Chapter 10

Initial Pedicles and Where is the Ring?

"Before You Die You See The Ring"

-Rachel Keller, The Ring (2002)

As stated, the majority of the procedure should be performed with the main surgeon having one hand on the Ligasure™ and the other hand firmly on the uterine manipulator.

This can be somewhat counter-intuitive for laparoscopic surgeons who are used to performing procedures using two hands, and manipulating an instrument in each (i.e. grasper and power instrument.) In this case, the surgeon manipulates the uterus against his or her bipolar ligating device, and later against the monopolar cautery, and we perform almost the entire procedure from this perspective. The assistant will be used to expertly position the camera, especially in executing the advanced technique of positioning the camera in a more lateral than natural perspective in order to best use the 30 degree offset to best visualize the operating field.

Again, I would prefer a Fornisee™ lighted uterine manipulator if available, secondary the multiple advantages it entails, however any vaginal manipulator with a ring that can be visualized can be used. Skilled positioning of the camera is critical to the success of the technique, therefore the assistants must become experts at placing the camera in a "counterintuitively" lateral position in order to use the 30 degrees offset to the surgeon's best advantage.

This is *literally* the opposite goal of direct visualization during robotic surgery, and can take quite a bit of practice to master. Care must be taken as to whether the camera is best positioned above or below the operating instrument based on the position of the uterus and the body habitus. If every movement of the operating instrument moves the camera as well, although this may be a necessary annoyance for difficult parts of the procedure, this is not the ideal circumstance for the entire procedure. Dissection should progress from this perspective and should then go forward, taking the major pedicles of the uterus, including

the fallopian tubes, round ligament, both leaves of the broad ligament, the cardinal ligament and the uterine artery. I recommend combining as many of these structures in as few bites as possible. I would recommend taking the bites through the ligaments as aggressively as possible, and with each bite the jaws of the power instrument should be snug against the uterus. Using the recommended bipolar devices will result in the sealing of the anterior and posterior lips of the leaves of the broad ligament, which will result in excellent hemostasis. As reported by many authors, I recommend pushing cephalad with your vaginal manipulator so that you are actually performing the circumferential colpotomy on the Ring of the vaginal manipulator cephalad to the utero-sacral ligaments.[41] Leaving the utero-sacral ligaments intact and attached to the vagina is a critical step of this hysterectomy and may have serious implications for preventing prolapse of organs later in the patient's life[42] (although some authors dispute this theory[43]).

A concept central to this entire hysterectomy is that these bites should be taken directly against the uterus if not within the uterus itself. Clearly this technique is not amenable to any type of cancer surgery where the intention is to remove surrounding tissues to prevent the spread of cancer. I also agree with the recommendation of other authors with the tenet that the removal of the Fallopian tubes is not appropriate at the time of initial hysterectomy, and that the Fallopian tubes should be removed later, after the uterus has been removed vaginally and even possibly until after the vaginal cuff has been sewn.[44] Doing so limits danger to the ureters and removes unnecessary interference in visualization. Bites should be taken on each side of the uterus until all ligaments are ligated and divided to the level of the circumferential colpotomy. Multiple burning of individual pedicles may be necessary at times, and as long

as the plane of dissection is kept snug against the uterus, no fear of lateral energy spreading is needed, regardless of device.

The next task that must be accomplished is the creation of a bladder flap and the movement of the bladder out of the operating field. Clearly, this task will be best accomplished with good visualization of the interface between the bladder and the uterus. As a manner of habit, I generally reduce all possible pedicles on each side of the uterus before turning attention to the bladder flap. Actual creation of the bladder flap is probably best made using the bipolar energy device after the uterine manipulator is used to push the uterus as laterally as possible to the patient's right side. This usually involves shifting the power device slightly to the right to come across the top of the isthmic portion of the uterus in order to create a plane in the uterine serosa. Radical pressure to move the uterus laterally from the vaginal manipulator can usually produce close to a 90 degree angle for this dissection.

Alternatively, this dissection can also be performed with an endoscopic extension on a Bovie™ device, although even with coagulating energy this will not be as hemostatic as the bipolar. From here, it should be relatively easy to push down the bladder using either the bipolar device or a second instrument such as a wavy grasper or Endo Kittner™ device. If there is any doubt that the entire bladder has been successfully removed from the operating field, consideration should be given for immediate backfilling of the bladder with saline through the Foley catheter in order to be sure the cephalad edge of the bladder is out of the operating field. Repeated filling, drainage and dissection may be required in complex cases. In cases of dissection where it becomes very difficult to see exactly where the bladder plane is, extreme precaution should be given to allow the possibility of leaving uterine serosa on

bladder tissue, as opposed to the extremely unfortunate event of a cystotomy. As discussed in previous chapters, some patients fear the indwelling presence of a Foley catheter more than the actual pain or risk of the surgery itself. Following the division of all pedicles and the creation of a bladder flap, circumferential colpotomy should be the last step in the hysterectomy from an abdominal approach.

For this procedure, the recommended tool is a Bovie™ cautery device with a laparoscopic hook extension attachment. Preferably 35 watts of coagulating current should be used, as cutting current is unnecessarily deficient in hemostasis, and the vaginal vault has an excellent blood supply that one need not fear interrupting. I would also highly recommend a handheld Bovie™ device, with controls in the surgeon's hand as opposed to a foot pedal. Stepping on foot pedals can be cumbersome and also adds an additional element of danger to the surgery, especially if unintentional activation of the power device occurs. Clearly, manipulation of the 30° laparoscope will be necessary in order to visualize the anterior and posterior portions of the uterus in order to form the circumferential colpotomy.

There are several techniques that you must learn in order to successfully and quickly perform the circumferential colpotomy. First, the anatomical location of the bladder and the nature of the anterior abdominal wall mean that it is much safer to have your cautery bounce off into the anterior aspect of the abdomen than the posterior aspect, and therefore it will be preferable to perform your colpotomy from a posterior to anterior approach. The best tool for this will be the laparoscopic extended hook cautery, and I would again suggest this be attached to a hand-held monopolar Bovie™ device, not with a cumbersome foot pedal. You should begin the colpotomy after all pedicles

have been dissected and the bladder has been pushed well out of the operating field.

Please note that, although in this technique I only recommend closing the vaginal cuff and not specifically closing the parietal peritoneum, if your goal will be to modify my technique to close the parietal peritoneum as well, then you're going to have to push the bladder even farther out of the operating field in order to leave yourself enough room so as to sew the two leaves of the peritoneum together. If you were following the techniques in this book to the letter and not closing the peritoneum then you simply need to move the bladder out of the area of the colpotomy to complete the procedure.

Once you are sure that all pedicles are hemostatic, you've pushed the bladder out of the way of the impending colpotomy, and you have denuded the tissue in the paracervical area to expose the outline of the manipulator ring all the way around, you can begin the colpotomy. I recommend beginning the colpotomy by grasping the posterior vagina with the endo-hook either directly against or, in some configurations, placed into the groove of the vaginal ring of the manipulator. I recommend starting on whichever side you feel will be the easier side, and starting your colpotomy from about 5 to 15 degrees on the contralateral side of the absolute bottom of the manipulator ring.

Thus, you will almost immediately be crossing the midline as you perform your colpotomy. I recommend using coagulating current as there is no danger of stripping this area of the anatomy of its robust blood supply. My common setting is 35 watts of coagulating current. You should then complete the first half, (or 55-65%) of your colpotomy and then switch to the opposite side, ending at approximately the absolute top of the vaginal ring. If the tissue has been properly denuded and all vessels ligated

prior to the colpotomy, you will often find that no further dissection is necessary and that you can cleanly make the colpotomy in one pass. Ideally you would then move to the other side and finish the remaining 140-160 degrees of the colpotomy from that side. Although the manipulator ring, even when coupled with a rod-like uterine body manipulator, does not have the ability to "swivel" the vagina very much against the ring, the small amount of movement that can be performed can be extremely useful and, in difficult cases, can allow you to visualize the start of your contralateral colpotomy so that you can continue the incision all the way around in one motion. Mastery of these twisting movements of the manipulator is critical for fast, efficient, repeatable colpotomy. It's also critical that the bladder edge is pushed out of the operating field prior to attempting to complete the colpotomy. Dissection in the area of the utero-vesico fascia is described above.

The techniques for performing circumferential colpotomy depend heavily on the ability to sustain a pneumoperitoneum at time of colpotomy. As I have done in previous aspects of this surgery, I will rate for you the methods for obtaining pneumoperitoneum from worst to best. The absolute worst is the attempt of packing the vagina with moist laparotomy sponges in order to achieve pneumoperitoneum. In my opinion this has the same effect as "wishing really hard."

A slightly more effective approach will be to pack those wet sponges inside sterile surgical gloves and then pack those in the vagina. This also usually fails, especially if a vaginal manipulator is constantly dislodging them. The superior practice will be the use of pre-manufactured pneumo-occluder balloons. These balloons can be useful for maintaining pneumoperitoneum, however I would strongly recommend filling those balloons with saline instead of air, and know ahead of time exactly how far you

can get away with insufflating them without the balloon bursting. Manufacturers are notorious for suggesting that you under inflate their balloons below maximum efficacy so that you will never have a balloon rupture inside a patient.

Lastly, if you want the best, as so often is preferred in life, you have to pay for it. The previously described Fournisee™ has a rubber pneumo-occlusion ring that, once placed in the vagina, essentially never fails, regardless of the amount of manipulation.

I recommend turning off the insufflation while leaving the Tri-Port™ in place as you move the vaginal perspective. Please be mindful of escaping pneumoperitoneum vaginally, especially if you are not wearing eye protection!

References:

42) Koh, C. H. (1998). A new technique and system for simplifying total laparoscopic hysterectomy. The Journal of the American Association of Gynecologic Laparoscopists, 5(2), 187-192.
43) Rahman H, Trehan N (2017) 'Adenomyosis': The Enigma. Adv Laparoscopy 1(1):29-33.
44) Schaffer, J. I., Wai, C. Y., & Boreham, M. K. (2005). Etiology of pelvic organ prolapse. Clinical obstetrics and gynecology, 48(3), 639-647.
45) Tormena, R. A., Ribeiro, S. C., Maciel, G. A., & Baracat, E. C. (2015). Single-port laparoscopic hysterectomy: preliminary results. Revista da Associação Médica Brasileira, 61(5), 446-451.