CEREBRAL VENOUS SINUS THROMBOSIS IN A YOUNG CHILD: SHOULD WE TREAT WITH ANTICOAGULANTS

Sathish Bangalore (1), Amarjit Mahay (1), Donald Bentley (2), Colin Michie (1)

INTRODUCTION

Thrombosis of the cerebral venous sinuses (or CVST) is a relatively uncommon pathology in children with a reported rate of 0.67 per 100 000 (1). The majority of cases present with acute neurological symptoms which may include seizures, headache, lethargy or vomiting. In addition there may be focal neurological manifestations. (2). CVST has been associated with a high morbidity and merits examination as it has been included within the top 10 causes of death in children (3-7). We present a case that demonstrates this pathology and some of the challenges in its management.

CASE REPORT

A ten-month old boy SF, who had been previously well, presented to the emergency department with a sudden onset of left sided weakness with an inability to crawl. There had been a two hour history of left-sided focal tonic clonic seizures. There was no history of recent trauma. He was born at term in the UK, the first child of non-consanguinous parents from Somalia. The pregnancy and delivery had been uneventful; there was no family history of note. SF had shown a normal developmental trajectory and appropriately vaccinated.

On control of his seizures with benzodiazepines, the child was found to have normal vital observations and an unremarkable neurological and systemic examination. No obvious source of infection was found and there was no suggestion of disseminated intravascular coagulation or metabolic derangement. However he developed a high fever with hypotension and status epilepticus with left sided seizures. He required supportive ventilation for 48 hours. Investigations suggested bacterial sepsis, but no infectious organism was identified from blood cultures, rapid antigen tests or PCR.

1 Department of Paediatrics, Ealing Hospital NHS Trust, London UB1 3HW.
2 Retired Consultant in Paediatrics, Hammersmith Hospital, Imperial College London.
Investigation with a CT of his brain showed a right-sided frontal intracerebral bleed with surrounding oedema. The MRI revealed a focal subarachnoid haemorrhage overlying the right frontal lobe in the region of central and precentral sulcus with compression and ischaemia of the underlying cortex. A cerebral arteriogram demonstrated a probable cortical vein thrombosis associated with a possible infective vasculopathy. Furthermore, a venogram displayed a filling defect in the right transverse sinus suggestive of a possible thrombus. None of the imaging showed evidence of an underlying vascular malformation. A Doppler scan of the leg vessels was normal, as was a skeletal survey and renal ultrasound. The EEG recorded a non-specific abnormality with diffuse excess theta and slow wave activity in the right cerebral hemisphere. There was no evidence of seizure activity. Routine bloods for clotting, haemoglobin electrophoresis and metabolic investigations were normal. Treatment of the child was conservative; in that he received ten days of a broad spectrum cephalosporin. Thrombolysis or anticoagulation was not instituted.

To summarise SF presented with focal seizures and weakness; imaging suggested a right transverse sinus venous thrombosis possibly secondary to sepsis. Six months later he demonstrated persistent left sided weakness with upper motor neurone signs; there was some delay in his gross motor development, although fine motor, speech, language and socialisation skill milestones appeared appropriate for age.

DISCUSSION

Cerebral venous thrombosis results from occlusion of a venous sinus and/or cortical vein and appears to be initiated by a partial thrombus or an extrinsic compression that subsequently progresses to complete occlusion. Secondarily the thrombus may extend to veins draining into the sinus. This results in cortical venous infarction with petechial or overt hemorrhagic, venous infarction and regional ischaemia. Venous infarctions commonly develop within the white matter or at the grey-white matter junction (7).

A CVST often has multiple causes in any one patient (8). Infection frequently precipitates the condition, but other disorders including hypovolemia, malignancy, autoimmune disease, sickle cell status and congenital cyanotic heart disease have been reported as contributing to cases (2). Prothrombotic conditions including factor V Leiden, protein c and s deficiency, antithrombin III deficiency or a mutation in the prothrombin gene, as well as nephrotic syndrome can also be predisposing factors. These conditions are understandably more frequent in paediatric cases. Some heterozygotes for prothrombin gene mutations or factor V Leiden may also be at risk. Cases without obvious initial co-morbidities may have a very high incidence of prothrombotic risk factors (9,10) and merit investigation. Prothrombotic derangements have been found in between 30 - 62% of cases

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(1,2,6). Anaemia and higher platelet counts were also common findings (2). Anatomical causes of CVST are rare.

A routine CT after contrast enhancement or MRI may show a dense-triangle sign (2). However this approach can miss about 40% of cases (1, 11). CT venography or MRV is the investigation of choice (12). Parenchymal MR and MRV are important in the demonstration of both the infarct and the clot within the vessels. Perfusion and diffusion MRI can help diagnose oedema/cerebral congestion secondary to obstruction but will not be able to distinguish from arterial infarct or venous infarct. (13, 14). Consequently a low threshold for CT or MR venography is essential in children presenting with acute neurological signs and symptoms (2). Detailed imaging is also needed in order to exclude anatomical anomalies. Variants of venous anatomy are common, and a hypoplastic or attenuated transverse sinus, as well as prominent arachnoid granulations may resemble a CVST.

Treatment of this condition resembles that in adults: physiological homeostasis should be maintained to prevent herniation. The use of anticoagulation is controversial in paediatrics (2, 3). Initial concerns about intracranial haemorrhage from thrombolytic therapy have not been supported by single case reports or any series (11, 15, 16), although there are concerns within paediatrics related to the safety of the monitoring systems (17). To date relatively few neonates with CVST have been treated with anticoagulants and this would therefore be recommended only in those with clinical deterioration, or with radiological evidence of clot propagation (18). Work with relatively small series of children has suggested that there is a better outcome in patients treated with anticoagulation therapy. (19). Those with recurrent thrombosis gain from anticoagulation therapy (20). Specifically, treatment with LMWH in newborn infants with a thalamic haemorrhage due to CVST appears to be safe (21). It is proposed that since treatment of CVST in adults with anticoagulation therapy is not delayed unnecessarily, a similar strategy should be applied to children and so facilitate natural recanalization and prevent thrombosis (22).

CONCLUSION

A case of thrombosis in a coronary venous sinus, initiated by infection, showed a relatively good outcome without thrombolytic treatment or anticoagulation. A literature review outlines the difficulty in diagnosing and managing cases. There is a need for a large trial to determine the benefit of anticoagulation therapy in children.
REFERENCES


Useful Patient Information

Living with your child’s Warfarin. Birmingham Children’s Hospital Patient information booklet.


Stroke support:
http://childstrokesupport.ning.com/
http://www.pediatricstroke.org/
http://www.pediatricstrokenetwork.com/