Hi, well thank you Herb, and thanks – thank you all for being here on this beautiful Saturday morning. I’m going to try to change the pace a little bit, robotics and urology has been around actually a lot longer than in most other fields and I’m going to go over a few things that hopefully you’ll find interesting.

A brief outline, again I think urology really made the robot what it is. It started out in cardiac surgery, it never caught on exactly and we’ll go over how it caught in urology and why. I’ll go over what we are doing currently in urology, and we’ve been doing robotic surgery here in urology since 2004, so quite a bit longer than some of the other specialties, so there won’t be any breaking news exactly although I think there is some exciting things that we are doing that are new that are really beneficial to the patients. And then the last thing I’m going to do is talk a little bit about who is a good candidate for robotic surgery in urology, and this probably goes for most, most of the robotic cases as well.

But first let’s go backward, urology has a subspecialty called endourology and that subspecialty is not like a normal cancer or pediatrics or an actual topic based subspecialty but it’s a subspecialty based on innovation. And this is the subspecialty that has brought TURP, the original minimally invasive urologic surgery to the community and then we’ve gone on ESWL and shocked with lithotripsy, the ultimate noninvasive urologic surgical treatment, and this progressed onto ureteroscopy, so that now we do many of our stones through a natural orifice, kind of the original natural orifice surgery if you will, to percutaneous nephrolithotomy, again for larger stones through
the back, and then went on to laparoscopy and really urologists were integral in developing nephrectomy, donor nephrectomy and then prostatectomy. So it was a very natural thing for us in endourology to go right into robotic surgery which gave us some nice advantages that we didn’t have with laparoscopic surgery. I think the next step is NOTES, which is natural orifice surgery and again we are doing some of that as well as some of the less surgery which is a single port laparoscopic surgery.

But let’s go backward with respect to robotics. Laparoscopic renal surgery really is, was fairly common, that was where laparoscopy and urology began just a little bit after the gallbladder became an easy laparoscopic target, people started looking at the kidney as the next site, 1990, 1991 were the first both simple and radical nephrectomies performed at Washington University with Dr. Clayman and Dr. Kabusi. Dr. Kabusi I was lucky enough to train with at Johns Hopkins as Dr. Zeh mentioned. But unfortunately the prostatectomy which really was the hardest thing to do, Dr. Kabusi and his group tried to do a few of those and found out that just like some of the early Whipple’s they took a huge number of hours, they were very difficult and they abandoned it back in 1993-'94, and that had to wait until 1999 when two groups in Paris, Dr. Vallancian and Guillonneau, were able to figure out a way to do the laparoscopic prostatectomy in a fairly regimented fashion that was able to be reproduced and this was when it just began taking off.

Unfortunately given the very steep learning curve with the laparoscopic prostatectomy it was catching on quite slowly, and that’s the primary reason for that is you are doing a lot of very difficult
suturing deep in the pelvis and many pelves are narrower, the pubic symphysis is low in the pelvis and it just makes it very difficult to reach to do the anastomosis between the bladder and the urethra.

And that’s where the robot came in, it was really first introduced in 1999 but just never took off for its original intent, and urologists recognized this as hey, this is something we can really use, this can make that anastomosis that we really just have so much trouble doing, this can make that anastomosis possible and really the wristed instruments, the 3-D vision, the depth perception, all those things were perfect for us and I think just by I think 2001 the very first robotic prostatectomy was done, by 2003 over 2500 robotic prostatectomies had been done, and really it was increasing exponentially, it was by far the number one volume-wise procedure done robotically.

I think you actually can see all this over there, I’m not going too carried away with it. But again, 3-D vision, you can see that the – the unique thing about this versus other laparoscopy, I think everyone is familiar with this, is you’ve got two eyes on the laparoscope, and those two eyes give you depth perception when you are looking into the – when you are looking into the viewer. Also again you are taking laparoscopic sticks which have no ability to bend at the wrist, and giving yourself a wristed instrument, absolutely essential for working deep in the pelvis and for making accurate throws with the needle.

This I think really shows where prostatectomy took off from, here we go. This was back in 2003, as I mentioned, only 2500 cases done, but really just exponential growth of robotic prostatectomy. Here the estimate is 10% of all prostatectomies were done robotically in 2004, just 3 years later in 2007
60% had been done. This is a little bit of an old slide, but this was an estimated for 2008. Unfortunately for Da Vinci I believe it didn’t quite get that high. I think it stabilized around about 70% now of prostatectomies are now done robotically and that still I think represents a significant group, probably about 70 or more thousand per year are done robotically.

So what procedures now are, are we doing robotically here at UPMC, and what is appropriate, what advantages are there? I think actually the most exciting procedure and the most advantageous of all procedures that we do urologically is actually the partial nephrectomy, not the prostatectomy. We do a fair number of these, I think we did 5 of these in April, so it’s something that we do fairly frequently and I think we’ll be doing even more frequently as time goes on because the robot allows us to do partial nephrectomies we couldn’t do laparoscopically before, and I’ve been doing laparoscopic partial nephrectomies since late 1990s but really those cases are cases we chose ever specifically, small tumors, exophytic tumors, kind of hanging off the kidney, pretty easy to take care of. A lot of the bigger, deeper tumors required us to do an open partial nephrectomy which involves a large flank incision, and really that takes – the recovery from that is quite significant. If we could – were able to dig out deeper tumors and put the kidney back together again we could do a lot of those tumors less invasively, minimally invasively and that’s what I think the robot lets us do.

The other thing that is important is that the robot lets us sew quicker, you are not nearly as – I’m sure all of us have seen, or many of us have seen people trying to sew laparoscopically, we are just not that good at that, it’s difficult, it’s very artificial trying to sew, like trying to sew with chopsticks.
With the robot it’s much quicker and because of that our warm ischemic times are much shorter and with kidney surgery you want warm ischemic times to be under 30 minutes, and I think our times went from about 30 down to about 20 minutes on average with, with the implementation of the robotic partial nephrectomy program.

Another procedure that we robotically, which is just a less common procedure, but certainly it really is very applicable to the robot is a pyeloplasty. Pyeloplasty is done for ureteral pelvic junction obstructions, so where there is blockage between the renal pelvis and where it goes into the top of the ureter, and if you have blockage in that area you can cut that out and you can sew it back together again in an unblocked fashion and the robot certainly facilitates that. We were doing those all laparoscopically before but again this makes it a lot quicker and I think it makes our anastomoses significantly better and more water tight. I know some people are actually not leaving drains now afterward, which is really a testament to the ability to get a good anastomosis and probably why those pancreatic and bile duct anastomoses are much more successful than they would have been just laparoscopically.

There are a number of other procedures which certainly we can do and have done robotically but don’t offer quite the exact, the same amount of benefit. These are more because these are extirpated procedures where we are just removing things, we are not sewing things back together and so just removing the kidney and nephrectomy, adrenalectomy or nephroureterectomy where you are
removing the whole kidney, the ureter all the way down to the bladder, those procedures all you can do just as easy pretty much laparoscopically, although certainly can be done robotically as well.

I’m just going to show you a brief example, because I think this really shows what we couldn’t do before and what we can do now. This is the left kidney right here, this is the bottom of the left kidney and you can see actually quite a good sized but subtle lesion deep in the lower pole of the left kidney. There is absolutely no exophytic components here, it’s not poking out, it’s not changing the margin of the kidney at all. It would be fairly difficult to find. This is actually in a 34 year old young man who was having a vasectomy done by his urologist and he couldn’t find his left vas deferens, one of the things that can be associated with that is renal abnormalities or really a lack of a kidney on that side. So the urologist astutely ordered a ultrasound and found out that the kidney was there, there was no problem with that but it had a good size tumor in it. And this is how he ended up coming to me.

But I’m just going to show you briefly a video which is, and this is really raw footage almost of just what you can do with the robot, what’s interesting. And just to get you oriented, we’ve just started here at the beginning of the case, we’ve got – the patient is lying in flank position, so that means that their right side is down, their left side is up and so the top of the screen is kind of the left side of the patient up in the air. Down here would be the aorta vena cava running down here in kind of a horizontal direction, the head of the patient is to the left of your screen, the right of the screen is the feet of the patient. This is the left or descending colon here along the inside wall.
Anyway, so it will get back there in a second. So again, the patient is lying feet to the right, head to the left and we’ll just show you a few of the steps. I just cut some bits out of here to show you what we can do now. Switched to a laser here, there we go. The problem is I can only show it on one side. So there again the descending colon, you can see that’s the solis muscle behind the – behind there, and we are going to reflect the colon down along the line of Toldt. Bring it all the way down really to the, to the aorta which is just down below the suction device that you see there. The ureter is being lifted up and we lift that ureter up and we go underneath the ureter so that we can see the solis muscle behind it, here is a nice view of it working. We then follow the angle up between the ureter and the aorta on this side and you can see the renal vein, that’s the main renal vein coming into view there. The robot is very nice for getting around that gently. We use a fenestrated bipolar grasper which is like kind of two little fingers, nice and gentle, not too sharp. We get around the vein, then the next thing we need to do is get around the artery which is right behind the vein. You’ll see we move the vein, push it off to the side there, we can develop the renal artery and for a partial nephrectomy the first important thing you have to do is you get the hilum prepared, we are not going to take the hilum like we would in a radical nephrectomy but we are going to clamp the renal artery because to cut a deep tumor out of the kidney you are not going to be able to do that with the kidney perfused.

Here now after we’ve got the hilum prepared we go up to the kidney where we are taking all the perirenal fat and Gerota’s fascia off the kidney, we’ve got the entire lower pole of the kidney exposed here and you can see there is no large tumor sticking off the kidney, maybe you can see
some kind of slight color changes in the kidney but not much. This is where we need some help and this is where the new Da Vinci, the SI, comes into play. It’s got something called Tile Pro which allows us to do picture, and picture basically with a laparoscopic ultrasound here. You can see at the top of the ultrasound picture over in the little part of the screen that there is the tumor, right there, you can actually see it nicely. And we can use that ultrasound to find the margins of the tumor, where it is, and then we’ll mark all around with cautery, we’ll score it and show ourselves exactly where that tumor is so that we can cut it out.

Before I do these cases I always make sure that the tumor is actually visible on ultrasound, unfortunately there are some you can’t see well on ultrasound. And those are still relatively difficult. Once you’ve got the tumor marked, then you go ahead and there is nice laparoscopic bull dog clamps, there is now new robotic bull dog clamps you can use to clamp the renal arteries, stop the blood flow to the kidney temporarily, and then we go up and go ahead and cut the tumor out. And one of the big advantages of cutting of the – of clamping it is that it doesn’t bleed, as you can see, which is very nice, the kidney being a blood filter, it’s about one-fifth of the body’s blood goes through it; if you do – if you tried to do this without clamping it you would see nothing. And it’s extremely important to see everything you are doing. You see we don’t use any cautery here at all, we use just cold cutting scissors because you’ve got to see normal kidney parenchyma and that ensures that you are getting a good negative margin.
And this tumor you can see it just goes deep, deep into the kidney. This is actually all the way through the meat of the kidney, we are getting down into the renal sinus fat, the fat that’s kind of in the center of the kidney, but that fenestrated bipolar lets you nicely elevate it gently without poking into the tumor, and you know you can see some fat way down there at the bottom of that where we’ve kind of lifted the nose of the tumor out of the, out of the deep base of this. Here is the last attachment and then you’ve got the tumor separate completely, look, here it goes way deep into the kidney, we’ll put that into an endo-catch bag to take it out later. You can also take it and throw it up over the spleen or the liver depending on how much time you have. But it’s okay to lose it.

Here is where you yell at the fellow to close the bag. All right. So here we’ve got a nice deep hole in the kidney that’s got to be closed up. We didn’t look like we got into any collecting system. If you do have a big opening in the collecting system that we will suture, and that can be done very nicely robotically. We’ve got some rolled Surgicel there that we will put down in along with some Flow Seal, which is probably one of the biggest things that’s helped us as well, just getting hemostasis deep down in there. I can guarantee you there are some large arteries down there, but a combination of hemostatic agents and then tightly closing the kidney over it. And this is a large Zero Vicryl that we use, it has plastic web clips on either end of it and those clips allow us to really cinch it tight and then there is a special sliding clip technique that you can use.

Watch, we’ll put probably 4 of those across this defect to close the entire defect. You can see the clip comes right up against it, you get a big bite of capsule because the kidney will tear, so you actually
can’t tie these sutures over the kidney, it will just rip right through like a cheese slicer, but we put these sutures really straight across the kidney and put clips on either side and then go and tighten them up sequentially. We’ll just first put all of the stitches in and then at the end we’ll tighten them all significantly. Once they are all tightened, we’ll put an extra Lapara-tie on to prevent them from loosening and then unclamp the kidney. This is the very end. So here is another one of those web clips, you can see you can – we’ll show you the sliding clip technique here. Put it right in the middle and then you can just slide it right up against the kidney right there, and later on I’ll put 4 more in. I don’t want to show you the whole thing. I’ll put 4 more in and then we’ll slide it real tight and really that will just cinch that hole completely closed there on the kidney and the amount of bleeding luckily is minimal even with a very deep resection.

So let’s switch gears down to the pelvis, the lower urinary tract. Prostatectomy, as I said, is still I think by far the highest volume done robotically although I’m guessing Hysterectomy is catching up because that’s more quickly and done in more volume. But we’ll talk a little bit about what’s, you know what’s the difference between the open prostatectomy and the robotic prostatectomy? And I trained doing open prostatectomy, probably did 500 of those before we started doing laparoscopic ones, and then switched rapidly over to robotic ones. I’ve done, we’ve done here at UPMC over 500 of the robotic prostatectomies, and my partner Ben Davies also does quite a few of those, and really the operation is exactly the same operation. As Dr. Zeh had said, one of the important things I think about switching to minimally invasive procedure is that you are replicating the operation, the same operation that you do open.
And because it’s really the same operation we’re taking out the same tissue, the same prostate, the same tissue around it, we are putting the same bladder and urethra back together again, the cancer cure rates, continence and potency which are kind of the big 3 that we look at are equivalent. There are a few small differences that are what make – I think what help people choose between one or the other. Clearly blood loss because of the pneumoperitoneum and the bleeding from lots of small veins, that’s where the big advantage of robotic procedures is. And our blood loss is probably on average about half a cup or so, whereas with the open procedure depending on who is doing it, it’s easily 3 or 4 cups. Which again isn’t a big problem, but it’s clearly more. The recovery is a little bit quicker because I think you go home with a little more blood, a little more energy.

We also can see the anastomosis where we sew the bladder to the urethra a little bit better, and because of that we take the catheter out in one week rather than two weeks. And interestingly patients see that as probably one of the biggest advantages. People hate going home with that catheter. It’s actually one of the reasons I think they developed it in France, because in France they – the patients wouldn’t go home with the catheter, so they would all stay for 2 or 3 weeks after the open procedure, so it was actually done to get patients home sooner. In the U.S. luckily we can just kick them out.

So a few disadvantages of the robotic procedure though is it takes a lot longer, and I think as people who have been in there know, it – the initial cases, again just like the pancreatic cases it took many,
many hours, 8 hours even. Today I think we are down to you know certainly on the robotic console doing cases that are you know including lymph node dissection and prostatectomy done in 2 ½ hours at times. So that’s good, we still need to you know keep pushing that even quicker, but certainly some of our open colleagues can do that quite a bit quicker, there is also a lot of setup time involved. So that keeps us slowed down, we only do 2 cases where my partner will do 3 and make fun of us, because he’ll still finish first.

One of the other issues is the position. Our cases are done in steep Trendelenburg, or steep head down position, the open cases are done in a kind of a jackknife position so people with bad backs probably aren’t as good for the jackknife. People with retinal perfusion problems maybe aren’t as good for the – or glaucoma maybe aren’t as good for the Trendelenburg, again the problems with that is pretty low on either side.

So there is a few other pelvic cases I just wanted to mention that we are doing. Dr. Davies again, my partner, does robotic cystectomies. The question on those is how to do the reconstruction, neobladder versus ileal conduit and whether you are going to do those intracorporeally or extracorporeally through the incision you remove the bladder from, but certainly can be done either way. And then pretty much anything else that we need to, we can get at in the pelvis, seminal vesicles, ureteral reimplantations, my partner Glenn Cannon at Children’s Hospital was one of our residents who went to Boston Children’s Hospital for his fellowship and is now doing robotic ureteral reimplantation and a fair amount of other robotic pediatric urologic surgery.
Sacrocolpopexy is a vaginal vault suspension, it has been done by urologists and then interestingly the vasovasostomy or vasectomy reversal, this is not done you know in the abdomen obviously, but taking advantage of the very fine scalable motion, you can scale the motion down 1 to 5, you can use small needle drivers and it removes completely the tremor, so putting together these tiny little tubes, the vas deferens with 9-0/10-0 suture, there’s actually significant series out there reporting doing them robotically. Again just I think illustrating what the robot can do to augment our skills as surgeons. It doesn’t make you be able to do something you can’t do surgically, but it certainly can make you do it better.

All right, so final couple of slides. Who is a good candidate for robotic urologic surgery and probably robotic surgery in general? The less prior abdominal surgery the better, we go through the peritoneal cavity so people who have had a lot of open abdominal surgery that can be a problem, although we will enter the abdomen from the you know side and take out adhesions, so a lot of people that have had at least some surgery it shouldn’t be a big problem. Certainly people that have had previous laparoscopic surgery we are happy about, because that tends to cause a lot less adhesion. Prior intraabdominal infection, peritonitis, things like that have – we’ve tried and found that that’s not the cases to work with. As people have mentioned, the BMI is an important thing. I’ve gone up to a BMI of 50 and I don’t like it, it really increases the time and makes it quite a bit more difficult, and I think it makes the case take longer, you’ve got a heavy patient on the table for a
longer period of time and I think that really increases your potential for positioning injuries. So we’ve basically said as a cutoff 40, which we stretch a little bit at times.

Specifically for partial nephrectomy it’s important to understand what the best procedure is – the best candidates for partial nephrectomy are those people who are getting any kind of partial nephrectomy whether it’s open, laparoscopic or robotic, and that is smaller renal masses. Smaller renal masses has increased though in size, it’s gone from probably 4 to 7 cm, 7 cm is a pretty good size you know kidney tumor. But today there is really no good excuse for just doing an open nephrectomy any more, an open radical nephrectomy. That is a procedure which we have almost gotten rid of and really I would encourage anybody if they – if you have patients or if you have friends who are you know recommended that that’s one of their options, that’s probably they should get a second opinion as well because most of the time if we have to do a radical nephrectomy we’ll do it laparoscopically, but a lot of times if we can save nephrons and save kidney function we will try to do that, and we’d rather do an open partial nephrectomy than we would a radical nephrectomy by any means. And certainly now that we can get at these deep tumors we are being able to do partial nephrectomies laparoscopically or robotically and really I think save patients both the loss of kidney tissue as well as the major incision across the flank that they would need for an open partial nephrectomy.

Certainly we prefer the tumors if they are exophytic, that means that they are kind of hanging of the kidney like a grape, that those are very nice, you don’t have to clamp the hilum with the kidney then.
We also prefer if they have a normal kidney on the other side then we don’t worry too much about how long the kidney is clamped, it recovers pretty well.

Pyeloplasty candidates, basically anybody these days should be having their pyeloplasty done laparoscopically or robotically. And then prostatectomy specifically, most anybody who is a candidate for prostatectomy is probably a good candidate for robotic prostatectomy except for a few patients that have had you know a lot of abdominal surgery. And you know there are probably a few patients that are really very good candidates for robotic surgery, and those patients particularly are those with a low hematocrit, some renal insufficiency, Jehovah’s Witness if they won’t accept blood, they are particularly good candidates also with bad lower backs if the flex position for the open procedure would not be useful.

The cases we’ve had trouble with and that we don’t normally recommend and we go more toward an open procedure is if they’ve had prior laparoscopic hernia repair, particularly a complete bilateral laparoscopic hernia repair with a big piece of mesh across the whole back of the pelvis, that can lead to the bladder being really stuck to that and can be difficult, although we’ve done a few of those. Large prostates, more than 4 times normal size, 100 grams is hard to get around, and then I mentioned the glaucoma or retinal perfusion problems.

So that kind of summarizes what we are doing now in urology. Like I said, it’s a bit of a more mature specialty, we are not just starting to do some new things, but I think we are pushing the envelope of
all the things, and again partial nephrectomy I would say was our biggest, the most exciting thing we’re doing right now, that we are preventing people from having large incisions across their side to have the benefits of nephron sparing surgery. Thank you very much.