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ACCEPTED MANUSCRIPT

Prediction of patient-specific post-operative outcomes of TAVI procedure: The impact of the positioning strategy on valve performance

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Abstract

Prosthesis positioning in transcatheter aortic valve implantation procedures represents a crucial aspect for procedure success as demonstrated by many recent studies on this topic. Possible complications, device performance, and, consequently, also long-term durability are highly affected by the adopted prosthesis placement strategy. In the present work, we develop a computational finite element model able to predict device-specific and patient-specific replacement procedure outcomes, which may help medical operators to plan and choose the optimal implantation strategy. We focus in particular on the effects of prosthesis implantation depth and release angle. We start from a real clinical case undergoing Corevalve self-expanding device implantation. Our study confirms the crucial role of positioning in determining valve anchoring, replacement failure due to intra or para-valvular regurgitation, and post-operative device deformation.

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1 Introduction

The first transcatheter aortic valve implantation (TAVI) dates back to 2002 [7]. Since then, many studies have demonstrated the efficacy of such a minimally-invasive approach for the

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