summer 2007

healthpoints

ALL THE POSSIBILITIES OF MODERN MEDICINE

Columbia University Medical Center
Department of Surgery
NewYork-Presbyterian

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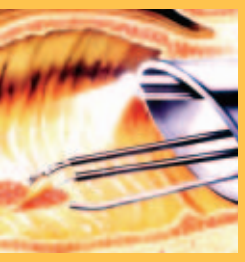

NOTES in the News

In the next step beyond laparoscopic surgery, surgeons and medical endoscopists are now working together to perform surgery without any external incisions or scars.

In a first-of-its-kind operation in the U.S., surgeons and a medical interventional endoscopist at NewYork-Presbyterian Hospital/Columbia University Medical Center have removed a woman's gallbladder with flexible instruments passed through her vagina. This experimental procedure was part of a study being done to determine whether people will have less pain and scarring, and faster recovery, if abdominal surgery is performed through a natural orifice rather than through incisions in the belly.

Natural Orifice Translumenal Endoscopic Surgery, or NOTES, is a new method of performing minimally invasive surgery through the mouth, anus, or vagina. Although a small internal incision must be made in the vaginal wall to access the gallbladder or other internal organ, such incisions should hurt less than traditional abdominal incisions

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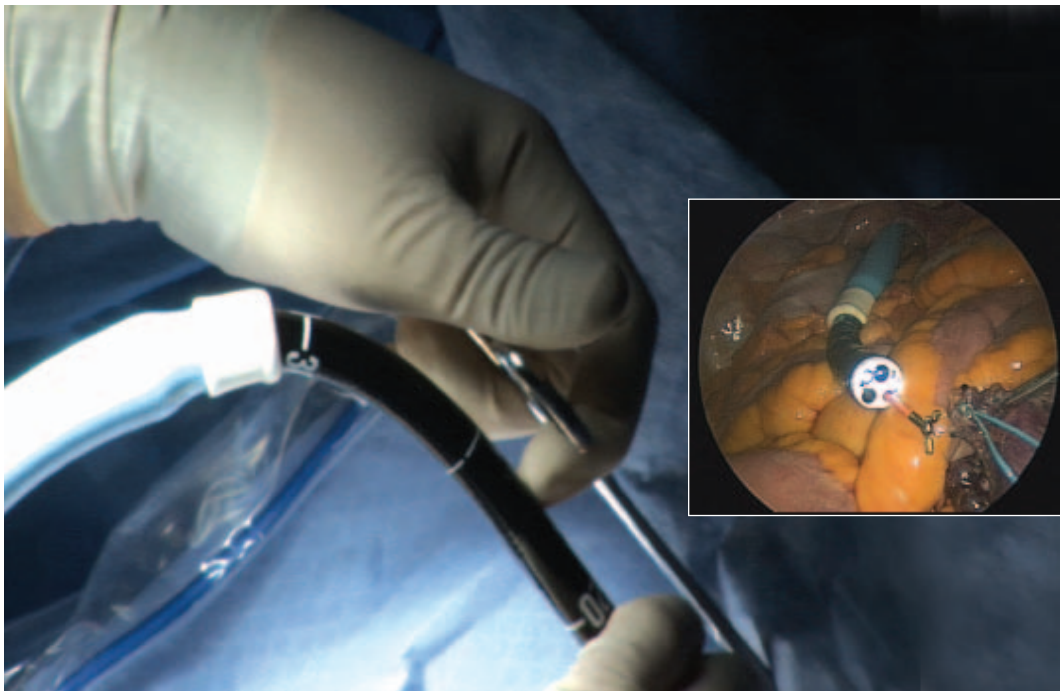


The Columbia team performed the first transvaginal gallbladder removal operation in the U.S. in March 2007. Inset: **A magnified scope provides excellent imaging of the interior anatomy, allowing for precise placement of the tiny instruments.**

From High Mortality to High Survival

Turning the tables on congenital diaphragmatic hernia

Congenital diaphragmatic hernia, or CDH, is one of the most common birth defects, affecting about one in 3000-4000 newborns today. CDH occurs when the diaphragm develops abnormally during gestation, creating a defect, or hole, through which organs such as the intestines migrate into the chest. The result is compression and impairment in the development of the lungs, including pulmonary hypertension, a dangerous condition involving high blood pressure in the lungs. Among babies with CDH, pulmonary hypertension can lead to heart failure and is the most significant cause of illness and death. Fortunately, medicine has made tremendous progress against pulmonary hypertension during the past 25 years.

But as recently as 30 years ago, the prognosis for babies born with CDH offered little hope. So when **Charles J. Stolar, MD,** *Chief, Division of Pediatric Surgery,* brought the innovation known as ECMO to Morgan Stanley Childrens Hospital of NewYork-Presbyterian (formerly Babies Hospital) in 1982, its benefits were quickly noted. ECMO, or extracorporeal membrane oxygenation, served as a biomedical placenta for critically ill infants, providing an artificial heart, lung, gastrointestinal tract, and kidney. "With this safety net, survival rates began to climb," Dr. Stolar recounts. At that time, Morgan Stanley Childrens was the third institution in the world to use ECMO for newborns.

Alix O'Connor, above, underwent surgery to repair her congenital diaphragmatic hernia when she was two days old. According to her father, Brian O'Connor, "Dr. Arkovitz was everything we could have hoped for in a pediatric surgeon – he was informative, friendly, kind, caring, and always gave us as much time as we needed to ask questions. We were grateful to have been at Columbia with truly wonderful surgeons, doctors, and nurses. We genuinely look forward to Alix's check-ups with Dr. Arkovitz (now on an annual basis) to catch up with our friend who continues to take excellent care of our daughter."

Building on the success achieved through the use of ECMO, Dr. Stolar sought additional ways of improving the care of babies with CDH. The late **L. Stanley James, MD,** *Chief of Neonatology,* **John Driscoll, MD,** then *Chairman of Pediatrics,* and **Jen-Tien Wung, MD,** *Director, Neonatal Respiratory Care,* were just beginning to apply new respiratory care principles to patients with CDH. These strategies proved effective at minimizing damage to the vulnerable lungs of premature infants with too much pressure and oxygen toxicity. Having observed the significant benefits of this approach, the team began applying these gentler strategies to the more challenging group of term infants with CDH. Their innovative work further improved outcomes within five years, raising survival rates of children with CDH to 85% at Morgan Stanley Childrens Hospital.

"We took a very difficult problem, put together an outstanding team of physicians, residents, and nurses… and figured out how to solve it," says Dr. Stolar. "A very high death rate turned into a very high survival rate."

Gentle Ventilation for CDH Babies

Because babies with congenital diaphragmatic hernia (CDH) have underdeveloped, or *hypoplastic,* lungs, they often are unable to breathe at birth. Moreover, the lack of adequate blood vessels in hypoplastic lung tissue results in inadequate blood flow, causing high blood pressure in the lungs—a dangerous condition called *pulmonary hypertension*. Because of these critical problems, many newborns with CDH require help breathing from a ventilator.

Ventilators have traditionally been able to sustain about half of babies long enough to undergo and recover from surgery to repair their hernias, and eventually to develop adequate lung tissue and breathe independently. Those administering the ventilation have strived to achieve normal blood levels of oxygen and carbon dioxide by forcing the correct pressure into these tiny babies' lungs. But the application of too much pressure can damage undeveloped lungs, leading to sometimes serious, even fatal, chronic lung disease.

Now, a technique called "kinder and gentler ventilation" has proven superior to the traditional approach. Developed by **Jen-Tien Wung, MD,** *Director, Neonatal Respiratory Care,* gentle ventilation seeks to apply the minimum level of respiratory support needed, rather than to achieve normal blood levels of oxygen. Dr. Wung began using lower ventilation pressures in babies with CDH after he observed that lower pressures significantly improved survival among babies who aspirated meconium.

Today, the survival rate for babies who receive ventilator support at the Morgan Stanley Childrens Hospital Neonatal Intensive Care Unit is almost 90%, compared to the national average of 50-60%.

With this newfound success, a new generation of patients began surviving into childhood and adulthood for the very first time. Although they universally undergo corrective surgery to repair their hernias shortly after birth, such patients often require specialized medical care for unique, sometimes complex conditions associated with their CDH or subsequent treatments.

To meet the special care needs of this population, **Marc S. Arkovitz, MD,** *Assistant Professor of Surgery, Columbia University College of Physicians and Surgeons,* organized a multidisciplinary CDH clinic in 2005. In this unique clinic, specialists including neonatologists, pediatric cardiologists, pulmonologists, geneticists, surgeons, and developmental pediatricians work together to care for each patient. The Columbia clinic now treats more patients with CDH than most other U.S. institutions today.

Among the innovative techniques promoted at the CDH clinic is the use of minimally invasive surgery rather than open surgery to repair babies' hernias. Since 2005, Dr. Arkovitz has been performing diaphragmatic hernia operations through a thoracoscopic approach whenever possible, using small incisions in the chest. "Thoracoscopic surgery is less stressful for the baby than open surgery," says Dr. Arkovitz. About one third of babies may be stable enough to qualify for this method, while others still require an open surgical approach.

Paired with the clinical program is a research program aimed at understanding the causes of CDH. With new, higher resolution genomic technology now available, **Wendy Chung, MD, PhD,** *Director of Clinical Genetics, Columbia University College of Physicians and Surgeons,* is investigating the genetic mutations involved in this condition. Using the highly advanced methods that help predict prognoses in cancer patients, Dr. Chung is working to detect abnormalities in chromosomes, or even parts of chromosomes, that may be responsible for CDH.

"By determining the genetic abnormalities associated with CDH, we hope to be able to give better answers to the questions patients ask, such as which children will have problems in addition to the CDH, and will this ever happen again in our family?" Dr. Chung says. The ability to detect wayward bits of chromosomes is still in the research phase, and may become clinically available in two to three years, according to Dr. Chung. "By developing the data to make this technology useful, the potential is there to use it for prenatal testing as well as after birth."

A key area of the CDH team's focus involves the study of pulmonary hypertension, dangerously elevated blood pressure in the lungs. The severity of this condition is correlated with how well a child fares, according to Dr. Arkovitz. Babies with mild pulmonary hypertension have the best prognosis, while those with severe pulmonary hypertension tend to face the gravest risk for developing heart failure. No one knows why this is, however—whether there is something inherently different about the development of babies with severe pulmonary hypertension, if there is a genetic cause, or if there is something about the lungs being compressed that causes this difference in long-term outcomes.

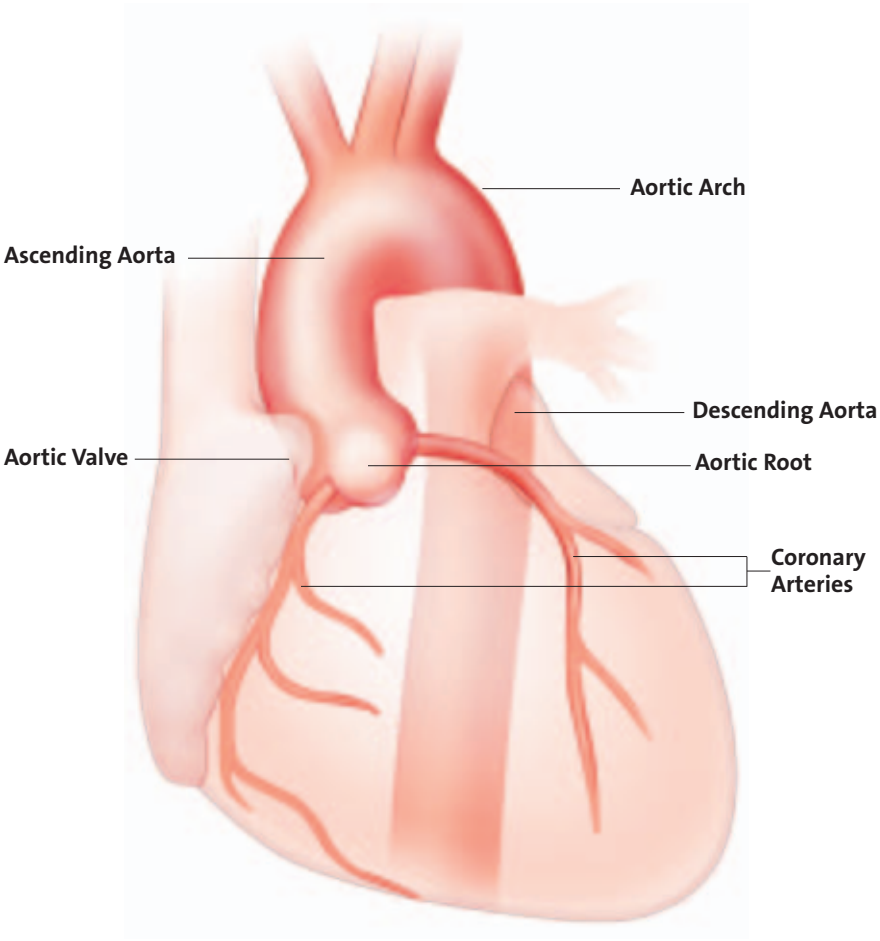
For more information, visit www.columbiasurgery.org, or call 800.227.2762.

Hybrid Heart Surgeries

Aortic aneurysm surgery preserves patients' valves.

Until recently, procedures to repair aneurysms located at the root of the aorta have typically required that surgeons replace both the aortic valve and the diseased section of the blood vessel. Afterwards, patients who received a mechanical aortic valve would have to take coumadin (a blood thinner) for the rest of their lives, and those who received a tissue valve faced the likelihood of repeat surgery to replace the deteriorating valve within the next ten years. But today, surgeons are finding creative ways to preserve and rebuild the patient's own aortic valve instead, avoiding both of these significant disadvantages.

"The traditional operation involves removal of both the valve and the ascending aorta, and replacement with either a mechanical or commercially available tissue valve," says **Allan S. Stewart, MD,** *Director of the Aortic Surgery Program at NewYork-Presbyterian Hospital/Columbia University Medical Center.* "But a significant number of patients have a normal aortic valve – only their surrounding tissue is abnormal. In these cases, we can remove the entire defective aorta, replace it with a Dacron graft, and rebuild the aortic valve."



NANCY HEIM

Specializing in high-risk cases, Dr. Stewart thrives on being creative in the operating room. "It takes longer to do this operation than to replace the valve, and it's somewhat of an art form," he says. "But this procedure (called the 'David procedure' after the Canadian physician who developed it) frees patients from surgery for at least ten years, and it spares them from having to take coumadin." He notes that the David procedure is particularly appropriate for young patients, for patients with Marfan's syndrome and other connective tissue disorders, and patients with aortic insufficiency, especially those with bicuspid aortic valves.

Since its inception in 1996, 93% of patients who underwent the David procedure remain free from symptoms. At NewYork-Presbyterian Hospital/Columbia, results have been "excellent" among the 50-plus cases performed since 2005, with 100% short-term success.

None of Dr. Stewart's patients has suffered a stroke after undergoing the David procedure. "Usually about 5-10% of patients undergoing this surgery have neurologic problems, so this is a significant step forward." Columbia is one of only a few centers in the nation with extensive experience using this technique.

Dr. Stewart has also devised novel strategies to improve the treatment of aneurysms located higher in the aortic arch. In most cases, operations to repair such aneurysms have required that patients have two major open surgeries to accomplish repairs in separate stages. To make treatment less traumatic and less invasive, Dr. Stewart is increasingly

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Pancreas Center

Specialized care for patients with complex pancreatic diseases

Patients visiting NewYork-Presbyterian Hospital/Columbia University Medical Center will frequently see and hear the term "multidisciplinary center." Indeed, Columbia is home to dozens of multidisciplinary centers devoted to the comprehensive care of specific disease areas such as breast cancer, obesity, and heart failure. While the significance of the term may go unrecognized by some, the presence of such centers can be vital, if not lifesaving, for conditions requiring comprehensive care across multiple specialties.

Such is the case with the Pancreas Center. **Directed by John A. Chabot, MD, FACS,** this special team treats patients with pancreatitis, pancreatic and duodenal cancer, as well as precancerous conditions of the pancreas and duodenum. The center's experts include oncologists to diagnose and treat cancers; geneticists to identify members of patients' families who may be at risk; diagnostic and interventional gastroenterologists to help pinpoint problems and provide immediate relief of acute disorders; surgeons to perform diagnostic and therapeutic operations, and nurse practitioners to help coordinate patients' care throughout their treatment at Columbia.

According to **Beth Schrope, MD, PhD,** *Assistant Professor of Surgery,* the close collaboration among members of the Pancreas Center translates into far better care for patients than what could be provided by physicians working in isolation. "We trust each other fully and we confer on a regular basis," she says. "Pancreatic diseases are complex, and the team approach helps ensure the best outcome for every patient."

Patient Julie Houston could not agree more. After experiencing abdominal

NINO ANDONIS

"I was shocked that so many experts cared about my well-being... Had it not been for this team, I would not be here today."

— JULIE HOUSTON

symptoms including acute pancreatitis in December 2005, Julie was treated with a temporary stent to open a blockage in her pancreatic duct. At that time, tests indicated there was no cancer. She firmly believed her symptoms were related to a blood pressure medication and, determined to avoid complex surgery, she insisted on waiting to see if they would subside. The team allowed her five weeks of careful observation. Her stent was removed, but the blockage remained.

"Then Dr. Chabot called and told me that the team felt I needed a Whipple procedure right away to find out what was going on." Surprised by his mention of a 'team,' Julie learned that about a dozen specialists had been conferring regularly about her condition, including Dr. Schrope, **Harold Frucht, MD,** *Director of Gastrointestinal Oncology* and *Associate Professor of Clinical Medicine,* **Stavros Stavropoulos, MD,** *Director of Endoscopic Ultrasound Procedures* and *Assistant Professor of Clinical Medicine,* **Robert Fine, MD,** *Director of the Experimental Therapeutics Program* and *Herbert Irving Associate Professor of Medicine* and **Abby B. Siegel, MD,** *Medical Director of Hepatobiliary Oncology,* and their assistants. All of them agreed on the urgency of surgery to check for the presence of cancer. "I was taken aback when Dr. Chabot told me that Dr. Stavropoulos could not sleep at night because he was concerned about me," Julie recounts. It was then that I realized surgery was inevitable."

Persuaded by the team's collective concern and their suspicion of a tumor, Julie agreed to have the Whipple procedure in April 2006. Fortunately for her, this was early enough for the surgeons to find her cancer before it had the chance to spread to other organs. At just 2.2 cm in size, the tumor had been missed by all the imaging and other diagnostic tests.

Following surgery, Julie completed a course of chemotherapy and continues to be monitored for signs of recurrence. Her prognosis is very good, and today she enjoys an active schedule of swimming, hiking, and travel. "Had it not been for this multidisciplinary team," she states simply, "I would not be here today."

Although the center was established just three years ago, its volume has grown rapidly, and it is now recognized as a Pancreas Center of Excellence.

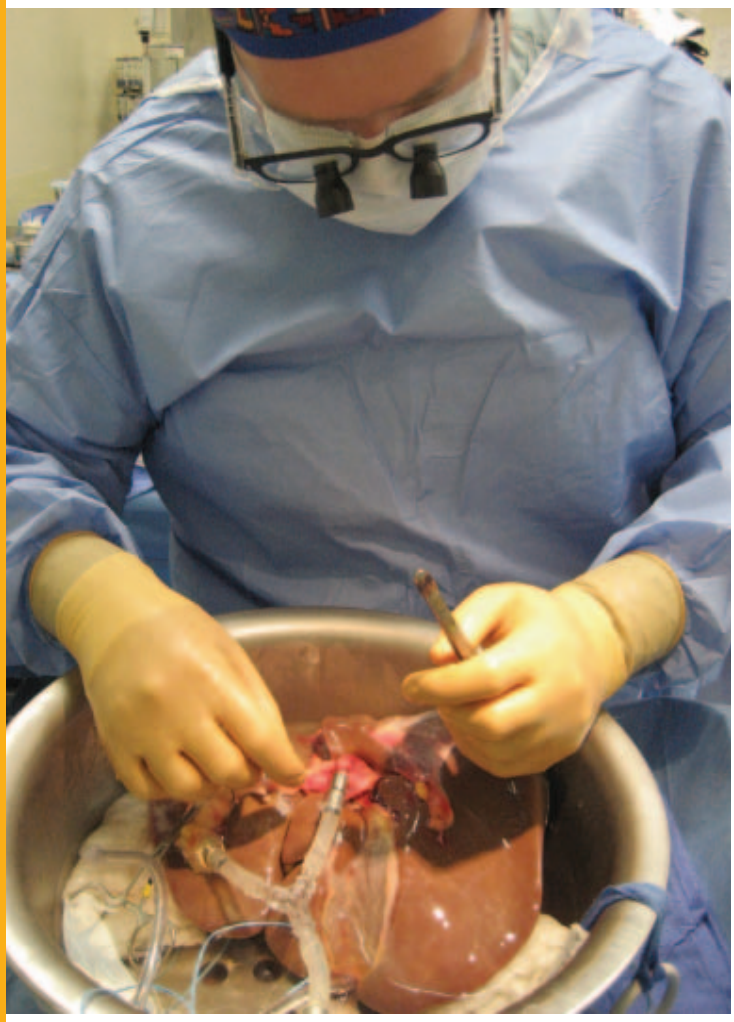
To learn more about the Pancreas Center, please visit www.pancreasmd.org or call 800.227.2762.

Liver transplantation

Better preservation of donor organs may enable more transplants

As advanced as the field of organ transplantation has become, several important challenges remain. Of these, the availability of donor organs stands paramount. Among those with end stage liver disease, over 17,000 patients wait for a donated liver every year in the U.S., but fewer than 6000 receive one, and about 1800 people die while on the waiting list.

As a result, researchers are avidly working to find ways to safely use as many potential donor organs as possible, including organs that once may have been considered "imperfect." According to **James V. Guarrera, MD,** *Assistant Professor of Surgery, Division of Abdominal Organ Transplantation,* many new techniques are being investigated to broaden the range of organs considered acceptable for transplantation. Some of these methods increase the time that organs may be preserved and prevent organ injury associated with being outside the body. These are important advances, according to Dr. Guarrera, because problems with the donor organ may lead to poor function or failure of the transplant.



Dr. Guarrera examines a donated liver that has been stored with machine preservation.

Until recently, however, these approaches have not been applied to donor livers. In the only U.S. study of its kind to date, Dr. Guarrera is researching the use of machine preservation to more effectively store livers before transplantation. He explains that in machine preservation, cold preservation solution is continuously circulated through a donated organ. This maintains the metabolic processes of the organ, which keeps it healthy prior to transplantation and prevents injury that might cause problems later.

"In kidney transplantation, the use of machine preservation has become standard practice in many parts of the country," Dr. Guarrera says, "because transplanted organs are more successful after this method compared to the older method of preserving organs." In the traditional method of cold storage, donor organs are simply submerged in cold preservation solution. The lack of active circulation through the organ causes some damage, and it limits the time that such organs may be stored. Because machine preservation actively circulates metabolic substrates, the organ stays healthier longer and does not undergo the same kind of damage.

In light of organ preservation successes with kidney transplantation, Dr. Guarrera hypothesized that machine preservation might similarly enhance outcomes in liver transplantation and allow the safe use of more organs. This preliminary study is the first to test the safety of machine preservation in human liver transplants. As Principal Investigator of the trial, Dr. Guarrera has tremendous support from his colleagues on the surgical team led by **Jean Emond, MD,** and **John Renz, MD,** and from perfusionist **Ben Arrington.** In addition, Dr Guarrera is collaborating with **H.T. Lee, MD, PhD,** a research clinician in the Department of Anesthesiology, to study the basic science underlying the method of machine preservation.

"Our hope is that this work may pave the way for safer transplantation of more patients in the future," says Dr. Guarrera.

For more information, please call 800.227.2762.

TEMS for Rectal Tumors

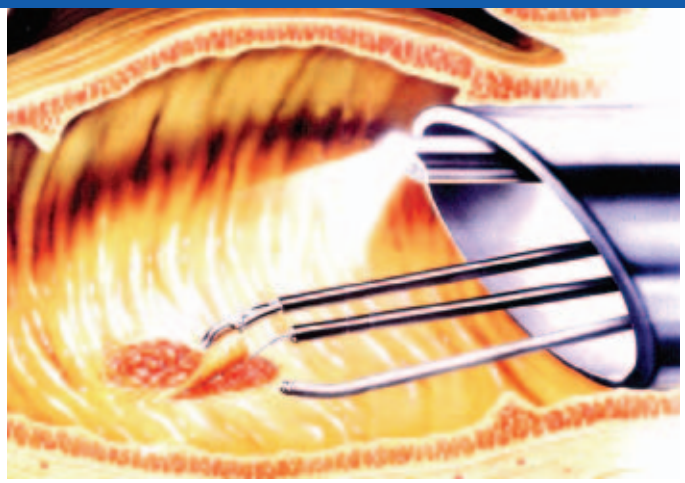
An alternative to major abdominal surgery

Until recently, many patients with precancerous growths or early cancers of the rectum had to undergo open surgery with a long recovery period and risks of complications. Now, a new addition to the surgeon's toolkit, transanal endoscopic microsurgery (TEMS), can eliminate the need for major surgery for many of these patients.

Patients with precancerous growths or early cancers of the rectum traditionally have had two options for removal, one entailing a major abdominal operation to remove the diseased part of the rectum, and the other, surgery to remove the lesion through the anus. For small growths near the anal opening, the second, less invasive method may suffice, but it does not work for lesions that are larger or not conveniently located, according to **Daniel Feingold, MD,** *Section Director of Clinical Trials, Colon and Rectal Surgery.* "Many patients, even those with benign lesions, have had to undergo high-risk, open abdominal operations."

Now, recent publications have documented the feasibility and safety of removing benign and early cancerous growths through the anus using transanal endoscopic microsurgery, or TEMS. This minimally invasive method uses specially designed instruments to remove small and large lesions through the anal opening. Dr. Feingold is very pleased to have this surgical option available to patients, because it allows his team to remove lesions that are large or that are located far from the anal opening.

New to Columbia in 2007, TEMS is not yet widely available in the U.S., despite its clear benefits of less trauma and faster recovery. In contrast with the open abdominal operation that requires a week to ten days in the hospital and a six-week recovery period, TEMS leaves patients with no skin incision and very little pain after surgery. Most leave the hospital 24-48 hours after surgery and experience very short recovery periods.



RICHARD WOLF MEDICAL INSTRUMENTS CORPORATION

Fine instrumentation is used to remove tumors during transanal endoscopic microsurgery, sparing patients from major abdominal surgery.

In addition to allowing the surgeon to access tumors high up in the rectum that would otherwise not be accessible to transanal methods, TEMS affords significantly improved visualization, according to Dr. Feingold. "It is often difficult to obtain an adequate view of the tumor using conventional transanal surgery, but the magnified video image in TEMS provides an excellent view of the lesion and permits minimally invasive excision."

TEMS is not appropriate for patients with advanced rectal cancers unless they are ineligible for abdominal surgery, but for patients with benign or precancerous lesions, TEMS can eliminate the need for major surgery.

For more information, please call 800.227.2762.

Reclaiming Healthy Intimacy, Passion and Pleasure

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Hybrid Heart Surgeries continued from page 4

employing an alternative that limits treatment to one procedure rather than the two operations that are standard elsewhere. To do this, he replaces the aortic arch during an open procedure, then completes the repair with a stent graft, placed under direct vision. This hybrid operation allows for a complete repair in one sitting so that patients do not have to undergo a second major open-chest procedure later.

In some cases, he and collaborating physician **William A. Gray, MD,** *Director of Endovascular Services, Center for Interventional Vascular Therapy,* can even access aortic dissections through catheters placed in small incisions in the groin instead of having to perform open-chest surgery. "More and more, we are able to repair aneurysms with stents that are inserted through catheters instead of through surgical incisions. More options are available with physicians working together," Dr. Stewart explains.

For more information, please call 800.227.2762.

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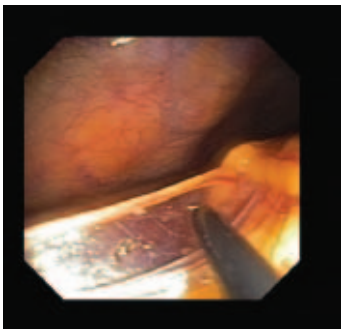
because those tissues are less sensitive to pain than abdominal muscles.

Although laparoscopic surgery has afforded patients tremendous benefits in reducing trauma and shortening recovery, there is still significant room for improvement, says **Marc Bessler, MD,** *Director of Laparoscopic Surgery.* Dr. Bessler performed this surgery with colleagues **Peter Stevens, MD,** *Director of Endoscopy* at NewYork-Presbyterian Hospital/Columbia University Medical Center, and **Dennis Fowler, MD,** *Director of the Minimal Access Surgery Center,* who have been at the forefront of research to make surgery even less invasive. In this procedure, the team made just three tiny laparoscopic incisions in the patient's abdominal wall, in contrast to the four substantially larger incisions usually required during a traditional laparoscopic cholecystectomy. "The patient felt almost no pain upon recovery, other than some minor discomfort at one laparoscopic site. We believe this approach will provide patients the benefit of reduced pain, faster recovery time and fewer scars than the traditional laparoscopic alternative," said Dr. Stevens. "As we enroll additional patients and gain experience with this technique, we expect to reduce the number of laparoscopic ports—with the goal of a true incisionless procedure," said Dr. Bessler.



In addition to transvaginal removal of the gallbladder, the Columbia team is investigating minimally invasive procedures for appendectomy, gastroesophageal reflux, and weight loss surgery. According to Dr. Fowler, "Incisions in the vagina have been used for a variety of procedures for decades, and proved safe with no long-term consequences." Based on the team's success in animal studies, they expect that physicians will access internal organs not only through the vagina, but with instruments passed through the mouth or rectum.

Read the latest about NOTES at www.columbiasurgery.org/news or to learn more, call 800.227.2762.

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