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Conference Abstract

P.68 WaveGraft–A Novel Endovascular Device Concept for Restoring the Natural Arterial Cushioning Effect

Florian Stefanov[1,*], Dave Veerasingam[2], Sarah Sayed[1], Patrick Delassus[1], Jonathan Bouchier-Hayes[1], Liam Morris[1]

[1]*Galway-Mayo Institute of Technology (GMIT)*
[2]*University Hospital Galway (UHG)*

Keywords

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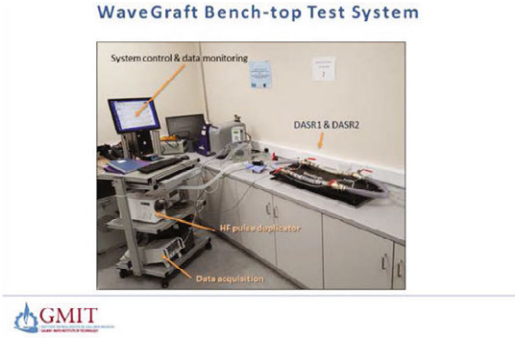
ABSTRACT

Background and Objectives: The cushioning effect of large, healthy arteries reduces pulsatile afterload to the heart, reduces pulsatility in the microvasculature of target organs, and promotes coronary/cerebral perfusion [1]. With age, large arteries become stiffer, which increases both pulse wave velocity (PWV) and pulse pressure (PP). This results in isolated systolic hypertension [2], which is characterized by increased systolic blood pressure (SBP) with normal or low diastolic blood pressure (DBP) leading to left ventricular afterload. This study aims to replicate, experimentally, arterial stiffness of hypertensive patients, and proposes a novel thoracic endograft for restoring the arterial cushioning function.

Methods: The experimental setup comprised of two stiff descending aorta silicone replicas (DASR 1&2), pulse duplicator, heated blood mimicking fluid, pressure and flow sensors. An internal annular viscoelastic cushion, referred to as the 'WaveGraft', was deployed in DASR2. Firstly, pulsatile flow was directed through DASR1, (stiff vessel only), then it was diverted through DASR2 (vessel including WaveGraft).

Results: When compared to the stiff vessel replica (DASR1), the WaveGraft (DASR2) data showed significant reduction in PWV(−60%), SBP(−9%) and PP(−35%), while DBP increased by 10%. An increase in diastolic perfusion by up to 150%, was observed from the recorded data.

Conclusion: This work successfully replicated, key features of aortic hemodynamics in hypertension, linked to the increase in arterial stiffness. The WaveGraft concept showed great potential in altering blood pressure, flowrates and PWV, which may become an important clinical tool in the management of isolated systolic hypertension, heart failure, chronic kidney disease and other chronic conditions.



Figure

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*Corresponding author. Email: *florian.stefanov@gmit.ie*