Epileptic seizures following cortical application of fibrin sealants containing tranexamic acid in rats.

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Abstract:

Background. Fibrin sealants (FS) derived from human plasma are frequently used in neurosurgery. In order to increase clot stability, FS typically contain aprotinin, a natural fibrinolysis inhibitor. Recently, synthetic fibrinolysis inhibitors such as tranexamic acid (tAMCA) have been considered as substitutes for aprotinin. However, tAMCA has been shown to cause epileptic seizures. We wanted to study whether tAMCA retains its convulsive action if incorporated into a FS. Method. FS containing aprotinin or different concentrations of tAMCA (0.5-47.5 mg/ml) were applied to the pial surface of the cortex of anaesthetized rats. The response of the animals was evaluated using electroencephalography and by monitoring the clinical behaviour during and after recovery from anaesthesia. Findings. FS containing tAMCA caused paroxysmal brain activity which was associated with distinct convulsive behaviours. The degree of these seizures increased with increasing concentration of tAMCA. Thus, FS containing 47.5 mg/ml tAMCA evoked generalized seizures in all tested rats (n = 6) while the lowest concentration of tAMCA (0.5 mg/ml) only evoked brief episodes of jerk-correlated convulsive potentials in 1 of 6 rats. In contrast, FS containing aprotinin did not evoke any paroxysmal activity. Interpretation. Tranexamic acid retains its convulsive action within FS. Thus, use of FS containing tAMCA for surgery within or close to the CNS may pose a substantial risk to the patient.