Today, surgeons from Children’s Hospital Boston will demonstrate, live, a pediatric robotic-assisted laparoscopic pyeloplasty. Using minimally invasive robotic methods, surgeons are able to perform the complete reconstructive surgery laparoscopically with higher precision than with traditional methods. Dr. Craig A. Peters, a urologic surgeon at Children’s Hospital Boston and associate professor of surgery at Harvard Medical School, will perform the surgery, which will remove an obstruction from the patient’s kidney and reconnect the kidney’s drainage system. During the program, you may send your questions to the webcast moderator, Dr. Alan B. Redek, Surgeon in Chief and Urologist in Chief at Children’s. Just click the MDirectAccess button on the screen.

Welcome from Children’s Hospital Boston. Good afternoon. I’m Alan Redek and I will be the moderator of this webcast. During the past several years, we have become increasingly interested in the use of minimally invasive surgery in children. During the past 3 years, we have used robotic-assisted laparoscopy to perform more than 120 urological operations in children. Today, we will demonstrate a robotically-assisted laparoscopic procedure to correct a ureteropelvic junction obstruction in a child. The case that will be presented is of a 10-year-old boy with a 2-3 year history of severe episodic abdominal pain with nausea and vomiting, usually occurring in the evening. An ultrasound was done, which showed severe left-sided hydronephrosis. A Mac3 renal scan showed relatively good uptake in the kidney, but delayed drainage, indicating obstruction. It was felt that this patient was a surgical candidate. The operation will be done by Dr. Craig Peters, one of four surgeons in our department who does this surgery. Dr. Peters is the director of our minimally invasive surgical unit. Dr. Peters started this case a little while ago and, at the very beginning of the case, created 3 ports for access for the procedure, 2 working ports, as diagrammed here, and a camera port. I will transfer now to Dr. Peters in the operating room and he will take over and I will show as he is talking the daVinci surgical robot with the various parts of the robot and the carts. Craig.

Thank you. What we’ll do before we continue with the operation is just orient you to the room. What you can see here to my left is the daVinci robot and the
surgical cart that contains the instrumentation that we will be doing the operation with, as well as the camera. We have then a vision cart that has all of the controls for illumination and insufflation, and then the surgeon’s console, where I’ll be sitting, that both has the visual monitor to allow me to have 3-dimensional imaging of the interior of the patient and the surgery, as well as the mechanical controls that are translated through a computer system to allow me to delicately move the instruments inside the patient.

Our team consists of our scrub nurse, Kelly, and Dr. Estrada, our patient-side surgeon, as well as our anesthesia team and our circulating team, Carol and Lenny. What we’ll now do is go ahead and show you the inside of the patient and what the surgical field will be and move from there.

The instruments that we’re using are 2 articulated devices that can move in multiple dimensions with complete control, being manipulated by myself here in the console. Although we call this a robot, it really is a master/slave control system and it does not function at all autonomously. The computer system does allow me to translate these movements very naturally so that really what I want to do is a very smooth action guided by a very high fidelity 3-dimensional image that I can see. Unfortunately, I can’t transmit that to you.

What we’re looking at is the patient’s left kidney here. We’re looking through the mesentery. The transverse colon is here to our left. The descending colon is up here in the top of the field. We can see the bulging renal pelvis here. We can see the stent that we’ve pre-placed just to the level of the ureteropelvic junction obstruction. It can be seen through the mesentery and then right here is the vessel that is in all likelihood creating the obstruction by creating a kink in the ureter. What we’re going to be doing is transecting the ureter and then moving it anterior to the vessel and reattaching it to alleviate the obstruction.

What we’ll first do is start by immobilizing the renal pelvis. We expose it by simply making a small window in the mesentery, obviously avoiding the larger mesenteric vessels which supply the bowel, but this is a very simple way of accessing the renal pelvis that we really only can do laparoscopically. There is an alternative where you can mobilize the colon and we’ll do that in older patients with a lot of mesenteric fat, but in kids such as this, we can gain a very nice access through this method. The cautery is the device that we use for most of our mobilization. It’s a hook cautery system that gives us specific electrical current where we need it and allows us to also do the dissection. You can see, as we move along, that it’s fairly easy to pick up the tissue, move it, and do the necessary manipulations under really excellent visual control.

Now, this operation has been done for many years. You can do it open. That requires either a flank incision or a dorsal incision in the patient’s back and that is a well established procedure with a very high success rate, but it is a somewhat uncomfortable incision, particularly in older children, and it creates a fairly significant scar. What laparoscopy offers is reducing the degree of discomfort postoperatively and obviously reducing any cosmetic impact of the scar. We started doing laparoscopic
pyeloplasties 12-13 years ago in children. It had been established in adults as well that we had worked with, but we found that because it requires so much delicate suturing that with conventional laparoscopy it was quite difficult to do it efficiently and we were concerned that we maybe weren’t doing as good as job as we could. When the robotic systems emerged, it was clear that this offered us an opportunity to apply the benefits of laparoscopy to children without compromising the procedure because of the difficulty in delicate manipulation.

ALAN REDEK, M.D.

00:08:33.000 Craig, how many of these have you done?

CRAIG PETERS, M.D.

00:08:35.000 With the robot, we’ve done 30-40. We’ve done previously laparoscopically probably a dozen, all of which did fine but take longer and are much more difficult, whereas with the robot we’ve been able to really have more people do this. I’ve been doing laparoscopic pyeloplasties for a while, but nobody seemed to have the time to learn it and very few people ever really took it up, so as a result, it really never took off in pediatrics except for a few people in a few places around the world.

ALAN REDEK, M.D.

00:09:23.000 Craig, as you’re operating, I’m just going to show some background slides of, in general, something about robotically-assisted laparoscopic pyeloplasty so the audience can at least look at those and watch you operate at the same time.

CRAIG PETERS, M.D.

00:09:43.000 What we’re seeing here is now the stent in the ureter that we pre-placed just prior to putting the laparoscopic ports in. This stent will be used postoperatively and it’s attached to a small string that comes out the patient’s urethra. In about 2 weeks, they’ll just be able to pull that out in the office, after healing is completed. I don’t put the stent all the way into the renal pelvis because I like it to be distended to facilitate dissection, as we’ve been doing here.

ALAN REDEK, M.D.

00:10:24.000 How long will this patient be in the hospital?

CRAIG PETERS, M.D.

00:10:26.000 Most of the patients go home the next day. Probably 1 out of 5 will stay 2 days. The really young patients can go home the same day, but this patient’s from upstate Maine, so they’ll certainly stay at least a day and we may even keep them an extra day because of the distance, to make sure there are no problems.
ALAN REDEK, M.D.

00:10:52.000  So this really is a significantly shorter stay than with any type of open procedure.

CRAIG PETERS, M.D.

00:10:58.000  Yes, it is. Certainly in this age group, in a 10-year-old boy, he would be staying a minimum of 3 days with an open procedure and probably 4. Teenagers are 4-5 days, in our experience, but we can usually get them home in a day and certainly the families are happy with that.

ALAN REDEK, M.D.

00:11:19.000  Do you want to comment on the pain requirements for these patients, as opposed to patients with an open operation?

CRAIG PETERS, M.D.

00:11:27.000  Well, we’ve recently looked at that in a study and found that the postoperative pain medications needed were significantly less. Certainly when you take care of these patients, they seem more comfortable, more quickly. I think also what’s harder to measure is their return to activity at home. Most parents tell me that they’re back running around, doing their thing, quicker than what I certainly heard when we did open pyeloplasties routinely.

ALAN REDEK, M.D.

00:12:00.000  I’ve got a diagram up of a conventional pyeloplasty, Craig, and I think that the audience can see the pathology, although in this case it may be a double pathology. It may be a vessel crossing the ureteropelvic junction and sometimes an intrinsic obstruction. They see the classic intrinsic obstruction and have an idea of what has to be done surgically.

CRAIG PETERS, M.D.

00:12:35.000  We’re now showing that dilated pelvis that you can see in the diagram. You can see the vessels. Here’s an artery and then there’s a vein here, going to the lower portion of the kidney, that may be contributing to the obstruction. It’s a little hard to always know. As a result, we always transpose the ureter onto the opposite side and also will resect or remove a portion of the pelvis to make sure there’s no disease remnant that might create a persistent obstruction.

ALAN REDEK, M.D.
Craig, I’ve got a slide up now on the procedural steps for a robotically-assisted laparoscopic pyeloplasty. So you’ve placed your ports. You’ve exposed the ureteropelvic junction through the mesentery and the following steps are incising the renal pelvis, spatulating the ureter, and doing the anastomosis. So the audience knows what you’re doing.

CRAIG PETERS, M.D.

So right now we’re just working around these vessels and it’s a little bit friable, probably due to the fact that this child has had so many episodes of obstruction and pain. He just one 2 nights ago and you tend to see a little more reaction in the tissues there, so you want to go a little bit more carefully, but what I’m going to do is very soon put in the hitch stitch to pull up the renal pelvis and that’ll stabilize it and allow us to work with it a little more easily.

Okay, let’s go ahead and do the hitch stitch. This is a Prolene stitch that’s passed through the anterior abdominal wall and we use it to grab the renal pelvis, shown here, and lift it up and stabilize it, so my patient-side surgeon, Dr. Estrada, will be passing that needle in right there and if I could have the needle driver on the right hand.

To change instruments, they simply disengage it from the robot, slide it out, and then put in the next one. These are attached with a special interface that allows all the movement of the instrument that you’re seeing and then it’s just slid right back in.

ALAN REDEK, M.D.

So the idea of this hitch stitch is to make it easier to sew and to stabilize the field.

CRAIG PETERS, M.D.

Exactly. The other advantage is you’re always going to have a little bit of bleeding from the renal pelvis after you transect it, as well as leaked urine, and this will lift the area of the surgery away from that so that we’re not losing visualization as we go. So I’m going to drive the needle right back out, where it can be grabbed and then we can adjust the tension on this to allow us to expose the renal pelvis. Now I’ll take the hook cautery back on the right. So we can go ahead and lift up on that a little bit more.

ALAN REDEK, M.D.

I think the audience can really see what this does. It really pulls the renal pelvis right out in the field so you can visualize it a lot easier.

CRAIG PETERS, M.D.
00:16:37.000  This is a very important thing in doing laparoscopic pyeloplasty of any sort and I think it’s made it a lot easier. This was taught to me by Hok Tan in Australia, a pediatric surgeon I’ve worked with a fair amount. Now we’ll just continue mobilizing the renal pelvis.

ALAN REDEK, M.D.

00:17:27.000  Craig, as you’re dissecting, we have an email question. How long did it take for you to become comfortable using the robot and smaller trochars, instruments, and cameras used in pediatric patients?

CRAIG PETERS, M.D.

00:17:42.000  In terms of becoming comfortable with this operation, which of course I’ve been doing laparoscopically for a while, really the robot, if you have experience in laparoscopy, I think 5-10 cases and you’re comfortable with the manipulation and the mechanics of the robot. Each operation is a little bit different in terms of its requirements and how to move it along efficiently. I think when we’ve looked at operative times, we’re kind of leveling out after probably 20 cases of a particular operation. What’s interesting, though, is that we looked at the so-called learning curve in terms of operating time between 2 of us who have done the most of these. My partner, Joe Borer, had not previously done any laparoscopic pyeloplasties, whereas I’ve done them for a number of years, and both of us had exactly the same learning curve, so there’s no major advantage to doing that specific operation that we could see.

00:18:54.000  I think one of the real keys to the robot is it facilitates the person who doesn’t have the time or nature of practice to do one single operation over and over again, to become a proficient laparoscopist and offer the advantage of this to patients, which may otherwise not occur with conventional laparoscopy.

ALAN REDEK, M.D.

00:19:16.000  Craig, I have another question. What other types of procedures are you doing?

CRAIG PETERS, M.D.

00:19:24.000  We’ve done a variety of things. We’ve done a variety of kidney operations. We’ve done partial nephrectomies and nephrectomies. We’ve done reconstructions of the kidney, where there are other types of obstruction than what we’re seeing here. We’ve done bladder surgery for reflux and some incontinence. We’ve done continent diversions. We’ve done excisions of abnormal congenital structures in the pelvis. It’s been quite flexible in terms of what it can allow us to do.

ALAN REDEK, M.D.
I might add that other departments and other specialties are also doing robotic procedures. The cardiac surgeons are, the general surgeons are doing this in fundoplications, and the otolaryngologists have started to use the robot as well. Craig, what’s the age range for this procedure, especially on the young side?

CRAIG PETERS, M.D.

The youngest we’ve done is 2½ months and the oldest is any age we want, really. We go up to young adults or teenagers, but 2½ months went very well. We did use smaller instruments and there was a question that I didn’t get to answer on that. There are 5 mm instruments for small children. They are very similar to this and work fine and we can clearly adapt this to small patients. The scars that you see afterwards are really pretty minimal.

ALAN REDEK, M.D.

So now Dr. Peters have transected the ureteropelvic junction and removed a little bit of pelvis, so you’re really looking right into the renal pelvis.

CRAIG PETERS, M.D.

Right. You can see how thick-walled this is. Anybody who knows this operation, this is a very thickened pelvis, consistent with intermittent obstruction.

ALAN REDEK, M.D.

Craig, one of the emails that came in wants to know how many laparoscopic procedures have you performed?

CRAIG PETERS, M.D.

Myself, all told, probably 300 or so, diagnostic and operative. Now, you can see the stents right here. This is the part of the ureter we want to resect. We’re also going to spatulate the ureter and we’re also going to transpose it underneath the vessels, so they’re going to come anterior to the vessels, but I’m going to spatulate it first and we’ll move the camera over a little bit. Spatulation just simply opens the narrowing a bit and allows us to do a wider anastomosis. We will remove this and you can see these are never completely closed. This tells us, because it looks relatively open, that much of the problem was really the vessels. This is not a terribly tight stenosis but is really the anatomic arrangement with the vessels that was the problem.

So now what we’re going to do is bring the ureter around to the other side of the vessels and begin the anastomosis.

ALAN REDEK, M.D.
There’s another email question and I can answer this simply. The question is, is an 8-month-old girl a good candidate for this type of surgery? I think all of us would agree that an 8-month-old would be a good candidate for this operative procedure.

CRAIG PETERS, M.D.

Yes, absolutely.

ALAN REDEK, M.D.

Now, Craig, there’s another email asking have you ever done any of these without a stent and what kind of drain do you use, if you use a drain?

CRAIG PETERS, M.D.

Very good question. We have done them without stents and been happy with it, but if you do that, you do need to leave some sort of a drain. Then it becomes a little difficult when you’re doing it in this configuration, to get a stent in the retroperitoneum, so in that situation we would usually mobilize the colon and then pass the drain behind the colon and out the abdominal wall. I’ve found that the kids seem to recover quicker when we use a stent. We don’t have to have any external drains and it, I think, allows the repair to heal better. Today’s stents are so delicate, they can be removed with a string or with a brief procedure in a few weeks and I’ve found that the postop recovery seems to be just smoother.

We’ll now start the anastomosis. Could I have the 5-0 Monocryl brought in on the right? What we do is, through these cannulae, we will pass the sutures. We use regular laparoscopic instruments to pass the sutures in. We cut the suture fairly short because in this relatively small operative area, you don’t want a lot of suture. You’ll get tangled up. We’ve found 12-14 cm is an ideal length for a running suture of half the pyeloplasty. So here’s the suture we use. This is a very delicate suture. In an infant, I would use a 6-0 or a 7-0. In a 10-year-old, a 5-0, I find, is quite satisfactory. Now I’ll take the small needle driver. This is an absorbable monofilament suture that handles very easily.

ALAN REDEK, M.D.

So Craig, as you’re doing this, do you want to again comment on the differences in sewing between robotically assisted and laparoscopic procedure without the robot?

CRAIG PETERS, M.D.

Well, if you’ve ever tried to do laparoscopy, you understand some of the difficulty in suturing. Of course, the movement that you make is paradoxical because you’re on the outside and your instruments are being passed through the abdominal wall.
As a result, they actually are moving in an opposite direction than what you move on the outside, so you have to teach yourself how to sort of work that way. It’s certainly very doable, but it takes a lot of practice and not everybody has that kind of time to practice the new technology, whereas here, it’s pretty much you can sit down and start sewing. You’ll eventually become more efficient, but you can see, I can hold this needle very steadily, I can pass it. This is a very small needle. It looks very magnified here. I can see exactly where I want it to go. In this, I’m going to reposition it. I think I can get a little bit better stitch on this. Whereas with laparoscopy, although you certainly can get it in, it’s much shakier, less precise, and takes longer.

ALAN REDEK, M.D.

00:26:38.000 Craig, as you’re starting this, I’ll just ask another question. How long have you worked with the daVinci system and how many cases do you use the robot for in a given month?

CRAIG PETERS, M.D.

00:26:50.000 We’ve had the daVinci here at Children’s for a little over 3 years. We probably, this month we’ve done about 6-7 cases, again, of a variety of types of procedures and we are slowly developing and expanding it. As we figure out what is appropriate to use, we’re trying to study it and understand what the limits are and how well the patients do, so we are reviewing our results on a regular basis as well.

ALAN REDEK, M.D.

00:27:32.000 You’ve got a stitch now between the ureter and the renal pelvis. That’s going to be your first stitch. As you’re doing this, I might just tell the audience that we have a second daVinci which we have used for training purposes and retraining purposes, to train the nursing staff, the resident staff, and to use it for doing some research to try to develop newer and better techniques for the procedures. Do you want to comment on that?

CRAIG PETERS, M.D.

00:28:11.000 That’s right. Having the training robot is very helpful for our team because it’s extremely important to have a team that fully understands the system and its workings so you can be efficient because any of these procedures will take longer. Although we don’t need to race in surgery these days, efficiency is important and I think the families like that as well. I think it’s also useful in terms of training for safety and understanding how to use the system in a safe way and without sacrificing a lot of efficiency.

00:28:52.000 We are also setting up a research program that’s been funded very generously by a donor to the hospital and we’ve recently been doing a study on doing entire bladder reconstructions using pieces of intestine to correct bladder dysfunction in children, which normally requires a very large abdominal incision and is very difficult to
do laparoscopically, but we’ve been able to do this now in about 5 hours, whereas normally it’s a 5-6 hour open operation.

00:29:24.000 So we’ve placed the first stitch and this will orient us. We will run a suture line up each side of the pelvis and the ureter, bringing them together. This is done as a watertight running anastomosis. Some people like to do this with interrupted suture, but I don’t think there’s any major difference between them. We’ll remove that later.

ALAN REDEK, M.D.

00:29:58.000 Craig, there is a question regarding setup time for the equipment and also costs and the comparable figures in regard to this as well as open surgery.

CRAIG PETERS, M.D.

00:30:18.000 Setup time certainly takes a little bit as you’re starting. It is, like everything, an experience-based limitation. Our team, with now a fair amount of experience, is quite efficient in doing this and we pretty much do most of the setup while we’re doing the setup for anesthesia and the patient is being put to sleep, or we’re doing a cystoscopy to do the x-rays that we do often before these cases.

00:30:52.000 Cost-wise, the instrument is certainly expensive at about $1.25 million and that’s certainly an issue that has to be factored in, but a lot of places have bought it, recognizing that it is better for patients and can shorten hospital stay and there can be economies drawn from that. When we looked at the overall time issues in balance, even with our very first cases, where we were not nearly as efficient, we were only about 15-17% higher in cost from open pyeloplasty in kids. We haven’t reassessed that now, with our much greater experience, and I suspect that the differential won’t be nearly as much. From an economic standpoint, it’s very hard to strictly validate or justify the robotic system unless you’re doing huge volumes. There are a few places in adult urology that are doing large volumes of radical prostates that come close or can actually make it profitable because of the fact that they’re doing patients that otherwise wouldn’t have come to those hospitals. Now, what’s going to happen as more of these systems are available is unclear, but I’m sure, just like computers, that this is going to be a technology that matures, becomes more inexpensive over time and, as further modifications come along, the costs will decline steadily. I think that really this is an emerging technology and we can get a glimpse of what robotic assistance in surgery can do.

00:32:42.000 If you watch, I’m doing this suture line no slower than I could do open, perhaps a little more accurately because I can see better, and certainly much more efficiently than what I can do laparoscopically.

ALAN REDEK, M.D.
We just saw a view of the entire team there, just a few minutes ago, and there’s a question on the role of the scrub nurse or scrub tech, the circulator, and the patient-side surgeon. Do you want to comment on their roles?

CRAIG PETERS, M.D.

Sure. The team in this is exceptionally important and we are lucky to have a very strong team here, who are both enthusiastic and highly skilled. The scrub nurse has to know exactly what instruments we need, and they’re different than conventional surgical instruments. They have to anticipate exactly what we’re doing, what sutures are going to be needed, and know the sequence of the operation. They also have to be comfortable with the instruments. They do all the setup of the robot and the calibration of the image system. The patient-side surgeon is also extremely important, from both an operational standpoint in terms of exchanging instruments and passing sutures and stents, if needed, but also for safety. If there is a problem all of a sudden where we have to convert to an open operation or there’s some emergency, that surgeon is there and ready to intervene with open surgery because I’m not scrubbed or sterile and I’d have to quickly scrub if I needed to get into the operation. Fortunately, we haven’t had to do that yet, but it is something we are prepared to do at any point.

ALAN REDEK, M.D.

Craig, how often, doing a pyeloplasty, have you had to convert to an open procedure?

CRAIG PETERS, M.D.

Knock on wood, we have not yet had to do that.

ALAN REDEK, M.D.

There’s a question which I’ll answer. The question is what was the obstruction found in this patient? The obstruction was a aberrant or lower pole crossing vessel which crossed the ureteropelvic junction. Occasionally this is associated with an intrinsic obstruction, but here it was primarily a vascular one.

CRAIG PETERS, M.D.

Yes, this one was clearly and typically his symptoms of intermittent pain would certainly support that. So now I’m going to resect the rest of the pelvis prior to completing the anastomosis.

ALAN REDEK, M.D.

As you’re doing this, Craig, there’s a question, is this type of surgery covered by most insurance companies? The answer is yes.
00:36:02.000 So the redundant pelvis has been removed and they’re going to remove it from the operative field.

CRAIG PETERS, M.D.

00:36:11.000 Some people like to resect a lot of the pelvis. In cases of intermittent obstruction, there’s really no need to do that because the pelvis isn’t nearly so large. In some of the newborns where we have a giant hydronephrosis, that might be necessary. So we’ll finish up one side of the anastomosis here and then go to the other side.

ALAN REDEK, M.D.

00:36:41.000 As you’re doing this, Craig, I have up on the screen a picture of an abdomen of a child one month following robotic polyplasty. This was a baby. This was a 3-month-old. You can only see two small scars, the two working ports. The camera port is in the umbilicus, so you really can’t even see it, so cosmetically it’s very appealing.

CRAIG PETERS, M.D.

00:37:15.000 Yes. Even further out, the scars tend to fade away. I know that might not matter to some people, but having teenage girls, I understand that abdominal scars can be important. So this is the completion of the first side of the anastomosis. Now we can check it and make sure it’s all intact. It looks fine all along there. No gaps.

ALAN REDEK, M.D.

00:37:54.000 It really looks like a wide open anastomosis. I think you can even drive a truck right through there.

CRAIG PETERS, M.D.

00:38:05.000 I don’t know that we have our sterile truck anymore, but it looks nice and open.

ALAN REDEK, M.D.

00:38:21.000 Dr. Peters, after he ties this, he’s going to run the other side to complete the anastomosis.

CRAIG PETERS, M.D.

00:38:52.000 Some people have had concerns with this robot in that you do not have any what’s called haptic feedback, or sensation of touch or pressure. That’s a real issue, although from a practical standpoint we have not found it to be a problem. You do have to be careful when you’re tying delicate sutures because you don’t know how much
tension you’re exerting on them and can break them, and with certain tissues you have to be particularly careful to avoid injury. What I’ve sort of said is that in essence you can see with your eyes. If you watch the tissues move while you’re doing things, and that takes a little bit of practice, but fairly quickly you can learn it. When we’ve done some of our studies of manipulation, it takes people maybe an hour of practice to be able to suture very delicate 6-0 or 7-0 type sutures without regularly breaking them.

ALAN REDEK, M.D.

00:40:18.000 What magnification is that?

CRAIG PETERS, M.D.

00:40:21.000 When you’re at this level, it’s probably 10-12 power, so we use magnification for this operation anyway, but you still can’t see it this well. You’re in so close. A lot of people have gone to where they’re using smaller incisions because they think that is better and then you don’t have to do laparoscopy, but you’re compromising your vision. I think the visual acuity of this system is one of its real strengths, in addition, of course, to the 3-dimensionality, which is a huge advantage over conventional laparoscopy. Really, until you sit at the console, it’s hard to appreciate how good the 3-dimensionality is. You also notice I’m rotating the camera. This is a 30° lens, so it allows me to see a slightly different angle as we approach this side of the renal pelvis.

ALAN REDEK, M.D.

00:41:33.000 Craig, would you comment on the demand of families to have this type of surgery done, if at all possible, rather than open procedures?

CRAIG PETERS, M.D.

00:41:51.000 Well, I think it’s variable. I think it’s becoming more widely understood that there is this option. Certainly in the adult fields people are hearing about laparoscopic prostatectomies, for example, laparoscopic cholecystectomy, and even cardiac surgery, a little less so in the pediatric arena, but we do get a lot of questions for some form of minimally invasive surgery. I think as people understand the availability of it, they will certainly be requesting it. It will be obviously an interesting challenge to see how our health care system is going to decide how they want to pay for it because the technology is initially more expensive. It may ultimately save money, but that’s yet to be proven.

ALAN REDEK, M.D.

00:42:46.000 I have a technical question, Craig, that I’ll give you now. The question is, is there a reason why you do not put in a manual port to be used by the bedside surgeon to do things like cut sutures, so you don’t have to change instruments on the robot?
CRAIG PETERS, M.D.

00:43:05.000 Some people choose to do that. Perhaps I’m overly stubborn, but from our early days in laparoscopy, we really try to limit the number of ports because I think that is what’s uncomfortable to the patient and we’ve worked out ways in most operations, not in all, where we do not need a hand port. In smaller kids, it’s actually difficult to get it in because there just isn’t enough room due to the bulk of the robotic system with a small child. We’re hoping to get a needle driver that has a scissor on it, which would allow us to just cut the suture, but with our team, our instrument changes are very quick and that has not been a real problem, to my mind. So now we’re going to suture up the front wall

ALAN REDEK, M.D.

00:44:11.000 Craig, when will you see this patient again after discharge?

CRAIG PETERS, M.D.

00:44:16.000 We’ll see them back...because they live several hours away, they’re probably going to be seeing another physician initially, but I will do is at 2-3 weeks, we will take the stent out. Again, with the string attached, that can be done in the office. If we don’t have a string attached, then we do a brief anesthetic and a cystoscopy to remove the stent. Then, one month after that’s done, we will get an ultrasound to make sure that the kidney is draining adequately. That’s critically important to make sure that there’s no swelling that has created a temporary obstruction that might cause a problem.

ALAN REDEK, M.D.

00:45:01.000 I have another question. Could you comment on the quality of the tactile feedback using the robotic arms?

CRAIG PETERS, M.D.

00:45:13.000 That’s what I was mentioning a little bit briefly before in that the lack of touch feedback, tactic or haptic feedback, is something people have been concerned about. Certainly it would be nice to get some sensation of tension or pressure, but to be honest, I’ve found that it does not limit me. We have not had problems with it. It does take a little practice and what we say is that you feel with your eyes. As I pull up on this suture, for instance, you can watch the tissues move and, from that, gain a sense of tension that’s appropriate.

ALAN REDEK, M.D.

00:46:04.000 There’s another question about ureteropelvic junction obstruction in girls. Girls get ureteropelvic junction obstruction just the way boys do, so it’s relatively common in both sexes. Dr. Peters is starting the running stitch of the anterior wall.
CRAIG PETERS, M.D.

00:47:15.000 You can see how with the hitch stitch, really everything’s lifted above. There’s always this little bit of ooze of blood and some of the urine from the kidney that would obscure your view if it were not being lifted up above it, so the hitch stitch also stabilizes the renal pelvis very nicely so it facilitates your suturing.

ALAN REDEK, M.D.

00:48:14.000 Craig, you will take the ureteral stent out in 2-3 weeks. When will you see the patient after that? When will you get further imaging?

CRAIG PETERS, M.D.

00:48:24.000 We’ll do an ultrasound 4 weeks after the stent comes out. If that’s showing improved dilation, then we’ll do another ultrasound in 4 months or so. In this child, where his presenting symptom was pain, we’ll really know whether it’s been effective, based on his symptoms, and hopefully we’ll find that he’s not having any more symptoms of pain. In general, when we’ve done these, the pain goes away very nicely. They may still have some residual hydronephrosis for a while, but that tends not to worry us as long as the kidney is draining well. If we have any concerns, then we obtain a functional imaging study, such as the diuretic renal scan that he originally had, the Mag3, and make sure that the kidney is both functioning and draining adequately. I continue to monitor these children with ultrasound for probably about 3 years, just to make sure that there is no late obstruction or stenosis, although it’s quite uncommon.

ALAN REDEK, M.D.

00:49:35.000 Is your success rate doing this comparable to open procedures?

CRAIG PETERS, M.D.

00:49:44.000 Yes. Now, we don’t have the same length of follow-up time, but it’s hard to believe that it’s going to be much different if our early results are equivalent. We’re fundamentally doing the same operation and that’s one of the things that’s appealing, that you’re not changing what you’re doing; you’re just changing how you get there. That’s where much of the improvement in the patient’s immediate outcome originates because it’s really the challenge of getting to the surgical field. It’s not this operation that really hurts the patient very much; it’s the incisions.

ALAN REDEK, M.D.

00:50:29.000 Do you want to comment on the use of this procedure, robotic-assisted laparoscopy, to perform extravesicle antireflux procedures?

CRAIG PETERS, M.D.
Well, we’ve been doing that fairly frequently as well and have been very pleased with the results. The only limitation is that we really aren’t very comfortable doing bilateral extravescicles because there’s a small but real incidence of temporary urinary retention in those patients. Now, it may not make a huge difference and it goes away, but it is a bit of a problem for that patient. In someone with unilateral reflux, we’ve got it down to where it’s about a 1.5 hour operation. They can go home either the same day or the next morning in most cases and the success rate has been quite good. It’s been well tolerated. This is particularly in older children, where they may still have persisting reflux. If you choose to fix it, and it’s controversial as to who needs to be fixed and that’s not a question we can answer today, but it certainly is a good definitive surgical operation and option that has less morbidity than our conventional open surgery.

ALAN REDEK, M.D.

As you’re finishing up this anastomosis, there’s a question regarding level of magnification. Can you change the level of magnification of your movement with the daVinci and is there a setting that you can vary the magnification?

CRAIG PETERS, M.D.

No, in this system there is not. Pretty much the only thing is whether I move in or out. There is a newer version that has one modification where you can zoom out and see a very broad field. It’s almost a fisheye lens view, which is very nice and that would be a useful element. Because we typically work with such small kids in a very focal area, we don’t need that as much.

ALAN REDEK, M.D.

As you’re tying and finishing your anastomosis, there’s a question: what kinds of restrictions are there for patients after surgery, particularly babies, and how long are those restrictions?

CRAIG PETERS, M.D.

Well, for babies, we don’t let them ride bicycles, but really for infants, we pretty much let the parents do with them what they will. For toddlers and school age kids, we ask them to be a little bit quiet for 4-5 days. I’m not sure that many of them actually do that because it’s hard to slow them down. They seem to be moving around fairly quickly anyway. For teenagers, I ask them to sort of lay low for about 5 days and then take about a week to go back toward normal activity. Most seem to have told me that that seems to work pretty well. Infants, many of the parents tell me that within a couple of days they are back to their normal level of activity and apparent comfort level.

ALAN REDEK, M.D.
00:53:56.000 That looks like you’ve completed your anastomosis.

CRAIG PETERS, M.D.

00:54:01.000 Yes. I’m going to just irrigate it a little bit.

ALAN REDEK, M.D.

00:54:06.000 And your ureteropelvic junction now is anterior to the obstructing vessels.

CRAIG PETERS, M.D.

00:54:15.000 Which are under here.

ALAN REDEK, M.D.

00:54:15.000 That looks terrific.

CRAIG PETERS, M.D.

00:54:17.000 This is really what this system can do and we really have only made a small little incision. We haven’t had to mobilize much tissue other than this. We’ll drop this down and then close the peritoneum over it, although you don’t really need to do that. This is just a routine suction device. We can change the focus, as you see here.

ALAN REDEK, M.D.

00:55:22.000 Dr. Peters is now going to just close the window that he made in the mesentery of the bowel and then we’ll remove the ports, so you’re almost finished.

CRAIG PETERS, M.D.

00:55:40.000 That’s about right. So you’ve really seen pretty much all of what’s important here and hopefully get an idea of the potential for robotic assistance in surgery, particularly minimally invasive surgery. I think it’s an exciting field that’s going to continue to evolve and offer a lot of advantages in surgical manipulation to both young patients as well as older patients. I think you can get an idea that this really is very doable by anyone with reasonable surgical skills, even if they’re not a laparoscopic surgeon. I’m sure that this equipment is going to become a lot more effective and efficient in the years to come. I want to certainly thank our team, who has been spectacular today and for one time has actually not been talking very much, but again, I can’t emphasize the critical importance of having a dedicated team to work with in this sort of endeavor. So back to you, Dr. Redek.

ALAN REDEK, M.D.
00:57:10.000 I’d like to also thank you, Dr. Peters and the team, for an excellent job. Just some closing statements. With advancing technology and the development of smaller instruments, there will be continued interest in this rapidly evolving field in the surgery of infants and children. These techniques are also employed, as we said a little while ago, by other departments in this hospital, primarily cardiac surgery, general surgery, and otolaryngology. We hope that you have enjoyed this webcast and appreciate your interest. Thank you very much.

NARRATOR

00:57:52.000 Thank you for watching the robotic-assisted laparoscopic pyeloplasty procedure from Children’s Hospital Boston. To obtain more information, to make an appointment, or to receive a physician referral, please click the buttons on the screen.