

healthpoints

ALL THE POSSIBILITIES OF MODERN MEDICINE



COLUMBIA UNIVERSITY
MEDICAL CENTER

Department of Surgery
In affiliation with
NewYork-Presbyterian Hospital



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Hybrid Heart Surgery

Hybrid cars? You bet. Hybrid heart surgery? Even better.

This issue of healthpoints discusses advances in heart surgery that have been made possible by new surgical technologies and techniques that are less invasive than traditional methods. Hybrid heart surgery refers to procedures that use traditional surgical methods in conjunction with minimally invasive, catheter-based approaches. Hybrid operations allow surgeons the flexibility to take advantage of the best that each method has to offer and to tailor operations to the needs of each patient with great flexibility. In some cases, a hybrid approach can enable the surgeon to treat a condition with a single operation rather than a series of operations, or to treat conditions that would otherwise be inoperable.

In this issue, two articles profile the benefits of hybrid surgery in children and adults. Hybrid surgery is gaining use by surgeons treating newborns with serious heart defects such as hypoplastic left heart syndrome. In adults, hybrid techniques are already in use for a host of diagnostic and therapeutic procedures: replacement or repair of heart valves, correction of atrial fibrillation, opening of blockages in the coronary arteries, and as discussed in this issue of healthpoints, a groundbreaking hybrid procedure to rebuild the aortic arch in patients with aortic aneurysms.

Pediatric Hybrid Heart Surgery

Hybrid procedures ease the burden for babies undergoing surgery for hypoplastic left heart syndrome and other conditions

The field of pediatric heart surgery has made dramatic advances in recent years, with many serious conditions no longer carrying the grim prognoses they once did. Yet the field remains one of the most demanding surgical disciplines. In the challenging area of heart defect repair, hybrid treatments -- which combine conventional surgery with catheter-based procedures -- now offer important alternatives.

Emile Bacha, MD, Director, Congenital and Pediatric Cardiac Surgery, NewYork-Presbyterian Morgan Stanley Children's Hospital/Columbia University Medical Center, specializes in hybrid heart surgery in children. In 2003, Dr. Bacha and others introduced the U.S. surgical community to a new hybrid procedure for the difficult-to-treat defect known as hypoplastic left heart syndrome (HLHS). Children born with HLHS must undergo surgery within the first week of their lives to survive, and until recently, the only treatment required a

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Hybrid Aortic Arch Surgery

Endovascular approach provides new hope for patients with aneurysms of the aortic arch.

The aorta is the largest artery in the human body. It receives blood from the heart and distributes it throughout the body. An aneurysm, a weakening or ballooning of a blood vessel, may occur in any artery in the body, including any part of the aorta. If an aneurysm develops in the aortic arch, the curved portion of the aorta, which supplies blood to the brain and arms, surgery to rebuild the vessel may be needed to prevent a rupture.

Until recently, operations on the aortic arch required two operations, performed six weeks apart. Now, a novel use of endovascular technology allows the two procedures to be combined into a single operation.

According to Allan Stewart, MD, Director, Aortic Surgery Program, the new hybrid procedure combines open surgery with endovascular repair. In this procedure, the physician inserts a catheter through the femoral artery in the groin. He then delivers a stent graft (a mesh-like tube) through the

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Renal 3000

The Circle for Life Event at Columbia University Medical Center Celebrating a Milestone in Kidney Transplantation

The first kidney transplant at Columbia University Medical Center was performed in 1969. The three thousandth was performed on April 6, 2010.

To celebrate this milestone, over 600 kidney transplant patients, donors and their families reunited with their medical teams on April 21, 2010 at NewYork-Presbyterian Hospital/Columbia University Medical Center (NYPH/CUMC). The occasion, the Circle for Life: Renal 3000 event, was a huge success, a heartfelt celebration of a second chance at life. The reunion made national news, being featured on more than 50 CBS affiliate stations across the country.

The procedure has evolved in ways few could have imagined at the time of the first successful kidney transplant in 1954. At that time, immunosuppressant drugs were not yet available, and transplants were performed only between identical twins in order to prevent organ rejection. The advent of immunosuppressant medications in the 1960s broadened the scope of donation to include deceased donors, and increased the number of organs available for transplantation.

Yet as the practice of kidney transplantation increased, so did demand for donor organs, as well as for better approaches to preventing organ rejection. Determined to meet these challenges, the transplant team at Columbia has pioneered a continuous stream of innovations in surgical technique, organ donation, and medical therapies over the past four decades.

Extended criteria protocols: To meet the shortage of donor organs, the program has implemented new protocols for using extended criteria organs that may not meet the usual criteria for transplantation, but are healthy enough for a successful transplant. Organs in this category include those from donors who are older, have hypertension or diabetes, or who at the time of their death suffered mild kidney injury. The use of extended criteria kidneys allows more people to receive kidney transplants than ever and is

proving highly successful, especially among older recipients and those doing poorly on hemodialysis.

Donor swaps: Paired donor exchanges anonymously match up compatible donors and recipients when a suitable donor cannot be found through family and friends. While logistically complicated (a two-way swap requires four transplant teams and four operating rooms; a three-way swap requires six teams and operating rooms, and so on), the procedure dramatically improves the opportunity for patients to find a compatible donor. Building on the success and popularity of the two-way swap, the program now performs swaps among up to six patients, events requiring twelve simultaneous operations.



Kidney swaps enable patients to be transplanted far earlier than if they had to wait on the organ wait list (for a deceased donor), sparing many from dialysis. In conjunction with an aggressive approach to managing the organ waiting list, kidney swaps have reduced the waiting time for deceased donor organs by an average of four years at NewYork-Presbyterian/Columbia – reducing the number of patient deaths while on the waiting list and significantly improving outcomes after transplantation.

Laparoscopic donor operations: the use of laparoscopy and minimally invasive techniques rather than open surgery facilitates a more comfortable and faster recovery for kidney donors. Many transplant recipients are also able to receive donor kidneys through a three or four inch 'mini-incision.'

Steroid avoidance protocol: In a highly successful protocol in place since 2001, molecular therapies provide highly personalized immunosuppressant therapy that can reduce or eliminate use of steroids after transplantation in more than 90% of patients at NewYork-Presbyterian/Columbia.

Kidney Transplantation Milestones at NewYork-Presbyterian Hospital/Columbia ♦

For more information about kidney transplantation, visit www.columbiasurgery.org Photos from Renal 3000 are available on the Department of Surgery's new blog: http://www.columbiasurgery.net/category/event_highlights/

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difficult open-chest operation followed by two additional procedures. That standard open operation, called the Norwood procedure, carried a 10% or greater risk of death.

Hybrid Stage 1 Procedure for HLHS

Developed in Germany, the hybrid stage 1 procedure for HLHS provides a safer and less invasive alternative to the Norwood procedure. According to Dr. Bacha, “During the hybrid procedure, we do not use the heart-lung machine. The procedure is pared down as much as possible in order to protect the baby at this vulnerable age, enabling the baby to survive and become stronger. When he or she is six months old, an age when a baby is in much better shape to handle major surgery, we correct the remainder of the problem.”

The procedure is hybrid in that it is performed jointly by a pediatric cardiac surgeon and a pediatric cardiologist. In order to stabilize the flow of blood exiting the heart, and wean the baby off prostaglandins (a medication without which HLHS babies cannot survive), the cardiologist places a stent through the main pulmonary artery. The surgeon places bands around the right and left branch pulmonary arteries to prevent overflow of blood into the lungs. The entire procedure is done through an incision in the chest (sternotomy). The mortality rate associated with hybrid treatment of HLHS compares favorably with that of the Norwood procedure.

Although surgical outcomes are comparable between the Norwood and hybrid procedures, the hybrid procedure is safer in that it avoids cardiopulmonary bypass (use of the heart-lung machine to temporarily clear blood from the heart). Cardiopulmonary bypass is associated with increased neurologic risks including attention deficit disorder, stroke, and reduced IQ. Although it is not fully clear whether the underlying heart disease, or the effects of open surgery, is responsible for these problems in some children, “the ability to avoid the heart-lung machine and its associated neurologic effects is an enormous advantage to these children,” says Dr. Bacha.

Hybrid Procedures in Pediatric Cardiac Surgery

When he brought the technique to the U.S. in 2003, Dr. Bacha was one of just two surgeons performing hybrid operations in children in North America. Since then, he has not only established hybrid surgery as an important therapeutic option, but helped to improve and expand applications of hybrid techniques as well.

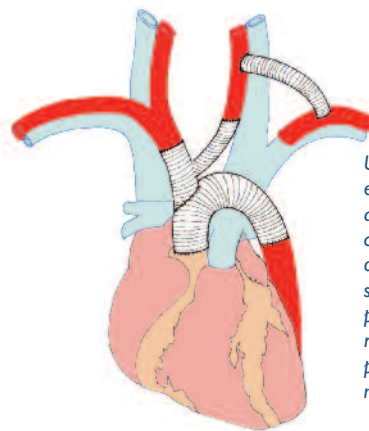
One such application is closing ventricular septal defects, or holes in the heart tissue. According to Dr. Bacha, “Typically, holes in the heart can be closed by suturing a patch on the hole during open heart surgery. But certain holes are difficult to access with open heart surgery, or there may be multiple holes that cannot be closed in one session, so that the child might need multiple open heart surgeries. In cases like these, the hybrid procedure can be very helpful. We are able to go through the chest and deliver a device to close such holes and prevent the need for repeat surgeries. Outcomes are excellent.”

Refining the Use of Pediatric Cardiac Hybrid Procedures at Columbia

Dr. Bacha performs hybrid heart procedures with an interventional cardiologist and in collaboration with the pediatric cardiology team at NewYork-Presbyterian Morgan Stanley Children's Hospital/Columbia (MSCHONY/Columbia). Hybrid techniques are not applied universally, and they are not appropriate for every child. “In the case of HLHS, there are some children who do better with the Norwood procedure than with the hybrid

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catheter in a collapsed state. The stent graft is positioned at the site of the aneurysm and expanded (‘deployed’), replacing and reinforcing



Using a hybrid endovascular approach, surgeons can repair aneurysms of the aortic arch in a single operation, providing a faster recovery and sparing patients a second major surgery.

the diseased aortic wall and ensuring that blood flows properly through the vessel.

The benefits of this new procedure include greatly reduced risk, a shorter hospital stay, and a more rapid recovery. It also spares patients a second major surgery. “Compared to open surgery, the endovascular approach significantly shortens the length of aortic arch surgery and reduces the adverse effects associated with these operations,” says Dr. Stewart. He performs endovascular procedures in a new, state-of-the-art hybrid operating room in NewYork-Presbyterian Hospital/Columbia University Medical Center's new heart hospital, which is attached to the main hospital.

Not all aortic arch aneurysms require surgery. Most patients who are evaluated for aneurysms can safely be monitored on a regular basis instead. According to Dr. Stewart, “Most people can tolerate aneurysms of up to five centimeters without any real increased risk of aortic problems. Beyond that size, however, there is an increased risk of tearing.” More precise determination is based on the ratio of the normal diameter and the size of the abnormal vessel. Patients should be carefully evaluated to determine whether surgery is needed.

Catheter-based aortic procedures are usually performed under local anesthesia by a multidisciplinary team including vascular surgeons, interventional cardiologists, and cardiac surgeons. This approach is especially beneficial to older patients, who might be ineligible for open surgery due to advanced illness ♦

For more information about Pediatric Hybrid Heart Surgery and Hybrid Aortic Arch Surgery, visit www.columbiasurgery.org

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