Tranexamic Acid
A Review of its Use in Surgery and Other Indications

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Tranexamic acid is a synthetic derivative of the amino acid lysine that exerts its antifibrinolytic effect through the reversible blockade of lysine binding sites on plasminogen molecules.

Intravenously administered tranexamic acid (most commonly 10 mg/kg followed by infusion of 1 mg/kg/hour) caused reductions relative to placebo of 29 to 54% in postoperative blood losses in patients undergoing cardiac surgery with cardiopulmonary bypass (CPB), with statistically significant reductions in transfusion requirements in some studies. Tranexamic acid had similar efficacy to aprotinin $2 \times 10^6$ kallikrein inhibitory units (KIU) and was superior to dipyridamole in the reduction of postoperative blood losses. Transfusion requirements were reduced significantly by 43% with tranexamic acid and by 60% with aprotinin in 1 study. Meta-analysis of 60 trials showed tranexamic acid and aprotinin, unlike $\varepsilon$-aminocaproic acid (EACA) and desmopressin, to reduce significantly the number of patients requiring allogeneic blood transfusions after cardiac surgery with CPB.

Tranexamic acid was associated with reductions relative to placebo in mortality of 5 to 54% in patients with upper gastrointestinal bleeding. Meta-analysis indicated a reduction of 40%.

Reductions of 34 to 57.9% versus placebo or control in mean menstrual blood loss occurred during tranexamic acid therapy in women with menorrhagia; the drug has also been used to good effect in placental bleeding, postpartum haemorrhage and caesarean section of the cervix. Tranexamic acid significantly reduced mean blood losses after oral surgery in patients with haemophilia and was effective as a mouthwash in dental patients receiving oral anticoagulants.

Reductions in blood loss were also obtained with the use of the drug in patients undergoing orthotopic liver transplantation or transurethral prostatic surgery, and rates of rebleeding were reduced in patients with traumatic hyphaema. Clinical benefit has also been reported with tranexamic acid in patients with hereditary angioneurotic oedema.

Tranexamic acid is well tolerated; nausea and diarrhoea are the most common adverse events. Increased risk of thrombosis with the drug has not been demonstrated in clinical trials.

Conclusions: Tranexamic acid is useful in a wide range of haemorrhagic conditions. The drug reduces postoperative blood losses and transfusion requirements in a number of types of surgery, with potential cost and tolerability advantages over aprotinin, and appears to reduce rates of mortality and urgent surgery in patients with upper gastrointestinal haemorrhage. Tranexamic acid reduces menstrual blood loss and is a possible alternative to surgery in menorrhagia, and has been used successfully to control bleeding in pregnancy.