

Extensibility and Distensibility of the Thoracic Aorta in Patients with Aneurysm *by*

Hector de Beaufort | Foeke Nauta | Michele Conti | Elena Cellitti | Chiara Trentin | Elena Faggiano | Guido van Bogerijen | Alberto Figueroa | Frans Moll | Joost van Herwaarden | Ferdinando Auricchio | Santi Trimarchi

Abstract Id: 21 Submitted: November 27, 2016 Event: The Houston Aortic Symposium: Frontiers in Cardiovascular Diseases, the Tenth in the Series Topic: Aortic

Hector de Beaufort^{1,2}, Foeke Nauta^{1,2,3}, Michele Conti⁴, Elena Cellitti⁴, Chiara Trentin⁴, Elena Faggiano⁴, Guido van Bogerijen^{1,2}, Alberto Figueroa³, Frans Moll², Joost van Herwaarden², Ferdinando Auricchio⁴, Santi Trimarchi¹.

1. Thoracic Aortic Research Center, Policlinico San Donato IRCCS, University of Milan, Italy.

2. Department of Vascular Surgery, University Medical Center Utrecht, the Netherlands.

3. Departments of Biomedical Engineering and Surgery, University of Michigan, Ann Arbor, USA

4. Department of Civil Engineering and Architecture, University of Pavia, Italy.

Objective: To quantify pulsatile deformations of the thoracic aorta over the cardiac cycle for patients with abdominal or thoracic aortic aneurysms.

Methods: ECG-gated CT images were analyzed to calculate various measures of pulsatile aortic deformation. A new definition of extensibility (longitudinal deformation), including the effects of heart movement and flow load, was proposed.

Results: Ten patients were analyzed. Results can be seen in Figure 1. Longitudinal deformations were most pronounced in the ascending aorta and smallest in the descending aorta. Radial deformations were most pronounced at the sinotubular junction.

Conclusions: Longitudinal and circumferential pulsatile deformations are considerable throughout the thoracic aorta. These findings highlight the need for more elastic endovascular devices.

Figure 1. Extensibility (in $10^{-3}N^{-1}$) of the ascending aorta, aortic arch, and descending thoracic aorta (left) and distensibility (in $10^{-3}mmHg^{-1}$) at the sinotubular junction, at the level of the brachiocephalic trunk, left subclavian artery and celiac trunk (right).