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Commentary: Measuring the performance in real time

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Dr Nguyen on deliberate practice under real-time monitoring by her coach.

CENTRAL MESSAGE

The novel intracardiac echocardiographic imaging method to assess septal thickness during cardioplegic myocardial arrest described here may allow measurement of the surgeon's performance in real time.

Although simple in theory, septal myectomy (SM) remains among the most challenging and perhaps one of the most underappreciated cardiac operations currently performed, with the reasons for this being multifactorial. The procedural challenges lie in the limited visualization of the transaortic surgical field, as well as in the highly variable anatomy and fluid dynamics, involving the mitral valve and subvalvular apparatus. The extent of the myocardial resection in terms of depth and width is dependent on the subjective judgment of the surgeon. These challenges are further exacerbated by the steep learning curve and low surgical volume in most centers, and, as a result, most cases are performed by only a handful of experts.[1] This underscores the importance of specialized training and mentorship, as well as simulation and models recently described.[2,3] Furthermore, the recognized variability of surgical quality and the limited availability of expert surgeons have contributed to the increasing interest and investment in alcohol septal ablation for patients with obstructive hypertrophic cardiomyopathy, despite the reported excellent outcomes of SM.[3,4]

If the surgical procedure could become more straightforward and reproducible, many of the aforementioned obstacles could be mitigated. In this issue, Williams and colleagues[5] describe their experience with intracardiac echocardiography during cardioplegic myocardial arrest in 10 consecutive SM procedures for hypertrophic cardiomyopathy. In this technique, termed *on-pump intraoperative echocardiography*, a unique ultrasound probe is placed transaortically on the septum during myectomy surgery, and the septal thickness is measured. Williams and colleagues[5] are to be congratulated on their innovative leverage of existing ultrasonographic technology, with the goal of aiding in the conduction of a complex and high-risk procedure in real time. Because this technique is still in its infancy, Williams and colleagues have yet to determine exactly how to utilize it in guiding septal resection; however, this study shows promising preliminary findings regarding the utility of on-pump intraoperative echocardiography for real-time quantification of septal thickness before, during, and after SM with the heart under cardioplegic arrest. The idea of using ultrasound technology during SM comes relatively naturally to cardiac surgeons. Having tested a variety of available ultrasound devices, including epicardial ultrasonography, an epiaortic hockey stick–shaped ultrasound probe, and transesophageal echocardiography (through a conventional transesophageal view with the heart filled with blood and by inserting the probe through the aortic valve in the surgical field [!]), with little meaningful success, we see great potential in using this long, narrow ultrasound probe for continuous verification of the location and extent of resection, allowing surgeons to identify residual areas of septal hypertrophy. Moreover, on-pump intraoperative echocardiography may provide a unique opportunity for less experienced surgeons and

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trainees to develop a greater understanding of the heterogeneous anatomy, as well as to perform SM in a controlled environment under the careful supervision of expert surgeons.

Although real-time performance measure with constant feedback is the model of traditional teaching for surgical procedures just as in sports, it has been very challenging in SM. Development of more technology of this kind should be encouraged.

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