Structural Heart Disease: How Do I Get Training?

Dedicated training programs are few and lack standardization, but there are other ways to gain experience.

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It is a full-time job for an interventional cardiologist to keep up with the ever-widening spectrum of medical therapies and procedures. Over the last decade, we have seen a leveling of percutaneous coronary intervention volume, with substantial growth in the areas of peripheral vascular and structural heart disease (SHD) intervention. Structural cardiovascular diseases, such as aortic stenosis or atrial septal defects, are acquired or congenital pathologies that involve the major central cardiovascular structures not including the standard acquired atherosclerotic coronary and peripheral vascular disease states.[1]

In the last several years, there has been an explosion in SHD interest, driven largely by the adoption of transcatheter aortic valve replacement (TAVR), mitral valve interventions, and transcatheter left atrial appendage closure. Historically, pediatric interventional cardiologists have been the most involved in structural heart procedures because they primarily treat congenital anomalies. More recently, the field of "adult structural heart disease" has blossomed and includes many SHD conditions that are not diagnosed or acquired until the adult years (see the *Key Components of a Comprehensive Adult Structural Heart Training and Clinical Program* sidebar).

THE EXPONENTIAL GROWTH OF SHD TREATMENT

The recent interest in SHD has been fueled to a large degree by the vigorous global adoption of TAVR. There are numerous international meetings that are primarily dedicated to the TAVR field, such as the Transcatheter Valve Therapeutics and the PCR London Valves meetings. In the United States, two TAVR systems are currently approved by the US Food and Drug Administration for use in patients at high surgical risk for conventional AVR (Sapien, Edwards Life Sciences; CoreValve, Medtronic, Inc.), and other emerging devices are under investigation.

A successful TAVR program requires a multidisciplinary heart team and institutional support, as well as specific structural experience requirements for the interventional cardiologist. For TAVR, the Centers for Medicare and Medicaid national coverage decision requires that the interventional cardiologist have "professional experience with 100 structural heart disease procedures lifetime; or 30 left-sided structural procedures per year, of which 60% should be balloon aortic valvuloplasty. Atrial septal defect and patent foramen ovale closure are not considered left-sided procedures."[2]

The national coverage decisions for the MitraClip (Abbott Vascular) and Watchman (Boston Scientific Corporation) left atrial appendage occlusion procedures have not been finalized, but similar numerical structural procedure requirements will undoubtedly be required. Therefore, for centers to become involved in these new procedures, there must be a team member with this structural heart experience.

For centers that are already proficient in structural heart procedures, these requirements will not be an impediment. For centers and individuals lacking this level of experience, gaining exposure to the required structural experience may prove challenging. For interventional cardiology fellows, structural heart training can often be obtained as part of the general interventional training program. For physicians in practice, obtaining experience can be more difficult. Strategies to gain experience include pairing with local electrophysiology colleagues to gain experience in transseptal puncture or developing a relationship with a structural heart disease mentor with whom one can "scrub cases."

Attending regional and national meetings focused on structural heart procedures is essential for any SHD practitioner to gain additional knowledge and stay current. For some, becoming a clinical investigator for new structural heart procedures is a good way to gain experience because these procedures are often novel, and prior experience requirements may be less stringent. There are also textbooks available on SHD topics, which are an excellent way to gain an overview of the field.[3]

Medical simulators can provide a risk-free environment in which both novice and experienced operators can perform structural heart procedures. Some simulators attempt to simulate a variety of procedures in the cardiac catheterization laboratory environment through the use of a full-body mannequin, multiple video monitors, and a touch-based user interface (VIST-Lab system, Mentice AB). Other simulation experiences may be run on a personal computer and are specific to a given device, such as the MitraClip Virtual Procedure software (Abbott Vascular), which is shown in Figure 1. In reality, many centers have chosen to hire interventional fellowship graduates who already possess the necessary procedural volume and structural experiences to satisfy their requirements.

STRUCTURAL HEART TRAINING PROGRAMS IN THE UNITED STATES

The Accreditation Council for Graduate Medical Education (ACGME) evaluates and grants approval to interventional cardiology fellowship programs that meet predefined metrics. The current focus of ACGME accreditation is to establish a standard curriculum and minimum procedural volumes primarily for coronary and peripheral vascular interventions. Similarly, the American Board of Internal Medicine examination in interventional cardiology is weighted toward knowledge of coronary and peripheral vascular disease states.

To date, there are no ACGME-accredited structural heart training programs in the United States. However, a web search can yield the current structural heart training opportunities available at interventional training programs. Although these have not been adopted by the American Board of Internal Medicine, published consensus documents, including those from the Society for Cardiovascular Angiography and Interventions (SCAI), have proposed the recommended curriculum, procedural exposure, and programmatic requirements for future structural interventional cardiologists.

Establishing competency in a formal training program can be challenging because, unlike coronary or peripheral interventions, the volume of structural heart interventions is relatively low. The ACGME prescribes that trainees must perform at least 250 percutaneous coronary interventions during their fellowship year as a minimum competency requirement. It is unrealistic to expect exposure to a similar volume of structural heart interventions in 1 or even 2 years. Professional societies have therefore proposed training algorithms that are not based on volume but rather exposure to the multiple facets of a structural heart program.

No two structural heart procedures are the same, but some procedures are more reproducible and standardized than others. For instance, TAVR has certain defined parameters of access site determination and valve sizing protocols. Other procedures, such as paravalvular leak closure, are less standardized and can require a high degree of intraprocedural improvisation and problem solving.

KEY COMPONENTS OF A COMPREHENSIVE ADULT STRUCTURAL HEART TRAINING AND CLINICAL PROGRAM

- Multidisciplinary structural heart team
- Imaging in structural heart disease (echocardiography, CT, magnetic resonance imaging)
- Vascular access for structural heart procedures
- Transseptal heart catheterization
- Aortic, mitral, and pulmonic balloon valvuloplasty
- Transcatheter aortic and pulmonic valve replacement
- Edge-to-edge transcatheter mitral valve repair
- Paravalvular leak closure
- Alcohol septal ablation for hypertrophic obstructive cardiomyopathy
- Percutaneous pericardial window creation
- Left atrial appendage exclusion
- Closure of atrial septal defect, patent foramen ovale, ventricular septal defect, and patent ductus arteriosus
- Aortic, coronary, and ventricular pseudoaneurysm closure
- Left ventricular apical exclusion
- Closure of coronary artery fistulas
- Treatment of pulmonary vein stenosis
- Coiling of unwanted vascular communications
- Relief of vascular obstruction, such as aortic coarctation

SOCIETY SURVEYS AND STATEMENTS ON STRUCTURAL HEART TRAINING STANDARDS

In 2010, the SCAI founded an SHD council with a stated mission of creating a forum for cardiovascular SHD specialists to collaborate on treatment, optimize patient care, and

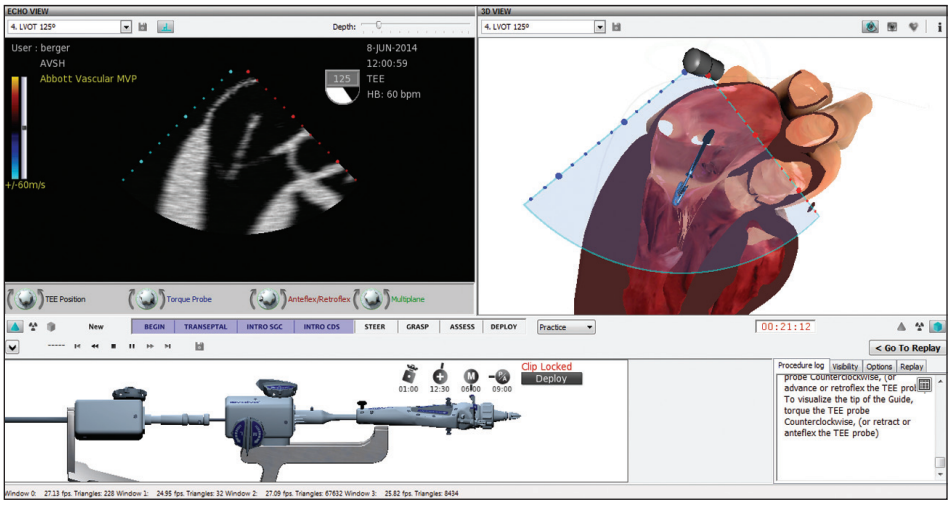

Figure 1. The MitraClip Virtual Procedure software trains operators on the MitraClip procedure. This software runs on a personal computer and simulates the use of the device delivery system, transesophageal echocardiography, and fluoroscopy. There is also a unique three-dimensional surface rendering showing the relationship of the device, heart structures, and transesophageal echocardiography probe (upper right panel).

promote cooperation among cardiovascular societies. The SCAI SHD expert consensus statements were published in 2010, defining the training needs and knowledge base for the developing field of SHD intervention.[1]

The most recent SCAI survey performed in 2012 by Marmagkiolis et al collected information from interventional cardiology program directors regarding the volume of structural procedures performed and solicited suggestions related to the development of training programs.[4] Fifty out of 137 ACGME-accredited interventional cardiology programs responded to the survey, and 86% were involved in the percutaneous treatment of SHD. Among those, only 29% offered a 1-year training program in SHD after completion of interventional cardiology training, and the majority of programs integrated structural training into the coronary and peripheral intervention training years.

In general, the number of SHD procedures performed was low. In only four of the 15 structural procedures covered by the survey was the average number of procedures performed higher than what program directors believed was the number necessary to achieve skill proficiency (atrial septal defect/patent foramen ovale closure, transseptal puncture, balloon aortic valvuloplasty, and TAVR). There was not a single center in the United States that offered sufficient training in all advanced SHD interventions.

CONCLUSION

Obtaining training and maintaining proficiency in SHD interventions is a career-long endeavor. Our understanding of structural disease pathophysiology, imaging modalities, procedural mechanics, and follow-up care is constantly evolving.

The ease of obtaining formal SHD training will depend largely on the career stage of the individual. It will certainly be easier for someone entering interventional fellowship to obtain SHD training than for an established practitioner. However, established practitioners can obtain exposure to structural procedures by other methods, as previously described.

Fortunately, there is "cross-talk" between many procedures. Transseptal puncture is a shared skill across multiple interventions, such as transcatheter mitral valve repair with the MitraClip, percutaneous balloon mitral valvuloplasty, and transcatheter left atrial appendage occlusion. Thus, gaining experience in one area reinforces procedural techniques when performing related procedures.

Finally, it must be acknowledged that few centers will be able to perform all structural heart procedures while maintaining volume and competence. Even within the SHD specialty, subspecialties are being formed with focused attention on TAVR, MitraClip implantation, or left atrial appendage occlusion. Setting attainable training goals and focusing on becoming an expert on fewer structural procedures will foster confidence and good clinical outcomes. ■

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