

Improvement of Stent Retriever Design and Efficacy of Mechanical Thrombectomy in a Flow Model.

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Abstract

PURPOSE:

In vitro experiments were performed to evaluate the efficacy of mechanical intracranial thrombectomy comparing the newly developed Aperio stent retriever and standard devices for stroke treatment.

METHODS:

The Aperio (A), with an increased working length of 4 cm and a special cell design for capturing and withholding clots, was compared to three benchmark devices: the Solitaire retrievable stent (B), the Merci X6 (C), and the Merci L5 retriever (D). In a vascular glass model with pulsatile flow, reminiscent of the M1 segment of the middle cerebral artery, we repeatedly induced occlusion by generating thrombi via a modified Chandler loop system. The numbers of recanalization attempts, peripheral embolizations, and recanalizations at the site of occlusion were recorded during 10 retrieval experiments with each device.

RESULTS:

All devices were able to remove the blood clots from the occluded branch. In 34 of 40 experiments, restoration of flow was obtained in 1-3 attempts. The main differences between the study devices were observed in terms of clot withholding and fragmentation during retrieval. Although there was only one fragmentation recorded for device A, disengagement of the whole clot or peripheral embolization of fragments occurred more frequently (5-7 times) with devices B, C, and D.

CONCLUSION:

In a vascular model, the design of device A was best at capturing and withholding thrombi during retrieval. Further study will be necessary to see whether this holds true in clinical applications

