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Commentary: Simulation—days of future past

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CENTRAL MESSAGE

3D-printed anastomosis model bridges the gap between low-and high-fidelity simulation, but challenges to implementation remain.

My first coronary anastomoses were simulated with silicone vessels mounted on a wooden board—a portable task trainer known to many from the Boot Camp organized by the Thoracic Surgery Directors Association and the American Board of Thoracic Surgery. This and other models like it have been proven as robust and affordable methods of training that improve performance.[1] One drawback of the "low-fidelity" simulation approach is relative lack of tactile feedback and anatomic/geometric realism. Cadaver and porcine-based "high-fidelity" simulations, in contrast, look and feel accurate but present significant financial and logistical hurdles. In this issue of the *Journal*, Saba and colleagues[2] bridge the low- and high-fidelity approaches using a 3-dimensional printed coronary artery anastomosis model that can be dissected, cauterized, and sutured with a realistic feel.

This innovative approach is important because it is designed to mimic the geometry and mechanical properties achievable with biological models without the cost, biohazardous waste, and time constraints. Although only 5 trainees and 3 attendings were surveyed, the model was uniformly considered effective and realistic. As demonstrated in the supplementary video, anatomy can be customized to an individual patient's computed tomography scan, and models can be cheaply and quickly reproduced (after investment in a 3-dimensional printer). The novel technology developed by Saba and coauthors represents a step into the long-visualized future of cardiothoracic surgery simulation.

This step into the future can only be realized by addressing what we have learned in the past and are experiencing in the present. The rate-limiting and most important reagent in cardiothoracic simulation has and will continue to be dedicated faculty to instruct, design curricula, and give formative feedback. The tools we use in simulation improve with each passing year, but challenges still remain to incentivize teaching, fund resident education, and most importantly, identify faculty to mentor and train the next generation of surgeons.

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