## 126. 3D Atrial Wall Thickness Measurement Algorithm From Segmented Atrial Wall Mask Using Partial Differential Equation

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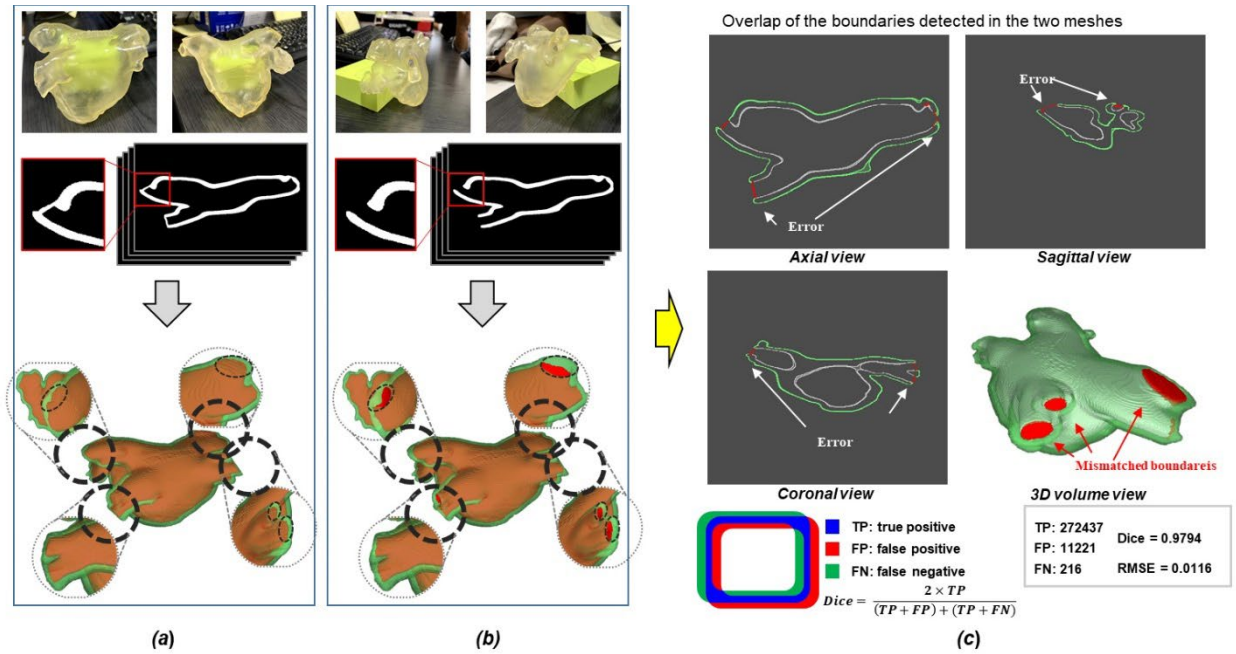
### Body

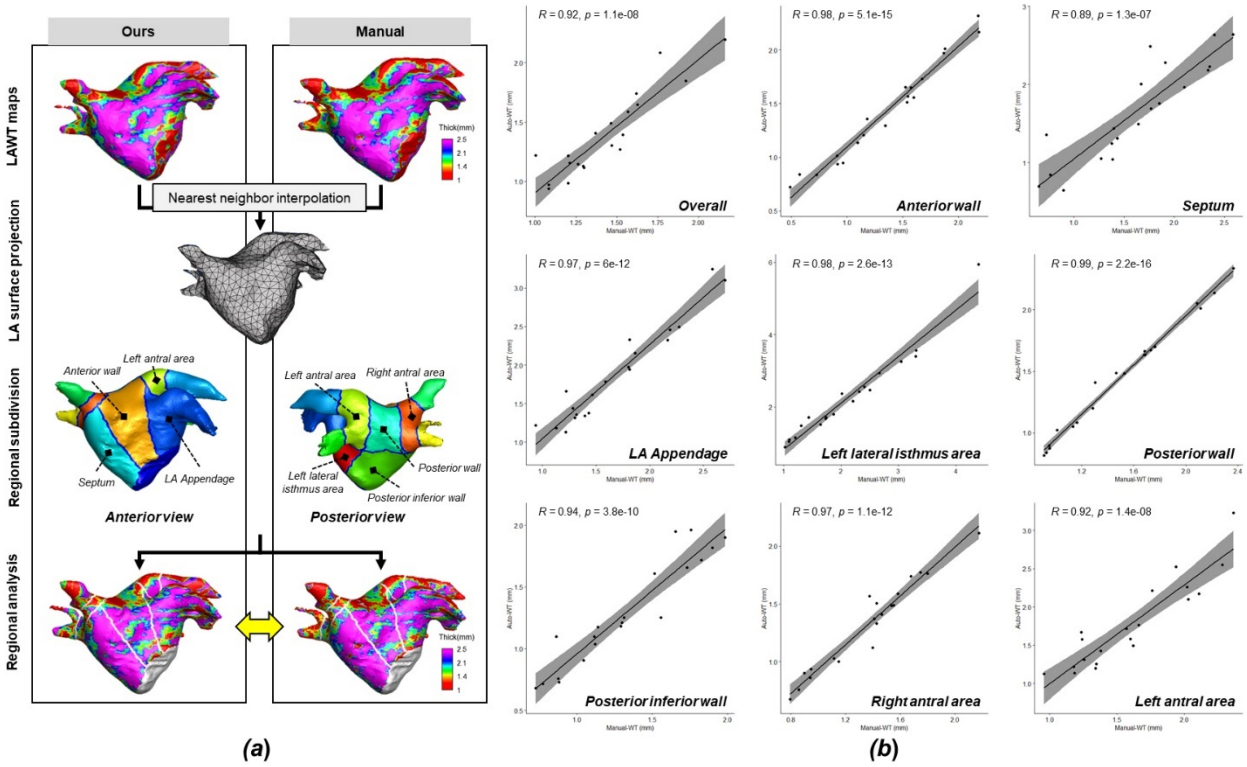
**Background:** Despite the advancement in artificial intelligence (AI) technology for a computed tomography (CT)-based cardiac wall segmentation, an accurate detection of the epicardial (Epi) and endocardial (Endo) boundaries is a prerequisite for the measurement of the cardiac wall thickness (WT).

**Methods:** Here, we proposed a novel algorithm detecting the Epi-Endo boundaries of the 3D-atrial WT from a segmented mask. We detected these boundaries that are topologically indistinguishable due to an open geometry at the anatomical boundaries using the combined Convex-hull and Poisson solver methods. The Laplace equation for the WT measurement was solved by a partial differential equation combined between the two detected boundaries of the myocardial. We verified the robustness of our algorithm in the mask images of the atrial wall separated from the CT images of 20 patients and a phantom model.

**Results:** The accuracy of the automatically detected Epi-Endo boundaries was acceptable compared to that manually extracted from the phantom model (Dice coefficient=0.979). The 3D atrial WTs calculated by the novel fully automated method had a good correlation with that measured by the conventional manual method ($R=0.92\pm0.11$, $P<0.001$) in the atrial CT images acquired from 20 patients with atrial fibrillation. The computation time for a fully automated measurement of each atrial WT was $27.15\pm6.99$ s per patient.

**Conclusion:** We proposed an automated novel framework for quantifying WT from the CT segmentation and verified its accuracy. Our approach can be applied in AI-assisted fully automated atrial-WT measurements for clinical use.




**Clinical Implications:** Our proposed algorithm can support fully automated 3D visualization of atrial wall thickness for clinical applications.