ICG inflation of the endoballoon in TERMR allows the accurate placement of the endoballoon and continuous real-time visualization and monitoring of its position. When the echocardiographic window is lost, direct visualization of the fluorescent endoballoon allows verification of the location and quick and easy repositioning of the endoballoon during the mitral repair, without the need for radiographic fluoroscopy. Because the ICG is not administered directly to the patient, risk is minimal. This novel technique both simplifies the use and improves the safety of the aortic endoballoon for TERMR.

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EDITORIAL COMMENTARY

“Glow in the dark” intraoperative imaging: Expanding the capabilities of robotic technology

Andrew B. Goldstone, MD, and Y. Joseph Woo, MD

See related article on pages 1456-8.

In this issue of the *Journal*, Yaffee and colleagues¹ from New York University describe a novel fluorophore-based approach for the precise placement of an endoaortic balloon occlusion device during totally endoscopic robotic mitral valve repair. In their series of 30 patients, the replacement of saline solution with indocyanine green and albumin facilitated indirect transaortic visualization of the endoaortic balloon. Their approach exploits the fluoroscopic imaging capabilities of the robotic endoscope to simplify endoaortic balloon positioning, and for this they should be congratulated. It is of interest, however, to know how this new visualization technique affected the conduct of the operation and its results. Did operative times shorten? Or, conversely,

does the ability to see the true position of the balloon lead to more, perhaps unnecessary, manipulations of the balloon within the aorta?

Advancements in imaging, surgical instrumentation, and robotic technology have enabled surgeons to perform complex cardiac surgical procedures through small incisions, often eliminating the need for sternotomy or cardiopulmonary bypass. The endoaortic balloon permits ascending aortic occlusion, cardioplegia delivery, and root venting, while simultaneously minimizes clutter in the surgical field. The balloon is initially inflated under echocardiographic guidance. Because the open heart compromises the echocardiographic window, surgeons must rely on concurrence between bilateral upper extremity arterial pressures for detection of balloon migration during surgery. Concerns of an increased risk of adverse vascular events (embolization, dissection, stroke, and lower extremity ischemia) limit widespread use of the endoballoon. Yet, increased experience with the device reliably decreases complication rates.^{2,3} While a determination of whether the added visualization of the endoballoon will further reduce adverse vascular events is premature, this series by Yaffee and colleagues¹ provides proof-of-concept data for a

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technique that definitely simplifies the operation of a device with a proven steep learning curve.

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