Review Article

Prophylactic intravenous tranexamic acid and thromboembolism in non-cardiac surgery: a systematic review, meta-analysis and trial sequential analysis

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Summary

Tranexamic acid is an antifibrinolytic drug that is widely used during surgery, but there are concerns about its thromboembolic effects. We aimed to investigate the effect of prophylactic intravenous tranexamic acid on thromboembolic outcomes in patients undergoing non-cardiac surgery. The MEDLINE, EMBASE and Cochrane Central Register of Controlled Trials were searched. Randomised controlled trials comparing intravenous tranexamic acid with placebo or no treatment in patients undergoing non-cardiac surgery were included. The primary outcome was a composite of peri-operative cardiovascular thromboembolic events, defined as any deep vein thrombosis, pulmonary embolism, myocardial ischaemia/infarction or cerebral ischaemia/infarction. A total of 191 randomised controlled trials (40,621 patients) were included in the review. The primary outcome occurred in 4.5% of patients receiving intravenous tranexamic acid compared with 4.9% of patients in the control group. Our analysis showed that there was no difference between groups for composite cardiovascular thromboembolic events (risk ratio 1.02, 95%CI 0.94–1.11, $p = 0.65$, I^2 0%, $n = 37{,}512$). This finding remained robust when sensitivity analysis was performed with continuity correction and in studies with a low risk of bias. However, in trial sequential analysis, our meta-analysis only achieved 64.6% of the required information size. There was no association between intravenous tranexamic acid and seizure rate or mortality rate within 30 days. Intravenous tranexamic acid was associated with a reduced blood transfusion rate compared with control (9.9% vs. 19.4%, risk ratio 0.46, 95%CI 0.41–0.51, $p < 0.0001$). It was encouraging to see the evidence that the administration of intravenous tranexamic in patients undergoing non-cardiac surgery was not associated with an increased risk of thromboembolic outcomes. However, our trial sequential analysis demonstrated that currently available evidence is not yet sufficient to reach a firm conclusion.

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