

Treatment will consist of TPA, interventional radiology, and long-term medication treatment and rehabilitation if needed. There is no minimum age cutoff for TPA at this point, however, there is a study currently underway at The Children's Hospital regarding the risks and benefits related to TPA administration in the pediatric population.

## Case Study

15y/o 130 pound male with a history of a Group A Strep infection was admitted to Swedish Medical Center at 1706 with a last known normal at 1610 and difficulty speaking. The pt had finished his course of antibiotics the day he was admitted. On admission vital signs were:

BP 110/66                      Hr100                      RR 16                      Temp 99.0                      SPO2 96%

On arrival the patient was alert but could not answer questions (NIH 2), could not follow commands (+2), had facial weakness (+1), had right upper and lower extremity drift (+1/+1), sensory deficit (+1), language difficulty (+3), and dysarthria (+2). His NIH was otherwise normal and he scored a 13.

The patient was transported to CT scan at 1711 and CT perfusion showed areas of match and mismatch. CTA of the head/neck showed M1 stenosis with a M2 clot. TPA was started at 1732 with 5.3mg bolus followed by a 48mg gtt at 1733.

Frequent reassessment was done to determine efficacy of the TPA and while the patient was able to follow commands and had improvement in his right weakness, the decision was made with the family to take him to interventional radiology at 1815.

After removal of the M2 clot the patient was admitted to the ICU on a Neosynephrine gtt to maintain SPB >130. The next morning the patient's NIH scale was three (7).

## **Ongoing Research**

Pediatric Stroke is a relatively new recognized and diagnosed pathology. Currently, a study known as the International Pediatric Stroke Study has over 150 co-investigators (including The Children's Hospital) in over 10 countries. This will be a multi-year study which will have conclusive data in regards to these patients. For example, infarcts in neonates preferentially involved the anterior circulation and left hemisphere while 30% were multifocal (8).

## **The Children's Hospital**

The Children's Hospital in Aurora, CO has the only designated pediatric stroke program in Colorado. The only major criteria for activating a pediatric stroke alert is that onset of symptoms are less than 12 hours with focal neuro deficits. There is currently a nationwide study underway of which TCH is one of 10 participating hospitals evaluating the benefit for TPA in children. Interventional Radiology can be utilized and is considered on a case by case basis (9).

## References

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7. Case study used with permission from Michelle Whaley, NP; Stroke Nurse Coordinator at Swedish Medical Center: 303-788-5000.
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