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Radial Force of Braided Thrombectomy-Assist Devices Vis-à-Vis Laser-cut Stent Retrievers in the ICA and Basilar

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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 with active strut apposition to the vessel walls. Development of braided stroke thrombectomy-assist devices for use in conjunction with aspiration systems may be gentler in the internal carotid and basilar arteries (with regards to radial force) compared to existing laser-cut stent retrievers.

Methods:

Radial force (RF) bench testing was performed using a radial compression station (Blockwise Engineering, Phoenix, AZ). The average total radial force (RF) in Newtons (N) generated (average of 3 readings) in vessel diameters (d) (Range 3.25 to 4.00mm) seen in proximal LVOs of the anterior circulation (such as in the internal carotid artery - ICA), and vessel diameters (d) (Range 2.50 to 3.25mm) seen in the posterior circulation (such as in the basilar artery - BA) was measured. The Solitaire Platinum Revascularization Device (Medtronic) with a distal outer diameter of 6.0mm was used as the predicate device. All thrombectomy and thrombectomy-assist devices were compared in terms of the RF being higher or lower (%) to the predicate device.

Results:

The total radial force (RF) of the SHELTER TM Retriever (Inera Therapeutics), a braided thrombectomy-assist device (with distal outer diameter OD of 6.0mm) is significantly lower (RF @ d=2.5mm: 58%) than the predicate device (RF @ d=2.5mm: 100%) and other laser-cut stent retrievers namely Solitaire 2 (4.0mm), Trevo ProVue (4.0mm), Trevo XP (3.0mm), Capture LP (3.0mm) (RF @ d=2.5mm: 103% to 152%). Thrombectomy devices with lower OD had higher radial forces than larger devices.

Conclusions:

Novel braided stroke thrombectomy-assist devices for use in conjunction with aspiration systems have lower radial force compared to existing laser-cut stent retrievers in the ICA and BA vessel diameters. Further studies in-vivoneed to assess the impact of lower radial force on minimizing VWI.

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

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