

### **Paediatric stroke management guidelines**

Mubeen Fatima Rafay

Section of Neurology, Department of Paediatrics and Child Health, University of Manitoba, Canada.

Childhood stroke is increasingly recognized. In spite of increased recognition, a lack of awareness regarding childhood stroke continues to exist resulting in delayed and missed diagnosis and treatment of childhood stroke.

For the clinicians, the management of stroke in children is a challenge. In majority of children with stroke, the presentation is non-specific with soft neurological examination findings indicating several differential diagnoses. Several causes and risk factors predispose to ischaemic stroke in children, which are different compared to adults. Most importantly, the paediatric stroke literature lacks systematic randomized data to establish evidence based management of childhood stroke except in children that have suffered stroke secondary to sickle disease. This has resulted in these children having a lack of consistently delivered diagnostic and treatment regimens. Not just randomized controlled studies (RCT's), protocols or consensus statements to treat children with stroke were also virtually non-existent, except in the last few years when several protocols and guidelines specific to childhood stroke emerged.

Over the last five years, four important guidelines outlining management of paediatric stroke from different paediatric disciplines (including neurology, neurosurgery, haematology and physiotherapy) have surfaced including the most recent American Heart Association (AHA) and Canadian Medical Association (CMA) guidelines.<sup>1-5</sup> Due to the lack of paediatric systematic RCT's, most of the recommendations for the management of childhood stroke are extrapolated from the adult stroke literature and based on consensus among physicians with expertise in paediatric stroke.

The initial two guidelines (the United Kingdom Royal College of Physicians Paediatric Stroke Working Group and American College of Chest Physicians Guidelines), one of which was subsequently updated in year 2008,<sup>2,3,5</sup> had almost similar recommendations for the management of specific stroke subtypes, except obvious differences in the initial management of acute arterial ischaemic stroke (AIS) in children.<sup>6,7</sup> For the paediatric medical community, both guidelines provided a good resource for the management of childhood stroke but did not completely address all aspects, etiologies and subtypes of childhood stroke. This was addressed most

comprehensively and exclusively for the first time by the recent American Heart Association guidelines for the management of stroke in infants and children. The CMA best practice recommendations for stroke care, which had been a valuable resource for the adult medical community for a number of years, also for the first time in 2008, dealt with paediatric stroke management together with adult stroke care guidelines. However, for the management of children with stroke, the Canadian guidelines for most part took into account the AHA recommendations and hence will not be discussed further.

With regards to AIS treatment, both AHA and American College of Chest Physicians (ACCP) guideline had similar recommendation for the acute and chronic treatment of arterial ischaemic stroke.<sup>1,5</sup> Both recommended initial treatment with anticoagulation until cardioembolic and craniocervical dissection etiologies are ruled out for which continued treatment with anticoagulation is advised for over six weeks or until cerebral arterial abnormalities resolve/improve or underlying heart defect is corrected, followed by switch to antiplatelet therapy with aspirin. In addition, both recommend anticoagulation for selected prothrombotic states and recurrent embolic events. For all others, except sickle cell disease, where optimal hydration and exchange transfusion has been shown to be beneficial, antiplatelet therapy with aspirin is indicated. The United Kingdom Royal College of Physicians (UK) guidelines had different recommendations and advised aspirin as both initial and chronic treatment of AIS except for extracranial cervical dissection without haemorrhage when anticoagulation is advised and cardioembolic stroke when anticoagulation was advised to be discussed with senior paediatric cardiologists and haematologists.<sup>2</sup> For prothrombotic states, a referral to haematology was advised. For recurrent stroke on aspirin, a switch to anticoagulation was considered by UK and either anticoagulation or clopidogrel, another antiplatelet agent, by ACCP.<sup>5</sup> This was not addressed by the AHA guidelines.<sup>1</sup> All guidelines were in agreement in not recommending hyperacute fibrinolytic therapy with tPA or alteplase for acute childhood AIS until much is known about the safe administration of this medication in children. There was also general consensus and

agreement with regards to use of rehabilitative therapies for childhood stroke.

For cerebral sinovenous thrombosis without evidence of haemorrhage on parenchymal neuroimaging, there was an agreement among all guidelines to treat older children (non-neonates) with anticoagulation until affected venous channels are completely recanalized or up to maximum six months. However, for neonates the recommendations varied. The treatment of neonates with CSVT was not specifically addressed in the UK guidelines.<sup>2</sup> The ACCP guidelines suggest initiating treatment with anticoagulation in neonates without large ischaemic infarction or intracerebral haemorrhage and to provide radiographic monitoring of such children with the recommendation to initiate anticoagulation if the extension of thrombosis occurs.<sup>5</sup> The AHA's recommendations are to provide supportive therapy such as hydration, infection, seizures and raised intracranial pressure and consider anticoagulation only in selected neonates with clinical or radiological evidence of propagating CSVT despite supportive therapy.<sup>1</sup>

These published guidelines are helpful tools in directing clinicians towards standardized management of children with stroke, resulting in better clinical care delivery, neurological outcome and also standardized data acquisition. The data thus collected will be extremely helpful to develop clinical trials especially with regards to safety and efficacy of suggested stroke treatment protocols in children. However, such clinical trials need adequate

patient numbers which are difficult to achieve in one paediatric centre. Multicentre participation with uniform, evidence based protocols or guidelines, for the management of children with stroke are therefore imperative. Efforts to achieve this goal are the main objectives of the international paediatric stroke study network which is currently supported by both regional and national networks across several countries around the world. Although research regarding paediatric stroke is in its initial stages, evidence based management and research as outlined above will certainly help to brighten the light at the end of the tunnel.

## References

1. Roach ES, Golomb MR, Adams R, Biller J, Daniels S, DeVeber G, Ferriero D, Jones BV, Kirkham FJ, Scott RM, Smith ER. Management of stroke in infants and children: a scientific statement from a Special Writing Group of the American Heart Association Stroke Council and the Council on Cardiovascular Disease in the Young. *Stroke* 2008; 39: 2644-91.
2. Paediatric Stroke Working Group. Stroke in Childhood: Clinical Guidelines for Diagnosis, Management and Rehabilitation. Ref Type: Generic.
3. Monagle P, Chan A, Massicotte P, Chalmers E, Michelson AD. Antithrombotic therapy in children: the Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy. *Chest* 2004; 126: S645-87.
4. Lindsay P, Bayley M, McDonald A, Graham ID, Warner G, Phillips S. Toward a more effective approach to stroke: Canadian Best Practice Recommendations for Stroke Care. *CMAJ* 2008; 178: 1418-25.
5. Monagle P, Chalmers E, Chan A, DeVeber G, Kirkham F, Massicotte P, Michelson AD. Antithrombotic therapy in neonates and children. *American College of Chest Physicians Evidence-Based Clinical Practice Guidelines* (8th Ed.). *Chest* 2008; 133: S887-968.
6. DeVeber G. In pursuit of evidence-based treatments for paediatric stroke. *The UK and Chest Guidelines. Lancet Neurol* 2005; 4: 432-6.
7. DeVeber G, Kirkham F. Guidelines for the treatment and prevention of stroke in children. *Lancet Neurol* 2008; 7: 983-5.