A novel coating biomaterial for intracranial aneurysms: effects and safety in extra- and intracranial carotid artery.

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Abstract:

Methyl-2-cyanoacrylate, a widely used material for coating cerebral aneurysm, was recently withdrawn. The aim of the present study was to develop an alternative coating material for cerebral aneurysm, which is safe, effective and stable within the brain. In the first experiment, an aneurysm model of the common carotid artery was produced in a rabbit by the local application of elastase. The aneurysm produced was covered by no material (Group A), a cellulose cotton sheet and conventional methyl-2-cyanoacrylate (Group B), a newly produced polyglycolic acid felt and fibrin glue (Group C), or a cellulose cotton sheet and fibrin glue (Group D). Histological examination showed that the materials resulted in the formation of tight connective tissue around the artery, and that the material was completely replaced by the connective tissue after 12 weeks. This change was found exclusively in Group C, but not in Group A or the other materials, although a temporary thickening of the intima was also observed at the site of the elastase application in Group C. In Group D, a long-term, marked thickening of the intima was observed. In the second experiment, using an intracranial internal carotid artery from a beagle, the applied polyglycolic acid felt and fibrin glue to the intracranial artery induced the formation of connective tissue around the artery that was completely absorbed 16 weeks after surgery. There were no signs of intimal thickening or of adverse reactions in nervous tissue. The present results suggest that polyglycolic acid felt and fibrin glue is a possible candidate for a safe, effective biomaterial to wrap or coat cerebral aneurysm.