

**Innovations in Gynecologic Surgery:  
Laparoscopic Retroperitoneal Hysterectomy  
May 6, 2009**

Hello and welcome to this "OR-Live" broadcast. This is from George Washington University. We're going to be discussing laparoscopic retroperitoneal hysterectomy. My name is Paul MacKoul reporting school. I'm director of GYN oncology at George Washington University, and I will be your host for the program today.

What we're going to do is show you a unique technique in order to remove a uterus with a retroperitoneal approach. I'm going to go over some slides initially and then go into the actual video clips that we have for several procedures that we're performing today at George Washington. Retroperitoneal dissection is an open surgical technique to gain access to the spaces of the body in the pelvis, the perirectal and perivesicle spaces. This allows for full identification of all of the anatomy. You can identify the ureter, the large vessels, and the uterine artery.

Now the open approach, which is done by most oncologist doing malignant cases, suffers from the fact that a large dissection within the space with a finger or digit causes bleeding. The laparoscopic approach is actually easier and faster than retroperitoneal dissection open. The same techniques are used but a different modality is used to do the operation. Dissection of the space can be accomplished with five-millimeter instruments quickly, cleanly, with ease of development, and very minimal bleeding. It can be applied to all GYN surgeries. You're going to see a hysterectomy performed today, but you can do this with every GYN operation that you want to laparoscopically.

The learning curve is moderate, but once that learning curve is overcome, it's an extremely powerful and versatile technique. The main point about this technique is complete identification of pelvic anatomy. The ureter and the course to the bladder is identified, uretolytic can be accomplished if required, bladder and space of Retzius also identified with mobilization of the bladder. The uterine artery can also be identified and ligated within the space. The external, internal, and common iliac artery and veins can be identified, and complications avoided once these are seen. This also leads to easy known dissection and presacral neurectomy near the aorta if required.

The presacral space and sacrum can be identified for laparoscopic sacral copopexy, and the perivesicle and perirectal spaces can be identified as well from modified radical hysterectomy and other malignant procedures.

So to show the anatomy clearer, this is a schematic of the uterine artery coming off of the internal iliac artery, going toward the side of the uterus. You can see there's a lot of collateral vessels towards the side of the uterus pick ups from the cervical and vaginal branches and the ovarian branches, and there's a lot more tissue at that site. Transection of the uterine artery at the level of the cervical vaginal junction or at the isthmus is hazardous because there's so much additional tissue, and bleeding can be encountered.

The next slide is a representation of what is actually happening at the site of that uterus with the Venus system or the Venus plexus of the uterus. You see a lot of additional tissue; veins, arteries, coming at that site. Ligating the artery is in retroperitoneal space at the takeoff point avoids this problem and also avoids injury to the ureter.

To compare retroperitoneal approaches to standard approaches, the real issue is the identification of anatomy and some of the problems associated with the ureter and the uterine artery. With the standard approach, you cannot directly see that ureter. There is no isolation or visualization of that ureter, and there can be increased thermal injury to the ureter during the dissection. The uterine artery is often not controlled effectively at that junction. This increases the risk of blood loss and conversion to laparotomy. It also increases the ureteral injury.

The bladder is not effectively mobilized in many cases, and there are limitations with this approach as far as uterine size and blood control. In heavier patients bleeding off of the cervical vaginal junction will often lead to an open surgical procedure. Pelvic side wall scarring with plastering of structures to the pelvic side wall does not allow access in many cases to even performing the operation. But with the retroperitoneal approach this is overcome. With cesarean section bladder injury can usually occur if the bladder is not mobilized.

With retroperitoneal approaches you're identifying all the anatomy. The ureter is identified directly in the retroperitoneal space and can be dissected off of the posterior broad ligament if required, thereby decreasing risk of direct or thermal injury. The uterine artery can be ligated at the internal iliac. You can transect other smaller caliber vessels as well. There's no collateral flow at that point.

There are no limitations with this approach. Almost every patient can be accomplished using a retroperitoneal dissection for a uterus. Hysterectomies, supracervical hysterectomy, obese patients, patients with multiple prior surgeries, any patient with pelvic side wall plastering and endometrioma into the side wall can be very effectively removed with this approach. Any uterine size. We're now up to approximately 40 weeks eight-pound uteruses doing this approach. Complex cases and malignancy can all be accomplished with retroperitoneal approaches.

It's also faster than the standard approach. Patients who have a uterus between 15 and 20-week size can be done at 45 to 75 minutes. Those patients with very large uteruses, between one and two hours. So it's faster. It's less blood loss, it's more efficient. It's better for the patient. The hospital loves it because they are decreasing their amount of time in the OR with OR time being so expensive.

The insurance companies love it. We have insurance companies sending us patients now because they understand how effective this approach is and what our results have been. So there really is no loser here. It's a win, win, win, all across the board, and I think for that reason alone, the procedure should be embraced by other physicians.

In addition, because of the ligation in this space, there is decreased blood loss, decreased pain. Because you're identifying the anatomy, there are decreased complications. Five-millimeter incisions can be used, and vaginal morcellation 6:10 is key to eliminating larger incisions on the abdominal wall, thereby causing more pain, and cosmesis is excellent.

Most of our patients are discharged the same day, up to 80 percent, which decreases cost. And we're actually using this approach now to convert from laparotomy to laparoscopy, not the other way around. And the most important point about retroperitoneal approach is it can be used with other procedures; endometriosis resection, resection of large pelvis masses, sacrocolpopexy, malignancy are all very amenable to this approach.

In summary, it truly is a superior approach to standard laparoscopic hysterectomy. Now the instrument that we use to perform this operation is Harmonic ACE. We have gone through many different types of other instruments, including bipolar, monopolar, and we find that because of the versatility of the Harmonic, it is the best instrument as applied to this procedure. We now have a short video showing some of the details of Harmonic ACE technology.

In the Harmonic System, an ultrasonic wave, operating at a frequency of 55,500 cycles per second causes the active blade to vibrate, creating excursion of the blade tip from 50 microns at power level one, to 100 microns at level 5. The transducer, housed in the Harmonic hand piece, converts electrical energy to mechanical energy. It consists of a stack of piezoelectric ceramics sandwiched under high pressure between two metal cylinders.

When pulsed with a high voltage electrical signal from the generator at the resonant Harmonic frequency of the ultrasound acoustic system of 55,500 hertz the transducer, blade extender, and blade expand and contract with each wavelength along the entire length of the device. Longitudinal expansion and contraction increases from just a few microns of longitudinal motion at the transducer to 50 to 100 microns at the blade tip, where maximum motion occurs. This creates frictional heating and cell disruption, delivering controlled coagulation and precise transection, with minimal lateral tissue damage.

You can dissect with the curve tip of the blade, and this is the active back blade that allows for cutting. Cutting is fast. You can cut through thick tissue, including the entire uterosacral and cardinal ligament complex. The back blade can also allow entry into the anterior vaginal fornix. You can drill through tissue, thereby by isolating the uterosacrals off of the vagina and opening up the vagina.

Coagulation is excellent as long as there's no tension, and you can ligate vessels up to five millimeters. It's safe, with a thermal spread of five millimeter or less, and there's no bipolar or monopolar cautery introduced into this operation. This one instrument can do the entire procedure without that additional risk of thermal injury.

So Harmonic ACE and retroperitoneal dissection are versatile, a dissector, cutter, and coagulator. One instrument for the entire operation, safe, and very well matched for retroperitoneal dissection.

Port placement is usually with a five-millimeter entry trochar. They're placed above the umbilicus for a larger uterus, lower quadrant right and left and suprapubic. A left upper quadrant is sometimes used for a prior midline incision if required to avoid injury upon placement to the bowel.

Direct entry is all accomplished, and for the cases that you'll see today, four five-millimeter ports are used. The scope is a five millimeter scope, high def. There is no need for a ten port at all for a scope or ten-millimeter scope. The five provide excellent visualization and eliminates a large incision, thereby decreasing pain. The graspers are Allis cupped, and also a five-millimeter single-tooth tenaculum. That tenaculum is very important for manipulating of large uteri in the pelvis, and really saves a lot of time during the procedure. Manipulator is a HUMI or a ZUMI, and a manipulator is important down below within the vagina because this prevents the need to apply another port site to manipulate the uterus in some cases.

We do not use cervical cup retractors for vaginal cutting at all. These are expensive. They take time to put in, and they do not effectively avoid injury to the bladder and ureter. The

procedure started initially with the transection of the round ligament, which is the start to opening up the perivesicle and perirectal spaces.

Dissection of these spaces occurs in the following order: The bladder flap is developed initially. After this is accomplished, the anterior broad ligament is taken down lateral to the infundibulum pelvic ligament. The perirectal space is then opened with visualization of the ureter, and then the uterine artery is identified and cut. This is accomplished by dissection below the ureter to the artery. The artery is skeletonized, and then the artery is then transected with the ACE approximately two millimeters medial from the internal iliac artery.

Once this is accomplished, the posterior broad ligament is now open. You actually are separating anterior and posterior broad ligament by performing a retroperitoneal dissection. That step allows you to either take the ovaries with transection of the infundibulum pelvic ligament or to preserve the ovaries with dissection of the ovaries off of the vascularized uterus.

Now the uterus has had both uterine arteries ligated at this point, so there's decreased blood flow; thereby eliminating heavy bleeding when the ovaries are taken down. A sponge stick is then placed into the anterior vaginal fornix, and here again we're eliminating the use of a cuff retractor and placing that sponge stick right up against the cervix. You can now open up the anterior vaginal cuff with the ACE back blade to expose the sponge stick.

Once the sponge stick has accomplished that task, a sponge in a glove is then placed in the vagina. This is very low tech but very effective. This is preserving the pneumoperitoneum, and now the procedure continues.

With the single-tooth tenaculum grasping the side of the cervix the cardinal and uterosacral ligaments can be taken down with the ACE, and then the uterus and cervix is detached. It's then removed either without morcellation if it's small enough or with morcellation if the uterus is too large. Abdominal morcellation is something we do rarely because we can morcellate most uteruses through the vagina. But when this is required, either a Gynecare morcellator can be used, or for uteruses greater than 20, 25 weeks, a protractor through a five to six-centimeter incision above the pubic bone can be placed and the uterus removed through that route.

Closure is always accomplished vaginally. We have gone through the process of laparoscopic closure with different instrumentation. We find that the vaginal closure is fast, very secure, and really provides a much better closure than a laparoscopic route.

And we're going to start with a -- port. This is a direct entry port. We're going to watch ourselves go right in through the fat and fascia, and now you can actually see bowel, so we're in right now. Okay. So she's got looks like a dermoid or some process on the ovary. They might have been imaging that as a fibroid, as well as some fibroids, so not too bad. Table down, please.

So we're going to start with a lateral port and we're going to visualize the epigastric artery right there. You can see that pulsating. We're going to twist as we go, and there's one. We're going to put one just above the pubic bone. I'm going to go directly through the round ligament. You can see the external iliac artery and vein. You can see the infundibular pelvic over here. So instead of going right across this with a standard approach, we're going to start way up over here. We're going to drill with the Harmonic right into that tissue and cut right through the rounds. Now this is going to open that space up.

You're going to see right here, this is the retroperitoneal space. We're starting to open up the perirectal space here right across this vessel and right across the anterior broad ligament. That's the goal of the surgery, to open up that entire anterior space. And you can use the back plate of the Harmonic to open tissue just like that. You see how close the uterine artery is. If you took too big of a bite you would get into that vessel.

So notice the way we're opening up the bladder here, as a retroperitoneal approach, right across the anterior bladder flap. Hugging the uterus a little bit. The target is to go between the vessels and the posterior broad ligament without opening up the posterior broad ligament. So this can all go. So we're going to come right on the backside of the ureter like that and we're going to continue dissect down in that direction.

Now the superior vesicle artery is sitting right next to it, so the perivesicle space goes up in this direction. So this is the superior vesicle and here is uterine. So now the advantage of this is look how small this vessel it at its take-off point. So, again, the internal iliac right here. Here is the external iliac here, the vein. Here is the ureter. Here is the superior vesicle artery.

So I'm going to go ahead and take this right at its take-off point from the internal iliac right here. Dead blade against the ureter, and I'm going to fire on max. Okay. So we're going across around on this side, and we're going to go anteriorly towards the bladder flap once again. So just go ahead. And you can see where we're headed for. We're going to undermine a little bit, keeping in mind that the uterine artery is pretty close. Go up higher towards the uterus more. Okay. That's good.

And here we're going to lift the bladder flap up a little bit more, and we're going to meet that dissection point. So we have taken anterior broad leaf down on this side. Now we're going to work on the anterior broad leaf below the bladder. You can see the infundibular pelvic. And she's keeping the jaws of the Harmonic just above the external iliac artery. And she's going to down as far as she can to the apex. There's that triangle.

The sides of the triangle are the external iliac medially; the infundibular pelvic ligament laterally. So you can see the uterine artery right there, and there's the superior vesicle. And she's going to take the uterine artery about two millimeters off of the take-off point from the internal iliac. Lift that gently. Good. You got it. Great. There's the transected uterine.

Open up the posterior broad ligament, and you can see behind it. We know the ureter is down low, so she's going to make a stab incision there and she's going to clamp that and extend that incision, and she skeletonized the IT a little bit already, and she's going to cut that now. Continue to dissect that bladder off within the space. Okay. Yes.

Now the sponge stick is going to go into the vagina, so the ZUMI is going to come out. Pull that out, please. And the sponge stick is going to go in. The bladder is completely free. Now, we're not using a cone manipulator. We're not using any other cupped-type of cervical instrument to try to find the plane. We've already established the plane. We know where the bladder is. We know where the ureter is. We know where the uterine artery is. The manipulator isn't needed. You're saving time and money.

We're going to go right across using the back blade of the Harmonic into the vagina. You can pierce with the instrument. Use the back blade to cut into the tissue. And you can see the sponge developing right there. Now I'm going to open this as much as I can like a big

smile. Because the more tissue I take down here, the easier it will be to take out the rest of the uterus and cut through the cardinal and uterosacrals.

Anatomically we know where the ureter is exactly, big pedicle here. You can see me lifting the uterosacral right up. We've taken down part of the cardinal. We're now taking down part of the uterosacral itself. And look at the big bites of tissue you can take. You can take very large bites with this, gather it up into the jaws clamp, and just fire on high. I haven't used men on any part of this case.

All we have left at this point now is the cardinal and the uterosacral on that side, and you can see clearly where the cervix is. Yeah, she's going to right across. Again, the plane will be from here down to there. So she's hugging the cervix a little bit more, and she's taking down the rest of the uterosacral and going across the posterior vagina. And we're just about ready to detach this. Okay. Great. So there's the mass, the uterus, everything coming right through the vagina.

Now we're going to go ahead and go below and close the vagina from below. Anterior vagina here. We're now grasping the uterosacral here. Remember, we cut the uterosacral off the cervix right next to the cervix. So the ligament is still intact, and we're going to pass a stitch right bang about a centimeter into the ligament itself, incorporating it into the vagina.

Now I use a running suture. I do not use a locking suture, and I use two sutures that meet in the center, both incorporating the angles, you know, either extracorporeal or intracorporeal. It takes longer. The approximation is not as good, so this is really a far superior approach, in my opinion, than going from above. And you can see the uterosacral is incorporated nicely right into the vagina here and here. You see the ligaments there. We'll irrigate a little bit here. Okay.

Well there you have it. That is a laparoscopic approach to removal of a uterus by a retroperitoneal dissection. I do appreciate your spending time with us this evening watching this new and valuable approach. I would like to thank both George Washington University and, of course, the patients for allowing us to video them during surgery. I also want to thank, especially Ethical and Endo surgery for sponsoring this "OR-Live" webcast, which provides a nice way for physicians to look into new techniques in laparoscopic surgery.

We do have a program in April in D.C., right around cherry blossom time. We're actually going to show some of these surgeries live. And we would love physicians to come and watch how this is done. There's a lot more you can gain in a live presentation. You can see where the ports are placed. You can see how the uterus is manipulated. And I believe it's a very informative way to learn more at retroperitoneal dissection.

It's not just for hysterectomies. It will be applied for endometriosis and other cases. So if you're interested, please let us know. We would be more than happy to have you come down and work with us on these cases. Once again, I thank you for attending, and goodnight.