

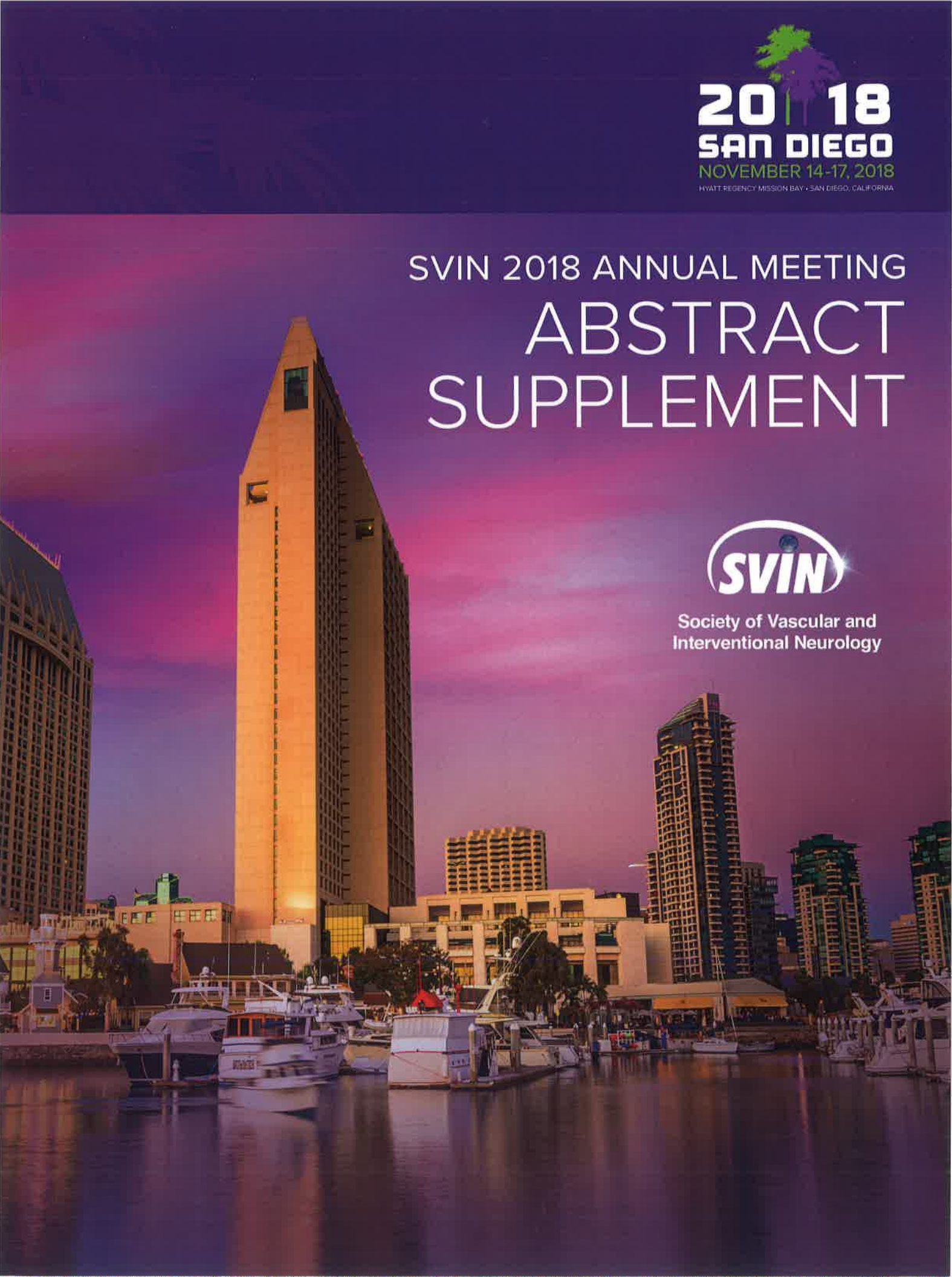


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Customizable Uniform and Cyclical Aspiration Thrombectomy Using a Digital Smart Pump: An In-Vitro Feasibility Study

Bharathi D Jagadeesan, MD¹, Alex Abou-Chebl, MD, FSVIN², Vikram Janardhan, PhD³, Vallabh Janardhan, MD, FSVIN³

¹*Departments of Radiology and Neurosurgery, University of Minnesota, Minneapolis, Minnesota, USA;*

²*Harris Comprehensive Stroke Center, Henry Ford Health System, Detroit, Michigan, USA;* ³*Division of Stroke Devices Research, Inera Therapeutics, Inc., Dallas, Texas, USA*

Introduction:

Aspiration is an important part of stroke thrombectomy (1). Pre-clinical studies have also suggested that uniform aspiration may need to be customized for varying vessel diameters and that cyclical (varying suction intensity) aspiration may be more effective (2).

Methods:

Suction intensity and duration are customized in an iPad app to create uniform aspiration (using the CLEAR TM App, Inera Therapeutics) or cyclical (using the CLEAR Pro TM App, Inera Therapeutics) aspiration. Customized aspiration initiated via the iPad app activates a Bluetooth-enabled smart pump (CLEAR Aspiration System TM, Inera Therapeutics) connected to a standard aspiration catheter with an inner diameter (ID) of 0.070" and length of 131 cm was studied. The suction intensity at the catheter tip is confirmed using a vacuum gauge (DuraChoice) and a previously defined technique (3), and any catheter luminal collapse is noted in an in-vitro flow model (United Biologics) simulating stroke thrombectomy.

Results:

Activating the smart pump to generate customized uniform and cyclical aspiration (suction range 0 to -29 in Hg) using an iPad app was successful. A vacuum gauge at the catheter tip confirmed the varying suction intensities generated by the smart pump without any catheter lumen collapse. Low, medium and high suction intensities of -13, -21, and -29 inHg on the digital smart pump resulted in suction intensities at the catheter tip of -12.5, -20.5, and -28.5 inHg. Pause of 0 inHg on the digital smart pump resulted in similar intensity at catheter tip. There was similar transmission of suction intensities between the digital smart pump and the catheter tip for uniform and cyclical aspiration patterns.

Conclusions:

It is feasible to customize uniform and cyclical aspiration using a digital smart pump. Further studies need to evaluate the impact of customizing uniform and cyclical aspiration on varying vessel diameters, clot types, and clot burden.

Keywords: Acute Stroke, Acute Ischemic Stroke Intervention, Mechanical Thrombectomy, New Innovation, New Technique

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