The Massachusetts General Hospital Cardiothoracic Residency Program

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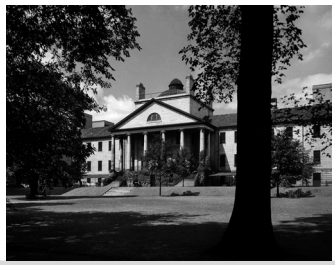
The Massachusetts General Hospital (MGH) was chartered in 1811 as a hospital for the poor, the third such hospital in the United States, preceded only by the Pennsylvania Hospital and The Hospital of New York. Founded by James Jackson and John Collins Warren in the spirit that "when in distress every man is our neighbor," it was staffed by local practitioners who volunteered their time in service to the community. This element of institutional culture remains strong as manifested by a continued commitment to community care and by the monikers applied to staff: the highest hospital appointment in the Department of Surgery remains "Visiting Surgeon."

The hospital has a long storied tradition of excellence in cardiothoracic surgery. Edward D. Churchill (Fig. 1) (arguably a thoracic surgeon) and W. Gerald Austen (Fig. 2) led the Department of Surgery for 60 years. Churchill's greatest contribution was his emphasis on the rectangular surgery residency program, which emphasized resident cooperation rather than competition. It has remained one of the most desirable residency programs in the country, perhaps in part because of the effect of this philosophy on the character of the program; most staff when asked by intern applicants to name the most important attribute of the residency would respond "your co-residents." The focus of the residency is on clinical care, but the inspiration to pursue academic practice is present. Among graduates of the MGH, 11 are presidents of the American Association for Thoracic Surgery (AATS) and 7, presidents of the Society of Thoracic Surgeons (STS), if one accepts this as a metric of success.

A cardiothoracic surgery residency program was formally started at the MGH in 1970, with Douglas Behrendt as the first finishing resident in 1971. Before that time, the 2 finishing "Super Chiefs" on the East and West Surgical Service (the Ward Service), who did an extra year of residency after graduating from the General Surgery Program, were eligible to take the examinations of the American Board of Thoracic Surgery if they had an interest in cardiothoracic surgery and qualified with enough cases. However, this informal residency was done on ad hoc basis and ran afoul of the American Board of Thoracic Surgery. W. Gerald Austen became the Chief of Surgery in 1969, and immediately decided that he needed to establish divisions within the fields of surgery. He named Mortimer J. Buckley as the first Chief of Cardiac Surgery (Fig. 3) and Hermes C. Grillo the first Chief of General Thoracic Surgery in 1969 (Fig. 4). These 2 men led their units for 28 and 25 years, respectively. Grillo and Buckley were giants in their field and were



Massachusetts General Hospital

Central Message

The MGH cardiothoracic surgery residency program has a long and storied history. It has produced numerous leaders in the field, made seminal contributions to the field and has gradually changed its structure and methods to improve the education of aspiring cardiac and general thoracic surgeons.

Figure 1. Portrait of Edward D. Churchill. (Color version of figure is available online at http://www.semthorcardiovascsurg.com.)

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Figure 2. Portrait of W. Gerald Austen. (Color version of figure is available online at http://www.semthorcardiovascsurg.com.)

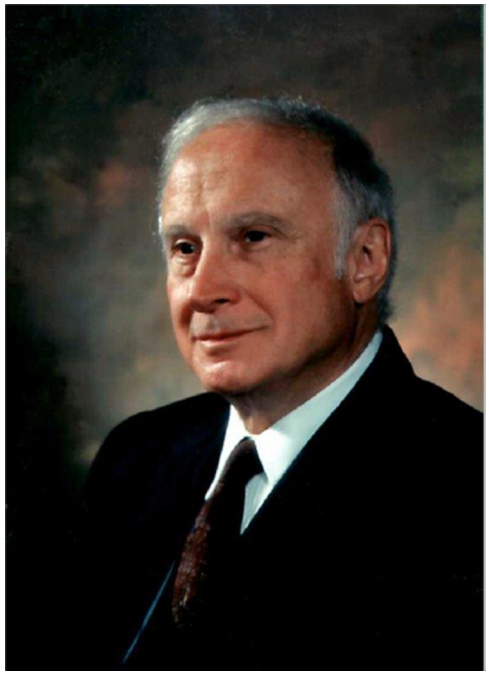

Figure 4. Portrait of Hermes C. Grillo. (Color version of figure is available online at http://www.semthorcardiovascsurg.com.)

codirectors of the thoracic surgery residency for many years. In 1994, Dr Douglas J. Mathisen became the Residency Program Director and continues to be in that position to this day. For the first 5 years, only 1 resident was taken per year and the residency was 1 year long. Starting in 1976, 2 residents were taken and separate tracks for cardiac and thoracic surgery were created. At that time, the general surgery program had a rich exposure to cardiothoracic surgery, and it was not unusual for resident surgeons to do 1-2 years of cardiothoracic rotations during their general surgery residency. During this time, there was also a 6-month rotation at Southampton General Hospital in England that was divided between cardiac and thoracic surgery, which provided additional excellent exposure to the field. In 1985, the residency was extended to 2 years in length, and 2 residents were selected annually until 1995. In 1996, 3 residents per year were accepted in the program and this continues to the current time. The residency was extended from 2-2.5 years in 2001, to allow for a 6-month rotation at Boston Children's Hospital for the cardiac track resident. This also allowed the thoracic track residents to rotate at outside institutions.

Figure 3. Portrait of Mortimer J. Buckley. (Color version of figure is available online at http://www.semthorcardiovascsurg.com.)

Currently, the residency offers both the traditional program after a full general surgical residency and also has a 4/3 program, which is increasingly popular. The program has graduated 93 cardiothoracic surgeons to date, and 22 surgeons have become either chiefs of their divisions or are chiefs of surgery. Dr William Frist became a senator after a successful career as a heart transplant surgeon, 2 surgeons have become CEOs

of health care organizations, and 4 have been presidents of the STS.

CARDIAC SURGERY AT MGH

Although the history of cardiac surgery at MGH arguably dates back to July 18, 1928 and the performance of the first successful pericardiectomy for constriction in the United States by Edward D. Churchill (28th AATS president),[1] perhaps an even more effectual event in the field as a whole occurred in February of 1931 when a young John H. Gibbon (41st AATS president), then a research fellow in Dr Churchill's laboratory, sat at the bedside of a young woman having suffered a pulmonary embolus after cholecystectomy. Watching her deteriorate, blood ever darker and veins more distended, he was inspired to devise a means of putting oxygen into the blood and remove carbon dioxide before reinjecting it into the arterial system. Dr Churchill provided Gibbon laboratory facilities to explore the development of such a machine culminating in a publication in the Archives of Surgery in 1937, after which he returned to Philadelphia. It is said that Dr Churchill was less than enthusiastic about the prospects of Gibbon's machine ever amounting to anything!

In the ensuing years, J. Gordon Scannell (58th AATS president)[2] performed closed mitral valvulotomies in the late 1940s, and, in June of 1955, the first successful removal of a left atrial myxoma in the United States under surface cooling and inflow occlusion (Fig. 5). In that same year, W. Gerald Austen (69th AATS president),[3] a graduate of MIT with a degree in fluid dynamics, began his internship and was approached by Churchill, Scannell, and Robert Shaw to build a heart-lung machine based on the design of Gibbon's machine. The first case was performed in 1956, with Austen as the perfusionist (Fig. 6). From there the practice grew here as elsewhere, initially focused on valvular and congenital disease. After completing his surgical residency and a 2-year fellowship at the NIH with Glenn Morrow, Austen joined the staff to establish a cardiac surgical unit. He was joined by Mortimer Buckley (76th AATS president)[4] in 1966, Eldred D. Munth in 1967, and Willard M. Daggett in 1968 in establishing the most active cardiac surgical group in New England. Concomitant with this was the development of one of the first—if not the first—group of dedicated cardiac anesthesiologists including Myron Laver and Edward Lowenstein who made seminal contributions to their specialty as well. After Dr Buckley, the cardiac surgery division was led by David Torchiana, now president and CEO of Partners Healthcare, and subsequently by Gus Vlahakes, then Douglas Mathisen, and now currently by Thoralf Sundt (97th president of the AATS).

Partnership with cardiology has been a hallmark of the MGH cardiac surgery program, since its inception. It was Paul Dudley White who established the cardiac unit at MGH, the first such dedicated unit in an academic institution in the United States. It was he who referred the patient needing pericardiectomy to the young E.D. Churchill, only recently returned to Boston from his Wanderjahr in Europe exploring the emerging field of thoracic surgery at the greatest institutions—Liverpool, Berlin, Prague, Munich, Bern, Heidelberg, Copenhagen, and Hamburg.[5] This collaboration continued for the generations that followed, with giants in cardiology such as Roman DeSanctis and Dolph Hutter favorably disposed to their surgical colleagues and establishing a culture of collaboration and cooperation that persists to this day. Most recently, this culture has expressed itself as a remarkably functional heart center with codirectorship by cardiology and cardiac surgery. The only challenge to the introduction of formal heart team

Figure 5. J. Gordon Scannell.

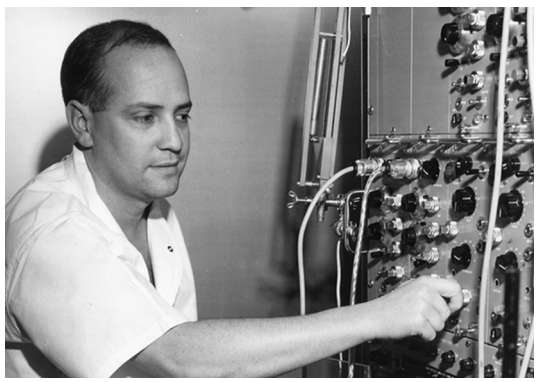

Figure 6. W. Gerald Austen as a resident running the cardiopulmonary bypass machine.

Figure 7. Cardiac surgeons of the Division of Cardiac Surgery at the MGH in 2016. (Color version of figure is available online at http://www.semthorcardiovascsurg.com.)

meetings has been the pressure of time, but they are a reality in our care paradigm today.

From an operational standpoint, the cardiac surgical group at MGH is structured to foster and function as a unified and collaborative team (Fig. 7). Believing that the success of each individual depends on the collective success of the group although, in return, the success of the group as a whole depends on the individual success of each member, we have moved from the individual office practices that grew organically from our history, to centralization of operations, which improves efficiency by pooling resources and also fosters the growth of integrated programs within the context of a group practice. This structure affords leverage through the collective strengths of the entire team. We are better able to ensure a uniformly high level of access, responsiveness, and service to referring providers while also affording each surgeon sufficient control over their individual schedules to be academically productive and domestically happy. A shared team of outpatient clinic nurse practitioners support the entire practice again with an emphasis on cross coverage and background similarity of practice. Consultation referrals are encouraged to enter the system through a centralized referral coordinator who provides referring physicians with availability information of all surgeons, leaving the decision-making to the referring cardiologist but facilitating a more even distribution of cases according to availability. This also encourages individual surgeons to provide excellent service so as to encourage referral. A leveling of the practice at the "inflow" leads to a more even use of operating room prime time and more even intensive care unit occupancy. This is critical to maintaining capacity to prevent case cancellations. We continue to strive to improve this practice just as we struggle with accomplishing uniform communication with referring practitioners, given the challenges of electronic medical records and the associated inaccurate and incomplete data with which every clinician is now familiar. We are confident, however, that as a team we can solve this problem while also satisfying the other aspects of our mission.

In addition to a commitment to providing outstanding clinical care, the cardiac surgical group at MGH today is driven to contribute to the field in a substantive way through research and by educating the next generation. The unit has a proud history of clinical investigation in thoracic aortic disease, particularly aortic dissection, and was a pioneer in the development and application of intraaortic balloon counter pulsation. Interest in the aorta persists, with a vibrant thoracic aortic center and continued publications on the subject. The principle basic science effort within the division has centered most recently on transplantation biology, an effort led by Dr Joren Madsen, recently (2009) president of the American Transplantation Society and director of the Transplant Center at MGH.

Figure 8. Portrait of Richard H. Sweet. (Color version of figure is available online at http://www.semthorcardiovascsurg.com.)

The educational paradigm on the cardiac service is in transition toward a preceptorship model to the extent that work hour restrictions permit. We feel that this affords the greatest opportunity for developing effective working relationships between staff and trainees and fosters earlier progression in the technical conduct of operations. Trainees in the cardiac track spend sufficient time on the general thoracic service to easily exceed their case requirements in all categories. On the cardiac service, there is a robust practice in the complete spectrum of acquired conditions so trainees receive a solid foundation in all conditions they are likely to see in practice. In addition, residents rotate in the cardiac catheterization laboratory and receive training in echocardiography and catheter-based interventions for structural heart disease. The recent creation of a "Heart Center Intensive Care Unit," caring for both medical and surgical cardiac patients and staffed by a multidisciplinary group of boarded intensivists including cardiac surgeons, cardiac anesthesiologists, and cardiologists falling under the direction of the chief of cardiology and the chief of cardiac surgery, also offers a superb education in all aspects of intensive care unit care.

THORACIC SURGERY AT MGH

General thoracic surgery has a long history at MGH with Samuel Robinson being the first surgeon at MGH to have a focus on thoracic surgery with his first lobectomy for bronchiectasis at MGH in 1909 that was a multistage affair completed over 10 months. Robinson was famous for the Robinson box, which enclosed the patient's head along with the anesthetist to allow positive pressure for operating on the open chest.[6] Robinson was a founding surgeon of the AATS and was the 4th president in 1922. Edward D. Churchill (the 28th president of the AATS) also of course had an interest in thoracic surgery and is famous for performing the first pulmonary resection for metastatic disease, defining the segmental anatomy of the lung, advocating lobectomy as the treatment of choice for lung cancer, and refining the technique of esophagogastric

Figure 9. Hermes C. Grillo in the surgery lounge. (Color version of figure is available online at http://www.semthorcardiovascsurg.com.)

Figure 10. Earle W. Wilkins.

Figure 11. Thoracic surgeons of the Division of Thoracic Surgery at the MGH in 2016. (Color version of figure is available online at http://www.semthorcardiovascsurg.com.)

anastomosis. Richard Sweet was the first really dedicated modern surgeon at MGH who focused his practice on thoracic surgery and became famous for his technique of esophagectomy emphasizing precise anastomotic technique (the Sweet anastomosis), which resulted in a remarkably low leak rate and mortality after esophagectomy.[7] He was a master technician, and surgeons came from around the world to learn his operative technique. Sweet was the 41st president of the AATS (Fig. 8).

Hermes Grillo (the 23rd president of the STS) focused his career on the trachea and developed a large referral practice of complicated tracheal problems, which provided great training for his residents (Fig. 9). Grillo was a classic Harvard professor—world famous, a renaissance man, superb technical surgeon, skillful writer, and passionate about his field. Grillo wrote the classic textbook on surgery of the trachea.[8] Earle W. Wilkins, a mentee of Sweet's, was a long-standing member of the Thoracic Surgery Division with a focus on the esophagus and thymus. He was a consummate gentleman, clinician and teacher (Fig. 10). Douglas J. Mathisen became chief of thoracic surgery in 1994, focused his career on surgery of the airway and neoadjuvant therapy for thoracic malignancies, is an excellent teacher both in the operating room (OR) and in didactic sessions, became a noted national leader in thoracic surgery, and has mentored 2 generations of young thoracic surgeons. The thoracic surgery group's focus their efforts on training cardiothoracic residents and not fellows. Mathisen started a summer medical student program in 1996. To date, 80 medical students have graduated from that program of which many have gone into surgery.

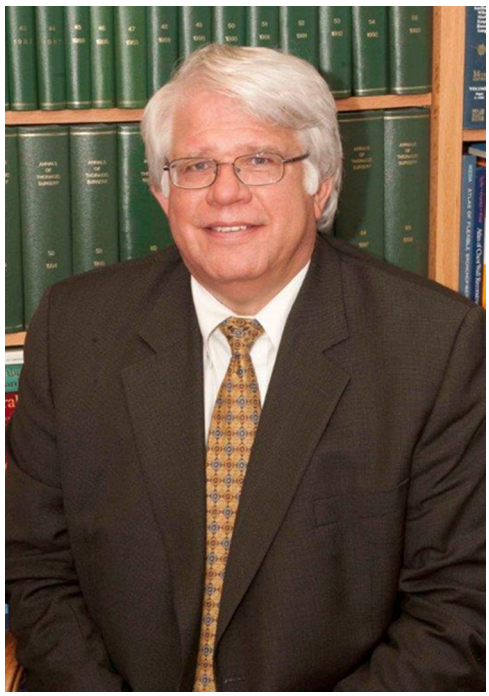

Figure 12. Douglas J. Mathisen, Chief of Thoracic Surgery. (Color version of figure is available online at http://www.semthorcardiovascsurg.com.)

The general thoracic track residents typically spend 16 months on general thoracic surgery rotations of 28 clinical months. Elective time away at other noted thoracic programs (Mayo Clinic, Memorial Sloan Kettering, University of Pittsburgh, and Toronto General Hospital) is encouraged and typically involves two 3-month away rotations. The aim of the General Thoracic Program is to train thoracic residents in the full breath of thoracic surgery, including endoscopy, open and minimally invasive surgery, with a concentration on airway surgery. The current yearly case volume is 1116 major cases, 1092 minor cases, and 1909 endoscopic procedures. Most surgery is done using minimally invasive techniques. Case-based learning is emphasized. Several didactic conferences are held weekly as well as a thoracic oncology multidisciplinary conference. The thoracic surgery team is large and includes 9 attending surgeons (Fig. 11), 2 thoracic residents, 3 physician assistants, 4 nurse practitioners, 2 general surgery residents, a data manager, a research nurse, and a program coordinator. The MGH Thoracic Division has made many contributions to the field, including tracheobronchial diseases, esophageal cancer, thymic tumors, thoracic outlet syndrome, lung cancer, rare lung tumors, and benign esophageal conditions. Three MGH thoracic surgeons have active NIH-funded laboratories; Michael Lanuti with lung cancer molecular biology, James Allan with lung transplantation biology, and Harald Ott with organ regeneration. Several surgeons are active in prominent national thoracic surgery organizations. The Thoracic Division is led by Douglas Mathisen, the 45th president of the STS (Fig. 12).

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