system, as well as the doors it opens for new procedures.

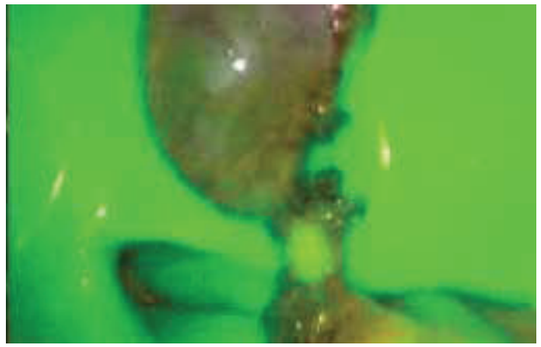
"With the Xi system, the robotic arms have farther reach and improved range of motion. It's perfectly suited for general surgery where you operate in multiple quadrants of the abdomen, often during the same case, whether it be for a colon resection or gastric bypass. The Xi arms are thinner and lower profile, and you can move around the abdomen without having to undock and redock the robot."

Dr. Kwan performs gallbladder removals, done through the umbilicus with one incision, leaving no scar. "We have also begun to use the robot more broadly, i.e., for paraesophageal hernias, colectomy, inguinal and ventral hernias, and bariatric surgeries." She is eager to use the new robot in Walnut Creek, which has brought needed capacity.

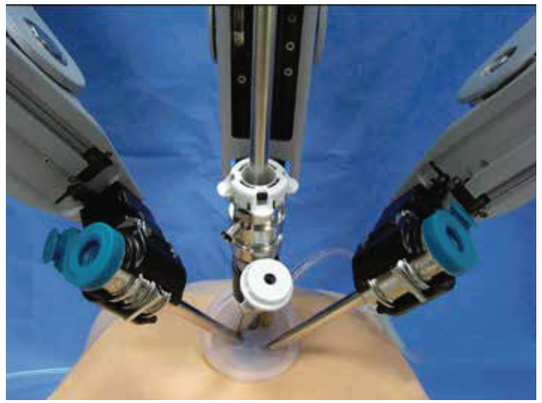
Another exciting feature, according to Dr. Kwan, is the Firefly technology -- integrated fluorescence imaging that provides image-guided identification of anatomical landmarks. "You can inject ICG (indocyanine green) to illuminate the blood vessels and circulation, for instance, during a colectomy, where you want to confirm that the colon has adequate perfusion prior to anastomosis. With a flip of the camera view, everything perfused turns green. You can see in real time that you have adequate blood flow. It is also useful in gallbladder surgery – you can see the biliary anatomy as the ICG lights up the bile ducts."

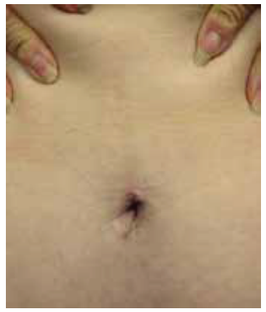
In terms of the big picture for robotic surgery, she says, "The sky is the limit. We have come a long way, with expansion into multiple specialties. Even thoracic and endocrine surgeries are being performed. Once surgeons pass the learning curve, all these advances in technology can help us perform surgery better."

Dr. Kwan has noticed a trend in patient demand. "Some patients now ask for robotic surgery. A few are afraid of it. But the more they know, the more they like it. I explain why I use it, and why I think it will give them excellent surgical outcomes. One short video is enough -- then they understand the advantages the robot can offer," she adds.



Firefly Imaging
This feature allows use of a fluorescent dye that binds to plasma proteins in the blood and becomes confined to the vascular system. According to Dr. Kwan, "We can inject it and immediately check the perfusion to the ends of the colon prior to anastomosis, or at the beginning of cholecystectomies and see it highlight the biliary tree so we can easily identify the hepatic and biliary anatomy. It has become very useful to me, especially during more difficult urgent cases with acute cholecystitis."





Robotic Single Site Cholecystectomy
"The robotic ports make it easy to achieve the triangulation necessary. We make a 2.5 cm incision at the umbilicus and insert the single site port. All four working instruments go through the port," says Dr. Kwan. She says the process allows virtually scarless gallbladder surgery.

ARTICLE REPRINT

Clinical Update
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Physician News

SERVICE LINE SPOTLIGHT:

2016 Update: Robotic Surgery Evolves at John Muir Health

When the robotic surgery program was launched at John Muir Health 14 years ago, we were first in the East Bay to offer minimally-invasive robotic surgery options to patients. Since then, the benefits of this surgery, including less tissue interruption, less scarring, faster healing and organ sparing, continue to revolutionize care. From 2002 through 2007, primary users of the technology at John Muir Health were surgeons in urology. Over the past several years, however, there has been steady evolution in the way the systems are used for different purposes.

In 2015-16, we added the latest surgical robot on the market at each medical center, to help meet the needs of the growing number of patients we treat robotically.

"We have been able to use robotically-assisted surgery in exciting new arenas, offering the benefits of this minimally-invasive approach to a wider range of patients," says Brenda Carlson, executive director, Oncology. "Our vision has been to develop a comprehensive clinical program involving multiple specialties."

Currently, specialists using the technique include OB/Gyn surgeons, urologic surgeons, and colorectal, Gyn-Onc, and thoracic surgeons, as well as general surgeons. Below, some of those who use the robotic approach frequently provide updates.

Early Adoption

The first advance was Laparoscopic Surgery, developed primarily to remove the Gall Bladder. Urologists adapted Laparoscopy to remove the Kidney in patients with Kidney Cancer or severe infections. Laparoscopy worked in 2 dimensions, lacked depth perception, and the instruments were like "chop Sticks": they had no wrist. This precluded doing more complex reconstructive procedures. The Da Vinci Robot was the next great leap in technology. It employed a 3-D camera which gives High Definition depth perception, and employed instruments with wrists. Now we were able to do more than just take out organs. We can now do the most complex reconstructive procedures, all at 10 power magnification, with dexterity better than the human hand.

Early adopter Stephen Taylor, MD, urologist at John Muir Health, has been involved with robotic surgery since its inception. "I don't think anybody could have predicted what the robot could do when it first came out. It didn't exist when I did my training. When it did arrive, it was very simple, with straight instruments like chopsticks. I was the first surgeon in Concord to use it, and our hospital was one of the first six in the nation to have one. We started out doing robotic prostatectomies."

"It's like the robot was designed for work in the pelvis. Now about 80 percent of prostatectomies are done this way. As we've gotten better at using it, the robotic approach is being used for applications by almost every surgical specialty."

JOHN MUIR HEALTH

He adds, "Our results are as good as anywhere in the country – probably better. Many of our patients are completely recuperated within a week or two, and can resume normal activities. They have a shorter stay, transfusions are a thing of the past, and the cosmetics are good. It feels like a night and day difference in terms of what we can offer patients now – surgery is so much easier for them."

Towards the future, Dr. Taylor says, "they're expanding the instrumentation of the robot. Everything is being miniaturized. For ENTs, there will be a tiny little camera, and instruments that convert to their specialty. It's the same for orthopedic or spine surgery. It's fantastic. We've progressed such a great deal. Now, the robot even talks to you."

Urological Robotic Surgery

Brian Hopkins, MD, urologist, is very pleased that John Muir Health has added the newest version of the da Vinci® Robot to each medical center.

"This new platform expands our capabilities and provides greater versatility," he says. We are doing robotic-assisted laparoscopic partial nephrectomies for individuals with many renal tumors. Because of our extensive experience we are confident in extending this approach even to very complex cases and to tumors previously thought to be either too large or too complex for it. Robotic-assisted partial nephrectomies yield cancer cure rates equivalent to total removal of the kidney, but have the advantage of preserving kidney function, minimal blood loss, and allowing 90 percent of these patients to go home the next day. This is compared to having a hospital stay of 4-5 days with open procedures. Very few centers, especially community hospitals, are able to offer robotic-assisted partial nephrectomies."

"Another application of robotic-assisted laparoscopic surgery is in the realm of female pelvic prolapse, with robotic-assisted sacrocolpopexy. This is a definitive procedure with extremely high success rates, outstanding outcomes with high patient satisfaction, and very low complication rates. This is true even in the most complex of cases and particularly when prior attempts at correction have failed. Again, because of its minimally invasive nature, there is minimal blood loss, a shortened hospital stay which is typically overnight, and expedited recovery with a rapid return to normal activities."

He adds, "Our experience is significant in each of these procedures, allowing us to offer the robotic approach to patients with more complex presentations. No procedure is without risk of complications, but the complication rate after these minimally invasive procedures is very low. Across the board, we tend to see minimal blood loss, less pain and faster recovery with better cosmesis or minimal scarring than with more open procedures."

Colorectal Robotic Surgery

According to colorectal surgeon and director of the colorectal program, Samuel Oommen, MD, "The main application for robotics in colorectal surgery is in the performance of Total Mesorectal Excision (TME) in the management of rectal cancer. The three-dimensional magnified view with EndoWrist motion aided by a stable camera platform allows precise identification of the autonomic nerves and other vital structures in the narrow confines of the pelvis."

Very importantly, he says, "TME for rectal cancer is the key in reducing local recurrence. This procedure can be technically challenging particularly in obesity and in a narrow male pelvis. The robotic technique allows removal of the operative specimen with an intact mesorectal envelope which leads to reduced recurrence and improved survival rates. The sexual and urinary dysfunction can be avoided by the preservation of pelvic autonomic nerve plexus."

"Having a robotic surgical option along with our considerable experience in laparoscopic and Transanal Endoscopic Microsurgery (TEM) allows us to offer these minimally-invasive surgical techniques to our patients with both benign and malignant colorectal diseases to provide superior quality of life and oncological outcomes," says Dr. Oommen.

"Since 2007, when robotically-assisted colorectal surgery was first offered at John Muir Health, we have the experience of more than 400 procedures. With a team of operating room staff dedicated to these procedures, John Muir Health is a national leader in robotic colorectal surgery," he adds.

John Muir Health, along with four other U.S. institutions, participated in an international prospective trial (ROLARR) randomizing patients to laparoscopic and robotic arms. The results presented at the American College of Surgeons meeting in October 2015 showed that the robotic approach has oncological and quality of life benefits in obese patients with a narrow pelvis. "The new daVinci Xi robot offers multi quadrant access in the abdomen. This feature allows removal of tumors located in any part of the large intestine with minimal or no movement of the robotic cart. We are excited to have this ability of wide range of motion of the robotic arms which ultimately will benefit more patients with complex disease process," says Dr. Oommen.

Gynecologic Oncology Robotic Surgery

Dan Paik, MD, gynecological oncologist, says that "Robotic surgery continues to provide outstanding clinical outcomes for our patients with cancer and those with benign, complex gynecologic conditions. "One example of how robotic surgery has changed our practice is the removal of large pelvic masses suspicious for cancer. Excision of these pelvic masses can now be removed intact through a minimally invasive robotic approach which ultimately leads to a faster recovery and less postoperative pain. As a result, our patients are amazed by how well they feel after surgery."

"Robotic surgery continues to be the best surgical approach for most of our endometrial and cervical cancer patients," he says. "The magnified panoramic view provides the utmost visual detail, which allows for precise surgical dissection. Ultimately, this leads to the best outcomes for patients."

Dr. Paik adds that the new da Vinci Xi system will allow for even greater surgical maneuverability in the entire abdomen. "I am thrilled that we are able to provide these surgical advancements for our patients," he says.

OB/Gyn Robotic Surgery

Stephen Wells, MD, OB/Gyn, relates that robotic surgery for hysterectomy procedures has allowed patients to recover more quickly and with less pain. In fact, he says, "This procedure allows patients to go home on the same or the next day – virtually making it an outpatient procedure – very different from the usual three-day hospital stay."

"Abdominal hysterectomies should be done only in select situations such as cancer, or uterine fibroids of such great size that they cannot be done in a more minimally invasive procedure, such as robotic assisted hysterectomy. There is much less bleeding associated with these procedures, and less potential for complications or prolonged postoperative recovery compared with the abdominal route."

He adds, "While in years past I was able to do laparoscopic hysterectomies of varying uterine sizes, robotics has opened up a whole new world, enabling me to remove uteri up to the level of the umbilicus with relative ease. Sometimes uterine fibroids come in unusual shapes, and the robot allows me to 'get around corners' very effectively, enabling dissection and removal with great ease. Also, myomectomy procedures can be done with great ease compared to straight laparoscopic techniques. All of these techniques are beneficial to the patient -- providing a safe surgical alternative to more invasive surgical techniques."

As one of the surgeons who initially encouraged adoption of robotics at John Muir Health, Dr. Wells always looks forward. "It would be great to add more training, and get more physicians on the robot," he says.

Thoracic Robotic Surgery

Wilson Tsai, MD, co-director of the thoracic surgical program, is enthusiastic about the expanding role of robotic surgery across specialties. "The more you learn about this technology, the more it pushes your exposure to what we are able to do with it. I truly think that because of the expertise of other specialists here, I was able to gain the confidence and support to pursue this approach. It's great that we have so many amazing surgeons in our community who have really expanded its applications."

John Muir Medical Center, Concord was one of the first hospitals in the Bay Area to perform Robot Assisted Lobectomy for lung cancer treatment, and the thoracic surgery team in Concord performed a robotic video assisted thoracic surgery (VATS) lobectomy to remove a tumor from the lung of a local patient.

The robotic lobectomy is a newer alternative to traditional open thoracotomy or thoracoscopic lobectomy. A VATS approach is minimally invasive, with incisions that are 0.5 to 1 centimeter. A camera (which also gives a wider field of vision) and low profile, thin tools are used for precision and navigation of angles in and around the chest cavity. This higher level of accuracy results in decreased pain levels and recovery time for patients.

"Robotic technology for medical treatment applications will continue to evolve, becoming even more accurate and efficient," says Dr. Tsai. "So our teams' skills and knowledge in effectively using them will always evolve in parallel, as John Muir Health is committed to using cutting-edge technologies that are shown to deliver the best outcomes for patients."

Dr. Tsai notes that the older Si model of the da Vinci robot is still a great system. "The Xi improves camera optics, with better definition, and better light, and it has a smaller, sleeker design," he observes. "The Xi is less bulky, importantly, because the way it positions the robot over the patient -- the 'octopus' design of the Xi helps with difficult angulation." He also appreciates the much better camera, when jumping between fields.

"The new robot is more specifically designed for more complex cases such as thoracic surgery. It has opened doors for a number of different surgeries."

General Surgery

General surgeon Diane Kwan, MD, who also specializes in bariatric surgery, is likewise impressed by the new