

## Fusion imaging in preoperative planning of mitral valve surgery to prevent injury of the left circumflex artery

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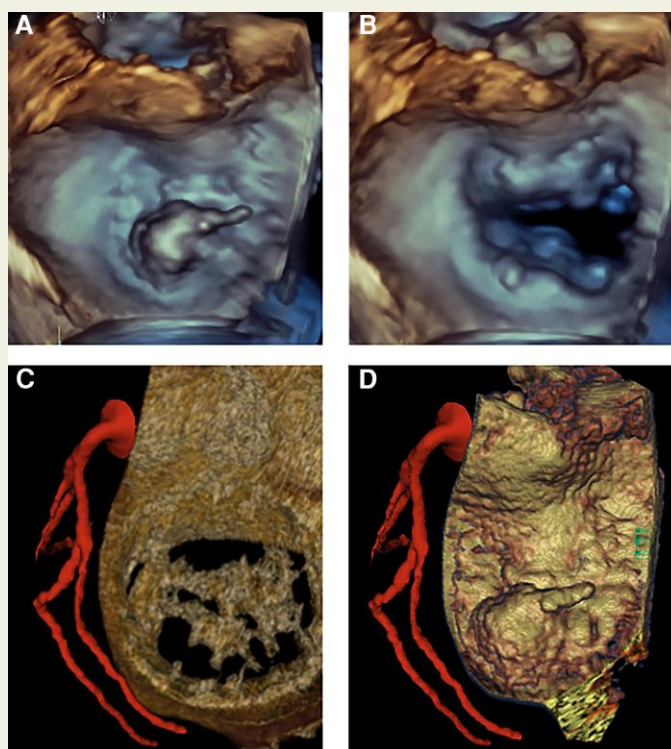
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A 66-year-old woman with severe mitral regurgitation was referred to our heart team to assess eligibility for mitral valve (MV) surgery (MVS). In MVS, injury to the left circumflex artery (LCX) is estimated to occur in up to 2.7% of the patients.<sup>1</sup> The distance of the LCX to the MV (on average  $3.1 \pm 1.3$  mm) is highly variable and is likely to determine the prevalence of this complication.<sup>1</sup> Transesophageal echocardiography (TEE) is the modality of choice for MVS planning (Panel A and B).<sup>2</sup> Computed tomography (CT) has been proposed as standard screening tool for MVS to determine the risk of LCX injury.<sup>3</sup> We aimed to fuse the CT-derived LCX identification (Panel C) with TEE-derived MV views to improve the surgical planning of MVS in patients at high risk of injury.

Using Meshmixer (Autodesk), 3D Slicer (Slicer) and Elastix toolbox, TEE (General Electric) and CT scans (Siemens) were pre-aligned using the Procrustes algorithm, cropped, and subsequently aligned using Mutual information registration with an adaptive gradient descent optimizer.<sup>4,5</sup> The LCX is segmented on CT and a MV reconstruction is made on TEE.

This initiative is the first to fuse CT and a TEE of the MV for the purpose MVS planning. The fused image (Panel D) provides synergistic information derived from both TEE and CT modalities. If, in routine screening on CT, the distance of the MV to the LCX is close, fusion of the LCX to TEE could be helpful to devise a surgical strategy for MVS.



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This study was approved by the local Human Research Ethics Committee (Amsterdam UMC). Informed consent was obtained.

[Supplementary data](#) is available at *European Heart Journal* online.

**Conflict of interest:** None declared.

The data underlying this article will be shared on reasonable request to the corresponding author.

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