Royal College of Paediatrics and Child Health

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Evidence Statement

Major trauma and the use of tranexamic acid in children

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Key points

- Tranexamic acid reduces mortality in adult trauma
- Early administration is vital for efficacy
- Due to the lack of published data on the use of tranexamic acid in paediatric patients who have undergone major trauma there is no evidence for a specific dose in this situation
- The RCPCH and NPPG Medicines Committee recommend a pragmatic dosage schedule – 15mg/kg tranexamic acid loading dose (max 1g) over 10 minutes followed by 2mg/kg per hour

Background information

Major surgery and trauma trigger the body to stimulate a similar haemostatic response, in both of these situations severe blood loss can present a challenge to the coagulation system. Tranexamic acid (TXA) is an antifbrinolytic agent and is used to reduce blood loss in patients during surgery, in order to reduce the risk of post operative complications. The agent acts by blocking the binding sites on plasminogen and can also improve haemostasis by reducing the activation of plasmin-induced platelets.

The CRASH-2 trial showed that administering tranexamic acid within four hours of trauma reduces the risk of death in bleeding adult trauma patients. The data is consistent with the changing practice in adult trauma, but is currently lacking for the use in paediatric trauma patients. This evidence statement is intended to provide guidance on the dose of TXA in major trauma to ensure consistency. It should not preclude the development of suitable robust research studies in this area to improve knowledge.

Efficacy

- The CRASH-2 trial showed that a TXA 1g loading dose over 10 minutes followed by a 1g infusion over 8 hours safely reduced the risk of death in bleeding adult trauma patients.
- In paediatric cardiac surgery, the reported dosing regimens are variable. Significant reductions in total blood loss and total blood or blood product transfusion volume were seen with a variety of dosing regimens.
- TXA doses used to reduce perioperative blood loss and the need for transfusions in scoliosis surgery in children are also variable.
- In surgical corrections of craniosynostosis in children, all regimens showed significant reductions in the need for blood transfusion.
- Short five day courses of oral TXA have been shown to be effective in the treatment of traumatic hyphema in children at a dose of 25mg/kg three times a day.

Safety

- In general, the adverse effects of TXA are rare. They include gastrointestinal effects, malaise with hypotension (on rapid IV injection), arterial or venous thrombosis (see below), dizziness, fatigue, headache, muscle pain and spasms, convulsions, and hypersensitivity reactions including anaphylaxis.

- The use of TXA presents a potential risk of thrombosis. Studies into the use of TXA in paediatric cardiac surgery and spinal surgery did not find any increased rate of thromboembolic events. However, these studies did not have sufficient power to determine safety. An increase in seizure rate may be due to the antagonistic effect of TXA on GABA receptors.

Dosing consensus

A scoping exercise of paediatric centres in the UK revealed a variety of protocols for TXA administration but without a specific evidence base. Following a review of the CRASH 2 trial and available literature in relation to the use of perio-opertative TXA in children (submitted for publication) the consensus view of the working group is to recommend a dosing schedule based on the CRASH 2 trial but translated for children. The group agreed that timely administration of TXA preferably within the first 3 hours of trauma for children is likely to be beneficial. In addition a large range of doses up to 100mg/kg have been used in children with very few reported adverse effects.

Dosage:-
Loading Dose – 15mg/kg (max 1g) diluted in a convenient volume of Sodium Chloride 0.9% or Glucose 5% and given over 10 minutes

Maintenance infusion – 2mg/kg/hour. Suggested dilution 500mg in 500ml of sodium chloride 0.9% or glucose 5% given at a rate of 2mls/kg/hour. For at least 8 hours or until bleeding stops.

Practicalities

Intraosseuous administration – There is no specific information available about the use of TXA by this route.

Use in ambulances – Ambulance unit trusts should develop appropriate patient group directives to allow administration of TXA to children over the age of 12 in accordance with local policy.

A scoping exercise of centres in the UK revealed a variety of protocols. There is no evidence to back up any one in particular. Individual sites may want to review their protocols in light of this recommendation.

Future work

Due to the lack of evidence in this area we recommend that use of TXA in these situations is monitored as closely as possible with data entered as part of the routine datasheet to the Trauma Audit and Research Network (TARN) datasets.

In addition specialised commissioners should consider the need for entry of all children into a suitable research study when commissioning children's trauma services.

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