Columbia P&S/NYPH Robotically-Assisted Cardiac Surgery Program

Michael Argenziano, MD  
Director, Robotic Cardiac Surgery

In the past decade, the face of cardiac surgery has been changed by a number of technologic advances, most notably the development of minimally invasive techniques, including minimally invasive direct coronary artery bypass (MIDCAB), off-pump coronary artery bypass (OPCAB), and minimal access valve surgery. Initial attempts to perform cardiac operations through small incisions were hindered by the absence of appropriate accessory technology, such as visualization systems, retractors, stabilizers, and alternate methods of vascular cannulation and cardiopulmonary bypass. With the development of these technologies, surgeons have been increasingly able to perform complex cardiac procedures, including coronary artery bypass, mitral and aortic valve replacement and atrial septal defect (ASD) closure, through smaller-than-traditional incisions. Nonetheless, in many cases, the extent to which incision size has been reduced by these minimally invasive approaches has been matched by a corresponding increase in technical difficulty and operative time, due to the constraints imposed by limited or incomplete cardiac exposure. For example, MIDCAB, in which a single vessel bypass to the anterolateral surface of the heart is achieved through a small anterior mini-thoracotomy, requires internal mammary artery graft harvesting by thoracoscopy, which even in the most experienced hands, is time consuming and technically challenging.

Although promising for patients requiring single-vessel coronary surgery, the early experience with MIDCAB led many surgeons to conclude that this procedure had limited applicability, since the vast majority of patients presenting for CABG required multi-vessel bypass. Some came to argue that the true invasiveness of coronary artery bypass grafting (CABG) was in fact not related to the size of the thoracic incision, but rather to the use of cardiopulmonary bypass, with its attendant adverse effects on a variety of organ systems. Thus, off-pump CABG (OPCAB), performed through a traditional sternotomy, was introduced as an alternative “minimally invasive” procedure. Since its introduction, OPCAB has gained increasing popularity. The short-term safety of multi-vessel OPCAB has been demonstrated by several groups, with reported mortality rates similar to those associated with traditional CABG. However, because the feasibility of OPCAB is dependent on a number of technical factors, including the severity and distribution of coronary disease, not all patients requiring myocardial revascularization are necessarily candidates for this approach. Furthermore, because cardiopulmonary bypass is well tolerated in the majority of patients, some have questioned the actual benefit of avoidance of cardiopulmonary bypass.

With respect to valvular surgery and ASD repair, advances in the area of peripheral cardiopulmonary bypass access and endoaortic balloon technology have allowed these procedures to be performed through smaller-than-usual, but not necessarily small, incisions. The development of these procedures has required the adaptation of surgical instruments and techniques to the challenge of operating “in a deep hole,” with less than optimal visualization. For these and other technical reasons, these procedures have been performed predominately at selected centers, and have not gained widespread popularity.
The minimally invasive cardiac surgical movement has recently been propelled by the introduction of a new category of technologic achievement: the computerized telemicromanipulator. Utilizing this device, also known as the surgical robot, surgeons can manipulate small instruments, which are inserted through small chest incisions, in tight spaces, achieving many of the technical maneuvers previously possible only with open exposure. In the last few months, cardiac surgeons at the Columbia University College of Physicians & Surgeons/NewYork-Presbyterian Hospital have begun to utilize this technology and are currently involved in several exciting clinical protocols testing the da Vinci™ Surgical System, manufactured by Intuitive Surgical, Inc. (Mountainview, CA) for a variety of cardiac surgical operations.

The da Vinci™ Surgical System consists of two primary components: the surgeon’s viewing and control console and the surgical arm unit that positions and maneuvers detachable surgical EndoWrist instruments. These pencil-sized instruments (with tiny, computer-enhanced mechanical wrists) are designed to provide the dexterity of the surgeon’s forearm and wrist at the operative site through entry ports less than 1 cm. This enables the surgeon to enter the chest through keyhole incisions and perform closed chest heart and lung surgery. One port allows access for the endoscope, a tiny camera that is attached to a fiber-optic cable. The other two ports provide access for surgical tools. Instead of the surgeon holding the tools, the robot wrists do – bending back and forth, side to side, and rotating in a full circle – thereby providing greater range of motion than humanly possible. The wrists of the robot mimic the motions made by the physician, who sits at a console beside the operating room. The surgeon peers through an eyepiece that provides high-definition, full-color, magnified, 3-D images of the surgical site provided by the endoscope. The physician moves his hands, which are attached to manipulation controls – and the robot follows along. An important element of this technology is that the built in computer enhances the surgeon’s hand movement and renders it more precise with less tremors – an important element in refining delicate bypass and valve surgery.

Because the da Vinci™ Robotic Surgical System allows for 3-D visualization and wrist-like dexterity and control of fine instruments which can be placed in the chest through port-sized incisions, this technology has the potential to impact the practice of cardiac surgery in three important ways:

1. **Make existing Minimally Invasive Surgery (MIS) operations easier:** Surgical procedures routinely performed today using MIS techniques will be performed more quickly and easily with the increased dexterity and control provided by robotic assistance.

2. **Make difficult MIS operations routine:** Surgical procedures that today are performed only rarely using MIS techniques may someday be achieved routinely with robotic assistance. Some procedures have been adapted for port-based techniques but are extremely difficult and are currently performed by a limited number of highly skilled surgeons. With the availability of robotic assistance, more surgeons at more institutions will be able to perform these procedures.

3. **Make new surgical procedures possible:** A number of procedures that are currently not feasible by minimally invasive techniques may eventually be performed through small incisions with the help of robotic technology.

In the United States, Intuitive Surgical, Inc. has received clearance from the FDA for use of the da Vinci™ Surgical System in laparoscopic surgical procedures such as cholecystectomy and Nissen Fundoplication and general non-cardiac thorascopic surgical procedures such as internal mammary artery mobilization. In addition, Columbia Presbyterian surgeons are involved in several clinical trials to assess the da Vinci™ Robotic System for mitral valve repair, coronary artery bypass and ASD closure.
ISLET TRANSPLANTATION ~
INNOVATIONS IN THE TREATMENT OF
TYPE I DIABETES MELLITUS

By Eric H. Liu, MD, PGY1

Since insulin was first isolated from pancreatic islets, transplantation of islets of Langerhans has remained the single best hope for a cure of Type I Diabetes. That hope has now finally emerged as a viable treatment for patients. Recent breakthroughs in immunosuppression and islet isolation have made several patients free of insulin, free of the fear of hypoglycemia, and free of possible secondary complications. In a joint venture between the Departments of Surgery, Medicine, and Pathology at New York-Presbyterian Hospital and Columbia University, islet isolation is now a commonly performed procedure, with islet transplantation in the near future.

Isolation of pancreatic islets has been performed routinely in the laboratory for nearly three decades through a process that utilizes the protease activity of Collagenase. Using a similar technique, human islets can be extracted from cadaveric donors who do not have a history of hyperglycemia, anoxia, or prolonged cardiac arrest. These organs are procured and preserved with the same care as those used in whole organ transplantation. An organ is then brought back to the laboratory where it is injected with enzyme through the pancreatic duct; tissue is circulated through a mechanical digestion chamber and islets are purified on density gradients. This technique separates the islets from exocrine tissue, allowing a purified islet preparation to be injected through a portal cannula into the liver.

The University of Alberta, Edmonton, Canada was the first group to successfully maintain islet transplants using islets from two organ donors and a new steroid free immunosuppressive regimen. This combination included Daclizumab, an IL-2 receptor antagonist effective in the induction period, and maintenance on Sirolimus (Rapamycin) and Tacrolimus (FK506). T-cell inhibitors routinely used in other solid organ transplants. These immunosuppressive drugs are free of the diabetogenic effects of glucocorticoids and cyclosporine. The first patients in the Edmonton trial have continued to be mostly insulin independent without major infectious or recurrent autoimmune complications.

Islets of Langerhans extracted from the pancreas and purified then injected percutaneously into the liver.

With the Edmonton success, many institutions are hoping to replicate these results and offer a cutting edge therapy to the millions of Type I diabetic patients around the world. New York-Presbyterian Hospital and Columbia University are in the process of building such a center. In conjunction with the Naomi Berrie Diabetes Center, Dr. Mark A. Hardy, Auchincloss Professor of Surgery, and Dr. Kevan C. Herold, Associate Professor of Medicine, have led several successful islet isolations. In anticipation of the therapeutic potential, the university and hospital have already dedicated major funds to constructing a new, state-of-the-art cell isolation center, to be housed and maintained by the Blood Bank and the Department of Pathology, under the guidance of Dr. Donna Skerrett and Dr. Harold Kaplan. Because of these institutional achievements and the obvious needs of diabetics in the New York area, the National Institutes of Health has awarded a major grant to the University, recognizing it as one of ten regional Islet Cell Resource Centers around the country that will isolate islets, perform islet transplantation, and provide islets for research.

Islet isolation may soon become a common therapy for Type I Diabetes. It is an exciting time for researchers and clinicians, and it provides a new hope for diabetic patients everywhere.

Eric Liu, MD a PGY graduate, is presently a first year Post Graduate in the Department of Surgery. He worked for one year as an Islet Transplant Fellow with Dr. Mark Hardy before entering his internship at Columbia Presbyterian.

Islets are first dissociated from the exocrine tissue and visualized with Dithizone staining (islets are red, exocrine tissue is pale, left.) The tissue is then separated using density gradients to produce pure islets (right).
Sherman Bull Reaches Summit of Mt. Everest

David W. Kinne, MD

Sherman Bull, MD (Pe-S 1962) who completed training in general and pediatric surgery at Columbia in 1969, became the oldest man to reach the peak of Mt. Everest on May 25, 2001. Sherman, age 64, was one of two doctors in a 21 man team that included his son, Brad (age 33), making them the first father-son team to reach the top. Brad helped a 32 year old man to become the first blind man to scale the summit. Sherman had made four previous attempts – in 1992, 1995, 1998 and last year. Twice before, he reached the south summit (100 meters below the peak), to be turned back by injury and then bad weather. In 1998, he fell 600 feet, breaking multiple bones (including two spine fractures), suffering DVT during recovery, postponing subsequent attempts.

He has scaled the seven summits – the highest one in every continent, and stays in training. Sherman credits his excellent team (21 Americans), 19 of whom reached the summit. This is the highest number of any team to accomplish this. He is considering a book on this two month expedition.

Sherman has a practice in general and pediatric surgery at Stamford Hospital (CT). He is Assistant Clinical Professor of Surgery at Columbia University and Attending Surgeon at Stamford University Medical Hospital.

Sherman, Peg, Brad and Reba in the Oval Office with President George W. Bush 7/26/01

Sherman and Brad on summit 5/25/01 0800

Sherman on summit 5/25/01 0900

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Arrhythmia Ablation Dr. Argenziano, who also serves as Director of Columbia’s Surgical Arrhythmia Service, chairs an international task force working on the development of a robotic operation for atrial fibrillation, a common cardiac arrhythmia which affects millions of persons. A trial of a new, minimally invasive operation for atrial fibrillation is currently being planned.

For information about the Columbia P&S/NYPH Robotic Surgical Program or to refer a patient to one of the robotic trials, please call our toll-free hotline, 1-866-ROBOT-OP.

Michael Argenziano, MD, graduate of Pe-S and former Chief Resident at Columbia Presbyterian, is currently Attending Surgeon in Cardiothoracic Surgery, Director of the Robotic Cardiac Surgery Program and Director of the Surgical Arrhythmia Program at New York-Presbyterian Hospital.

John Jones Surgical Society

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Soon to be Published
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An Exhibit of Highlights from Archives and Special Collections

David W. Kinne, MD

In the Archives and Special Collections reading room of the Augustus C. Long Health Sciences Library of Columbia University, there are over 15,000 rare books, manuscripts, photographs, letters, etc. Selections from these formed an exhibit: *From Hippocrates to Gray’s Anatomy*, displayed at Butler Library, May 4th to July 28th, 2001. This exhibition was curated by Steven E. Novak, Head, Archives and Special Collections, and Robert A. Vietrogoski, Archivist, Augustus C. Long Health Sciences Library.

The Library began collecting rare materials in 1914, with the purchase of the Physiology Collection of John Green Curtis (1844–1913), Professor of Physiology for many years at the medical school. Added to this was the nearly one thousand volume library in the History of Anatomy, created by Professor George Sumner Huntington (1861–1927) and, in 1974, the gift of the Jerome P. Webster Library of Plastic Surgery.

The Special Collections Department was established in 1976, followed by transfers of the Auchincloss Florence Nightingale Collection, the Freud Library, and the gift of the Lena and Louis Hyman collection in the History of Anesthesiology.

The Health Sciences Library possesses a wealth of historic surgical works dating from the early 16th century. The close connection between surgery and anatomy led Huntington to collect many books in the field. Most of the library’s surgical titles, however, were acquired by Jerome P. Webster, for his Plastic Surgery Collection. Believing the history of plastic surgery could not be understood in isolation from the history of surgery in general, Webster collected widely throughout the entire discipline.

John Jones, Columbia’s first Professor of Surgery when the medical school opened in 1767, wrote *Remarks on the eve of the American Revolution*. The title page was shown in the exhibit: *Plain Concise Practical Remarks on the Treatment of Wounds and Fractures; to Which is Added, a Short Appendix on Camp and Military Hospitals; Principally Designed for the Use of Young Military Surgeons in North-America*. (New York, 1775). It saw wide use as the accepted text on wound management and military medicine in the fledgling Continental Army. It also has the distinction of being the first surgical text written by an American to be published in North America.

The remaining surgical texts are described in chronological order. The most renowned surgeon of the Middle Ages, Guy de Chauliac, published a surgical text in 1519. Chauliac covered the field so exhaustively that his writings remained influential into the 16th century. While he made some innovations, he was a profoundly conservative figure whose views probably retarded the growth of surgery.

*Feldbuch*, by Hans von Gersdorff (Strasbourg, 1528) addressed the military surgeon. It focused on treating wounds, amputating limbs, extracting bullets and arrows, though it also had chapters on subjects as varied as anatomy, leprosy and medications. The illustrations, well-known for their realistic depictions of surgical operations and often hand colored, made *Feldbuch* one of the most popular and plagiarized surgical works of its time.

Giovanni Andrea Dalla Croce’s *Chiurgiae* (Venice, 1573) was notable for its descriptions of all the surgical instruments used before and during his own time. It has the earliest known illustrations of neurological surgery (a trephination) in progress. A cat and mouse are shown on the floor on this plate.

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Recent Appointments, Promotions and Honors

Appointments

Michael Argenziano, MD
Assistant Professor of Surgery, Division of Cardiotoracic Surgery
Director, Robotic Cardiac Surgery
Dr. Argenziano (P & S ’92) had his General and Cardiotoracic Surgical training at Columbia. His research interests, in addition to robotic surgery, include surgical electrophysiology and pulmonary hypertension.

Dennis L. Fowler, MD
Leon G. Hirsch Professor of Clinical Surgery, Weill Cornell Medical College
Professor of Clinical Surgery, Columbia University
College of Physicians & Surgeons
Director, Minimal Access Surgery Program, NewYork-Presbyterian Hospital
A graduate of the University of Kansas School of Medicine (1973), Dr. Fowler came to Columbia from Allegheny University Health Sciences MCP-Hahnemann School of Medicine in Pittsburgh. His research interests include physiologic changes from laparoscopic surgery, laparoscopic colon surgery and hernia surgery.

Zachary L. Gleit, MD
Assistant Clinical Professor of Surgery
Dr. Gleit graduated from Harvard/MIT Divison of Health Sciences and Technology (1993). After completing General Surgery training at Columbia, Dr. Gleit spent a year with Doctors Without Borders in Ethiopia, and then had a Fellowship in Transplantation at MGH. His research interest is in transplantation tolerance.

Ayad K. Jihayel, MD
Assistant Clinical Professor of Surgery
Attending Surgery, UMDNJ-University Hospital, Newark, New Jersey and St. Joseph’s Hospital & Medical Center, Paterson, New Jersey
Dr. Jihayel received his MD in 1975 from Baghdad University, Iraq, and took his Internship and General Surgery Residency at St. Raphael Hospital, Yale University. He trained in Cardiothoracic Surgery at Newark Beth-Israel Medical Center, Newark, New Jersey.

Carmen T. Ramos, MD
Assistant Professor of Clinical Surgery
Assistant Attending Surgeon, Division of Pediatric Surgery, Children’s Hospital of New York, NewYork-Presbyterian Hospital
Dr. Ramos graduated from the University of Puerto Rico, San Juan, P.R. in 1989. She trained in General Surgery at the University of Puerto Rico and Pediatric Surgery at Boston Children’s Hospital, Harvard University. She came to Columbia from Albany Medical College, and will specialize in pediatric general surgery, thoracic surgery, oncology, trauma, laparoscopic surgery and neonatal surgery.

Joshua R. Sonett, MD
Assistant Professor of Clinical Surgery (interim), Columbia University College of Physicians & Surgeons
Assistant Attending Surgeon, Division of Cardiothoracic Surgery, NewYork-Presbyterian Hospital
Director, Lung Transplant Program, NewYork-Presbyterian Hospital
Dr. Sonett graduated from East Carolina University in 1988. He trained in General Surgery at the University of Massachusetts Medical Center, with Cardiothoracic Fellowships at the University of Massachusetts and the University of Pittsburgh. After a Fellowship in Thoracic Surgery at Memorial Sloan-Kettering Cancer Center, he joined the faculty at the University of Maryland in 1996. In addition to his interest in lung transplantation, he is interested in minimal access and video assisted thoracic surgery, multimodality therapy for lung and esophageal cancer, and endobronchial palliation of benign and malignant airway stenosis.

Promotions

Annette C. Gelijns, PhD
Director, In CHOIR

Jean C. Emond, MD
Chief for Transplantation

Mehmet C. Oz, MD
Chief for Cardiovascular Services

Freya Schnabel, MD
Chief, Breast Surgery Division

David C. Stern, MD
Director, Division of Surgical Sciences

Jeffrey L. Zitsman, MD
Director, Pediatric Minimal Access Surgery

Honors

Jessica J. Kandel, MD
Herbert Irving Assistant Professor of Surgery
Division of Pediatric Surgery

Yoshifumi Naka, MD, PhD
Herbert Irving Assistant Professor of Surgery
Division of Cardiothoracic Surgery

Announcement

We regret to announce the passing of Dr. George H. Humphreys, Valentine Mott Professor and Chairman of the Department of Surgery. Dr. Humphreys died on December 18, 2001 at the age of 98.
Highlights of the John Jones Surgical Society and P&S Alumni Association Reception at The Hilton Riverside Hotel, New Orleans

On Wednesday October 10, 2001 the John Jones Surgical Society and the P&S Alumni Association hosted a reception at the Annual Convention of the American College of Surgeons, in New Orleans. The reception was held at The Hilton Riverside Hotel, the Convention Headquarters Hotel. Considering the diminished numbers of attendees at the Conference following the September the 11th disaster, we were able to attract a good crowd of 56 to the reception. Furthermore, there was lively conversation and exchange from a broad spectrum of attendees, P&S medical students present and past, and from Attendings present and past. Children of alumni and parent-child alumni reenforced history and tradition with their presence at the reception. Dr. Eric A. Rose, Chairman of the Department of Surgery, welcomed the group and gave them an update on activities in the department and at the hospital; Dr. Kenneth A. Forde spoke on behalf of the medical school sharing with the audience some of the new Dean’s vision and plans.

Kenneth A. Forde, MD
President, John Jones Surgical Society

1. Dr. Eric A. Rose, Chairman, Department of Surgery relaxing with guests at the John Jones Surgical Society and P&S Alumni Association Reception at ACS, New Orleans.

2. Dr. Kenneth A. Forde, P&S ’59, President of the John Jones Surgical Society (center) seen here with Mrs. Pruitt, Dr. Basil Pruitt and his son Dr. Scott Pruitt, P&S ’87.

3. Three generations of the Griffiths family: Cadivan Sr., P&S ’51, former Plastic Surgeon, Resident and Attending at PH, with his two sons Chester (L) and Cadvan Jr. (R), Chester’s wife and child also attended.

4. Dr. Spencer Amory, Chief, Division of General Surgery, recent recipient of two teaching awards - The Distinguished Teacher’s Award and The Charles Bohmfalk seen here with former trainees, from left: Drs. Sam Rhee, Plastic Surgery, Daniel Lee, Researcher in the Division of Surgical Science, Eugene Kim, 4th year Residency Program, Spencer Amory, James Huang, General Surgery at Brigham and Jonathan Sahn, General Surgery at NYU.

5. Dr. Mark Hardy, Director, Department of Surgery Residency Program, seen here with fellow Fellow of Laparoscopic Surgery at Columbia Presbyterian, Siva Vithiananthan (R).

6. From left to right: Dr. Soji Oluwole, Professor of Surgery and his wife Tolu Oluwole with Dr. Afololu Oke, P&S ’94.

7. From left: Drs. Paul Gerst, faculty member, Fred Bown Jr., former faculty member and Bard Cosman, graduate of P&S, ’87.

8. From left: Mrs. Dennis Fowler, Director, Minimal Access Surgery, New York Presbyterian Hospital, Richard Larry Whelan, Site Director, Minimal Access Surgery, Columbia Campus and Robert Grant, Chief, Division of Plastic and Reconstructive Surgery, Columbia Campus.

9. Dr. Eugene Kim and the mystery medical student!!

10. Former Resident Tyr Wilbanks (L) with Mrs. Jordan and former Resident Lawrence Jordan (R).

11. Kelly Migliero (center), 4th Year P&S student selected to participate in the Medical Student Program at the American College of Surgeons Clinical Congress with Chandra Varner (right) and Ava Lea (left), students from other medical colleges.
Ambrose Pare, the greatest surgeon of the the Renaissance, has an English text, translated from Latin and French by Tho. Johnson (London, 1634). Pare was a military surgeon, adept at all types of operations, and he invented many of his own instruments. He is perhaps best known for rejecting the traditional dressing of scalding oil for gunshot wounds, substituting instead the less painful one of egg yolk and turpentine.

Johann Schultes, better known by the Latinized form of his surname, Scultetes, was a military surgeon during the Thirty Years War. His text *Arsenal of Surgery* (1655), showing surgical procedures, instruments, and bandages, became the most popular text of the 17th century. The 43 full-page engravings are among the finest in surgical literature, including the multi-tailed Scultetes binder.

Joseph Pancoast published *Treatise on Operative Surgery* (Philadelphia, 1844), a landmark of the 19th century American surgical writing. The 486 illustrations on 80 plates were outstanding for accuracy and detail. Pancoast’s work went two more editions, selling more than 4000 copies over nine years – a best seller among American medical books of the time.

Other works of interest to surgeons include among others, anatomical texts Vesalius, (1543) and Gray’s *Anatomy*, (1858), the longest continuously revised textbook still used in the medical profession. Although Henry Gray is an obscure figure, he met a tragic early death after contracting smallpox from a nephew he was treating. Gray’s *Anatomy* is in its 38th edition (1995).

In the Physiology Collection, William Harvey’s *De Motu Cordis* (1639) explained his discovery of the circulation of blood as perhaps the most important breakthrough in the history of medicine, and the starting point of modern physiology. Von Leeuwenhoek’s illustrations of microorganisms from his own mouth, seen through his lens, and William Beaumont’s *Studies on Gastric Juice* (from the gastric fistula of Alexis St. Martin) were also shown.

The Webster Collection has outstanding holdings relating to Gaspara Tagliacozzi, Surgeon of Bologna (1554 – 1559) including seven copies of his pathbreaking work on plastic surgery, and the only signature of Tagliacozzi in the United States.

Also of interest were early works in Anesthesiology and the Auchincloss Florence Nightingale Collection. Nightingale’s best known work, Notes on Nursing: What It Is and What It Is Not (London, 1860) may have pertinence even today.

David W. Kinne, MD, recently retired from his position as Chief of the Breast Surgery Division in the Department of Surgery and David V. Habif Professor of Surgery. He now devotes his time to pursuing his interests in writing, history, and travel.

One stage in the operation to construct a new nose from the first published book on plastic surgery, *De curtorum chirurgia per insitionem* (1597) by Gaspare Tagliacozzi (1545-1599), Jerome Webster Library of Plastic Surgery

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