Two Cases of Cerebral Arterial Thrombosis in Infants Undergoing Craniosynostosis Repair

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Introduction:
The antifibrinolytic medication tranexamic acid has been shown to reduce estimated blood loss and transfusion requirements in a variety of cases in children, including: cardiac, major orthopedic, and cranial vault remodeling procedures. (1-3). While the studies showing efficacy of TXA in craniosynostosis repair did not reveal any thrombotic complications, they were not powered to reveal adverse events. (4-5)

We present two cases of perioperative cerebral arterial thrombosis in infants undergoing craniosynostosis repair who were treated with TXA.

Intraoperative Management

<table>
<thead>
<tr>
<th>Case #1</th>
<th>Case #2</th>
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</thead>
<tbody>
<tr>
<td><strong>Induction</strong></td>
<td>Sevoflurane/N2O/Oxygen</td>
</tr>
<tr>
<td><strong>Monitors / Access</strong></td>
<td>ASA standard, radial A-line, PSV02</td>
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<tr>
<td><strong>Maintenance</strong></td>
<td>Sevoflurane, Vecuronium, Fentanyl</td>
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<tr>
<td><strong>TXA</strong></td>
<td>100mg/kg bolus, 10 mg/kg/hr infusion</td>
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<tr>
<td><strong>Extubation</strong></td>
<td>Evacuated awake – uneventful transport to PICU</td>
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<tr>
<td><strong>Time/EBL</strong></td>
<td>4:14/200cc</td>
</tr>
<tr>
<td><strong>Fluids</strong></td>
<td>PRBCs – 215mL, Crystalloid – 29mL, Albumin 5% – 110mL</td>
</tr>
</tbody>
</table>

Post-operative Courses:

**Case #1**

4 hours post-op, the patient suffered an apparent ictal event. CT head showed: an infarction in the anterolateral aspect of the left temporal lobe in the distribution of distal MCA branches.

Four extremity U/S did not reveal any DVT. An echocardiogram showed a PFO with left-to-right shunting. Proteins C and S and Anti-thrombin 3 levels were normal.

The patient had no further seizure activity while in the hospital or upon follow-up with neurology and neurosurgery.

**Case #2**

POD 1, the femoral arterial line was removed with resulting signs of poor perfusion to right leg. Ultrasound showed a femoral artery thrombosis.

On POD 10, the patient was noted to have decreased left-sided movement. CT head and MRI/MRA showed: extensive infarction involving the right hemisphere, primarily involving the right MCA distribution due to complete occlusion of the right ICA and MCA (please see figures below).

Further workup revealed a PFO with left-to-right shunting and mildly elevated Factor VIII activity, but was otherwise unremarkable for hypercoagulability.

At follow-up the patient's left-sided weakness had improved to include movement against gravity in LLE and LUE.

Discussion:
The incidence of adverse reactions to TXA in infants is unknown. Applying the binomial distribution to the total number of patients in both published trials (4-5) shows that the upper limit of the 95% CI for the incidence of any adverse event not observed in the trials is 6.67%.

The optimal dosing of TXA in infants is unknown. Patients with ESRD may be at a higher risk of thrombotic complications. Risks, benefits and alternative therapy to antifibrinolytics need to be discussed and taken into perioperative decisions.

References: