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Optimizing Radial Force of Braided Thrombectomy-assist Devices Compared to Laser-cut Stent Retrievers in the MCA

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Introduction:

Recent reports have raised concern about the risk of vessel wall injury (VWI) when pulling out current laser-cut stent retrievers during active strut apposition to the vessel walls (1-4). Development of braided thrombectomy-assist devices for use in conjunction with aspiration systems may be gentler (lower radial force) and more optimized for vessel diameters seen in proximal LVOs and distal LVOs.

Methods:

Bench testing of radial force (RF) was performed using a radial compression station. The total radial force (RF) in Newtons (N) generated in vessel diameters (d) (Range 2.25 to 3mm) seen in proximal LVOs (~M1), and vessel diameters (d) (Range 1.5 to 2.24mm) seen in distal LVOs (~M2) was measured. Radial Force of less than or equal to 1N was grouped as "low" and radial force greater than 1N was grouped as "high" for this analysis.

Results:

The total radial force (RF) of all laser-cut stent retrievers (with distal outer diameter OD in mm) studied namely Solitaire Platinum (6.0), Solitaire 2 (4.0), Trevo ProVue (4.0), Baby Trevo (3.0), Capture L (3.0) were all higher in the M2 vessels (>1N) compared to M1 vessels (<1N), whereas the total radial force (RF) of the braided thrombectomy-assist devices namely SHELTER[®] Retriever (6.0) were uniformly low in both the M1 (<1N) and M2 (<1N) vessels.

Conclusions:

Choosing a stent retriever with lower OD does not translate to lower radial force. As a result, sizing of stent retrievers and thrombectomy-assist devices to target vessels should not only factor the OD of the devices but also the total radial force in the target vessel diameter. Novel braided thrombectomy-assist devices for use in conjunction with aspiration systems have lower radial force compared to existing laser-cut stent retrievers in the M1 and M2 vessel diameters. Further studies in-vivo need to assess the impact of lower radial force on minimizing VWI.

Keywords: Acute Stroke, New Innovation, Mechanical Thrombectomy, Stent retriever, Acute Ischemic Stroke Intervention

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