



## Prothrombin complex concentrates for rapid anticoagulation reversal before surgery



Current guidelines for rapid anticoagulation reversal for emergency surgery recommend four-factor prothrombin complex concentrate (PCC) and vitamin K co-administration. A team of experts from the U.S., Canada and Germany reviewed the current evidence on PPC treatment for vitamin K antagonist reversal in the perioperative setting. Overall, the studies identified in this review support current recommendations favouring PPC therapy in patients requiring vitamin K antagonist reversal before emergency surgery.

Vitamin K antagonist therapy is associated with an increased bleeding risk, and clinicians often reverse anticoagulation in patients who require emergency surgical procedures. Although fresh frozen plasma (plasma frozen within 8 hours of collection) or plasma (frozen within 24 hours of collection) was traditionally used for rapid reversal of anticoagulation with vitamin K antagonists, there are multiple limitations to its use, including the need for blood type matching before administration; time required to thaw the product; and risks of fluid overload.

PPCs – which are classed as either four-factor prothrombin complex concentrates (containing coagulation factors II, VII, IX, and X) or three-factor prothrombin complex concentrates (containing factors II, IX and X, but only minimal levels of factor VII) – are stored at room temperature, administered in a smaller volume and shorter infusion time than plasma, and are virally inactivated to minimise the risk of pathogen transmission. Despite the fact that PPC is recommended in all guidelines, plasma is still frequently administered for vitamin K antagonist reversal.

This review aimed to provide an update on the latest evidence for the use of PPCs for urgent vitamin K antagonist reversal in the perioperative setting, focusing on comparative studies and in the context of intracranial haemorrhage and cardiac surgery. The authors also reviewed current use for non-vitamin K antagonist oral anticoagulant reversal. The authors searched Cochrane Library and PubMed between January 2008 and December 2017 and retrieved 423 English-language papers, which they then screened for relevance to the perioperative setting; they identified 36 papers to include in this review.

PPC therapy was consistently shown to reduce international normalised ratio rapidly and control bleeding effectively. In comparative studies with plasma, PPC use was associated with a greater proportion of patients achieving target international normalised ratios rapidly, with improved haemostasis. No differences in thromboembolic event rates were seen between PPC and plasma, with PPC also demonstrating a lower risk of fluid overload events.

"In the studies identified in our search, rates of venous thromboembolic events in patients receiving

prothrombin complex concentrates varied considerably, from 0 to 26.3%," the authors write. "It should be noted that many of these studies included few patients, and the patient populations investigated often had a number of comorbidities; moreover, once vitamin K antagonist therapy is reversed, the underlying risk that first necessitated anticoagulation is restored, and as a result, caution should be taken when interpreting these findings."

PPCs are recommended in guidelines for rapid reversal of anticoagulation in vitamin K antagonist-treated patients and represent an important therapeutic option for emergency surgical interventions, the authors conclude.

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