

Supplementary Material

Strongly Coupled Fluid-Structure Interaction Analysis of TEVAR with Double-Branched Endograft for Non-A Non-B Aortic Dissection: A Patient-Specific Case Study

Binghuan Li¹, Yu Zhu^{1,2}, Kaihong Wang¹, Sandro Lepidi³, Mario D'Oria³, Xiao Yun Xu¹

¹ Department of Chemical Engineering, Imperial College London, UK

² National Heart and Lung Institute, Imperial College London, UK

³ Division of Vascular and Endovascular Surgery, Department of Medical Surgical and Health Sciences, University of Trieste, Italy

Corresponding Author:

Xiao Yun Xu, PhD

Department of Chemical Engineering, South Kensington Campus,

Imperial College London, London, United Kingdom

SW7 2AZ

Email: yun.xu@imperial.ac.uk

Keywords: TEVAR, Fluid-Structure Interaction, branched stent-graft, haemodynamics.

S1. Grid Independence Test

The grid independence test was performed separately for the fluid and structural domains prior to the coupled FSI simulation. For each domain, three mesh densities with different element counts were generated and evaluated using standalone transient CFD or finite element analyses. In each case, key solution variables at the peak systolic phase were probed at five sequential cross-sections (P1-P5) throughout the geometry, as shown in Figure S1. For the fluid domain, spatially averaged pressure and wall shear stress were compared, while for the structural domain, spatially averaged deformation and von Mises stress were assessed. Mesh statistics for the fluid and structural domains are summarized in Table S1, the grid convergence results are presented in Figure S1.

Table S1 Summary of mesh statistics used in the grid independence test.

	Coarse Mesh	Optimized Mesh	Dense Mesh
Fluid Domain	839950	3071611	6302818
Structural Domain	579602	1234966	2309162

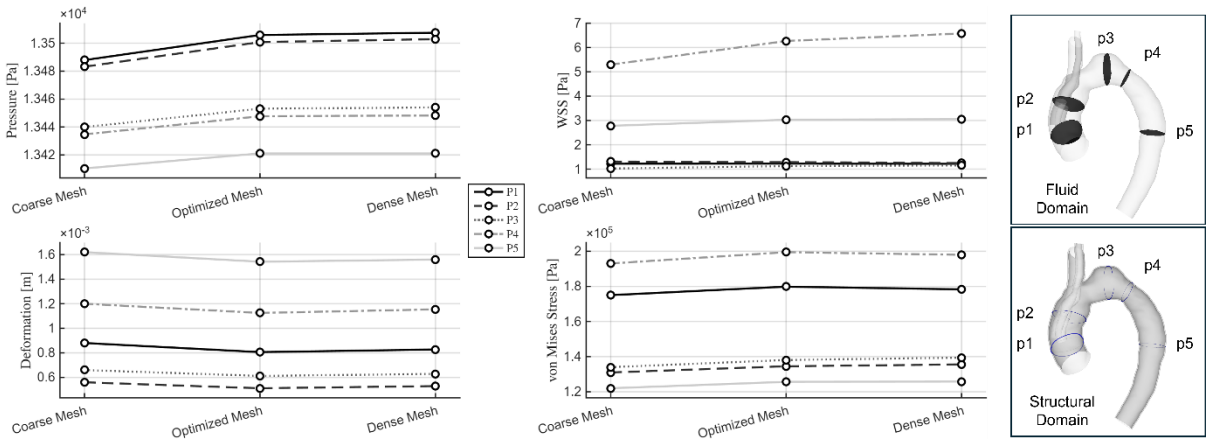


Figure S2 Comparison of spatially averaged fluid pressure, wall shear stress, deformation, and von Mises stress across coarse, optimized, and dense meshes at five locations (P1-P5).