Optimizing Efficiency With Robot-Assisted Laparoscopic Sacrocolpopexy

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Learn detailed tips on robot-assisted sacrocolpopexy from this experienced cutting-edge team, then watch a video of the procedure online.

Since it was first described by Lane nearly 50 years ago, the sacrocolpopexy procedure has evolved tremendously.[1] Once a relatively morbid open abdominal procedure, this operation is now routinely performed laparoscopically, either with or without robotic assistance. Two recent studies support the use of robotic assistance for sacrocolpopexy.[2,3] In 2005 our team began a transition away from traditional laparoscopic techniques toward the use of robotic assistance for these cases. Having now performed more than 300 robot-assisted laparoscopic sacrocolpopexies, we have adopted some new time-saving techniques that do not involve shortcuts that may change the nature of the procedure (such as the use of staples).

In 2008, we published a detailed description of our robotic techniques in this journal.[4] The purpose of this month's article is to provide an update that includes our newest surgical improvements. **Video of the procedure is available on YouTube at www.youtube.com/watch?v=ScVlmysgsC4 to further illustrate our descriptions (Figure).**

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PATIENT SELECTION

In our current program, we prefer to offer the laparoscopic sacrocolpopexy to our "more active" patients with posthysterectomy vaginal vault prolapse or uterine prolapse, as long as they seem capable of tolerating a 2- to 3-hour operation in a very steep Trendelenburg position. We prefer a vaginal surgical approach for patients with true isolated anterior or posterior defects and for "less active" patients who may also have significant comorbidities.

FOCUSPOINT

Having now performed more than 300 robot-assisted laparoscopic sacrocolpopexies, we have adopted some new time-saving techniques that do not involve shortcuts.

CASES INVOLVING A UTERUS

Supracervical Hysterectomy

We use monopolar scissors and bipolar forceps for the hysterectomy and dissection of vesicovaginal and rectovaginal spaces. We try to leave behind the smallest amount of cervical tissue possible, without inadvertently creating a defect in the vagina. In order to optimize the location of cervical amputation, we mark the desired level of amputation on the posterior cervix (using electrocautery) just above the insertion of the uterosacral ligaments. Then we prepare the anterior leaflet of the broad ligament for the final closure by leaving as much as possible. Once the uterine vessels are adequately exposed, it is best to cauterize the anterior and posterior branches separately. The amputation is made easier by placing adequate tension on the uterus with the tenaculum and barely touching the tissue with the electrified shears. We find it helpful to remain oriented to the posterior mark. Because the robotic single tooth tenaculum can be difficult to maneuver

FOCUSPOINT

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safely in tight spaces, we do not like to use it to transfer the uterus to the upper abdomen. Instead, we use the bipolar forceps for this task.

Anterior Vesicovaginal Space Dissection

Next, we grasp the anterior cervix with the robotic single tooth tenaculum and create tension by pulling toward the sacral promontory. This usually obviates the need for any vaginal instrumentation and saves the time and frustration associated with verbally instructing the vaginal probe holder. The endpoints of the anterior dissection include the bladder neck distally and the lateral vaginal sulcus. The latter is usually identified by longitudinal vessels that constitute the limit of the dissection. We hold the bladder peritoneum anterior and cephalad to expose the vesicovaginal plane of dissection. In that plane we try to create vertical fingerlike strings of tissue by gently pushing the loose areolar tissue. We use energy to cut strings of tissue that are less amenable to pushing and find it important to move evenly across the anterior vaginal wall in progressive horizontal sections. Depending on the total vaginal length, the anterior dissection would vary between 4 and 6 cm of anterior vaginal wall exposed beyond the distal edge of the cervix.

Posterior Rectovaginal Space Dissection

The detailed visualization of the rectovaginal space provided by the robotic approach is unique. We begin by identifying the rectal reflection, the bottom of the cervix, and the insertion of the uterosacral ligaments. We grasp the posterior cervix with the tenaculum and pull anterior and toward the pubis but do not attempt to peel the peritoneum down from the cut edge of the cervix. Instead, we begin our posterior dissection about 1 cm below the bottom of the cervix and significantly higher than the rectal reflection. Starting closer to the rectal reflection will increase the risk of rectal injury and make the visualization more difficult due to a "curtain" of peritoneum hanging down from the cervix.

We incise the peritoneum horizontally from one uterosacral ligament to the other, then using a combination of sharp and blunt dissection we expose the posterior vaginal wall from one sulcus to the other. The scope is then advanced into the posterior dissection space, which creates the impression of being in a "room" where the ceiling is the vagina, the floor is the rectum, and the distal wall is the perineal body. The length of the posterior dissection depends on the patient's defect and defecatory dysfunction.[5] For larger defects and/or defecatory dysfunction, the dissection is continued down to the perineal body.

Sacral Dissection

We have adopted a minimalist approach to the sacral dissection. We expose just enough of the anterior longitudinal ligament to place 2 sutures safely, starting at the level of the promontory and progressing caudally. The peritoneum is opened overlying the promontory using cautery, allowing the hot air from the energy to diffuse into the underlying areolar tissue. This helps to identify avascular windows that we use to further the dissection closer to the ligament. Meticulous hemostasis is paramount, as it allows for superior visualization of the surgical planes.

The key is to remain oriented at all times in regard to the promontory and be mindful of unintended dissections of the lateral (hypogastric), superior (common iliac), or inferior (lateral sacral) veins. We extend the peritoneal incision down into the cul-de-sac, splitting the difference between the ureter and the rectosigmoid to join the posterior dissection. We incise the peritoneum layer only and spread the underlying areolar tissue just enough to ultimately facilitate peritoneal closure over the mesh as the final step of the case.

FIGURE. Robotic sacrocolpopexy.
Video available at www.youtube.com/watch?v=ScVImysgsC4.

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MESH PREPARATION AND SUTURES

We currently use the Restorelle Y mesh. We cut the mesh arms based on information gathered from the office pelvic organ prolapse quantification examination plus examination under anesthesia prior to surgery. Typical posterior length is 8 to 10 cm; the anterior arm is cut down to 6 to 8 cm. These measurements account for an average of 2 cm for the cervical length; the rest represent vaginal coverage beyond the distal edge of the cervix.

We then fasten the anterior arm of the Y mesh to its sacral arm using a loosely tied suture; this keeps the anterior arm out of the way during the posterior suturing. We use soft, nonabsorbable, monofilament small-size sutures such as the Gore-Tex CV4 suture on a TH-26 needle. Delayed absorbable monofilaments would be an acceptable alternative.

Posterior Vaginal Wall Suturing

As stated above, we start by attaching the mesh to the posterior vaginal wall. We grasp the cervix with the tenaculum to place it under tension. We start with the mesh then pass through the vagina and tie; the knot will lie between the vagina and the mesh. This will keep the mesh out of the field of vision and out of the instrument's working path. The first row of sutures is essential and can be challenging. We place 3 sutures to secure the mesh to the distal end of the dissected posterior vagina, just above the junction with the rectum. Pushing down on the rectum then brings that distal aspect of the dissection into view. Next we move up approximately 2 cm and place an additional suture in the midline. We then move up another 2 cm and place 2 lateral sutures; we repeat the lateral sutures up to the uterosacral ligaments. Well-placed sutures save time, as they decrease the need for extra sutures to correct a misaligned or gathered mesh. It is crucial to get the vagina as lateral as possible to avoid creating a narrow strip of coverage.

CERVICAL CLOSURE AND ANTERIOR WALL SUTURING

Once the posterior arm of the mesh is secured, we proceed to close the cervix. We use a zero monocryl running suture and apply an absorbable clip (Lapra-Ty) (off-label use) on each end in lieu of knots.[6] We close the cervix for 2 major reasons: first to prevent any vaginal discharge from the cervical os due to inflammation; second, the anterior vaginal wall is pulled up and behaves as one structural unit with the cervix.

We cut the loose suture holding the anterior mesh arm back, then we lay the anterior mesh on the vagina, grasp the anterior cervix through the mesh, and pull toward the promontory. No vaginal instrumentation is used. We place the first row of 3 sutures at the very distal end of the dissection. We go through mesh, then vagina, then back through mesh and tie. As opposed to the posterior wall, anteriorly the knots will lie on top of the mesh. We then place additional lateral sutures every 2 cm up to the cervix. In patients with a large anterior defect, where the vagina is wider than the mesh, we will go to the lateral edge and gather the vagina to the mesh. This will create vaginal folds that we call "neorugae." A minimum of 5 anterior and 7 posterior sutures are required to ensure adequate coverage and decrease the risk of pull out.

FOCUSPOINT

Well-placed sutures save time, as they decrease the need for extra sutures to correct a misaligned or gathered mesh.

SACRAL SUTURING AND PERITONEAL CLOSURE

Next we close the peritoneum over the vaginal mesh using a zero monocryl with a Lapra-Ty clip at its end. We start from the left round ligament down to the rectovaginal peritoneal cut edge up through the anterior bladder peritoneum. After multiple passes across the anterior bladder peritoneum, the right round ligament is reached, and we proceed down to the cut edge of the pelvis peritoneum overlying the right uterosacral. Next we go over the mesh to the posterior rectal peritoneum, back through the anterior peritoneum, and place a Lapra-Ty clip. We will close the rest of the peritoneum over the mesh after the sacral suturing. Pull-out studies support the placement of sacral sutures at the level of the promontory as the orientation of suture placement does not matter (vertical vs horizontal).[7]

We routinely place 2 sutures starting at the promontory and one just below. First, we tension the mesh by having the assistant place a hand in the vagina. We use a zero Ethibond suture on an SH needle; start with the needle perpendicular to the ligament, then turn and start pushing and follow the needle curve. While tying the sacral sutures, the tension is taken off the mesh by using a vaginal probe. Care should be taken to have the knot lying flat

on the sacrum without any intervening space. We finish the peritoneal closure over the mesh using the same zero monocryl suture, bringing the peritoneum from the right pelvic side to the rectosigmoid side and place a Lapra-Ty clip at its end over the promontory.

We undock, morcellate, then close the fascia at the umbilical port while the assistant is performing the cystoscopy and any vaginal procedure such as sling or perineorrhaphy. Note that we never switch scopes during the procedure; we only use a zero-degree scope. So far we have not had to convert any case to an open surgery.

POSTHYSTERECTOMY CASES

Often patients have significant adhesions in the cul-de-sac and to the pelvic side wall. These adhesions could give the appearance of a "false cul-de-sac," which increases the risk of injury. Caution should be taken to restore normal pelvic anatomy prior to beginning the vaginal and sacral dissections. In order to achieve adequate dissection in posthysterectomy cases, a vaginal probe is needed. A cone tip probe would be more suitable for initiating the right plane anteriorly; a wider probe would work better during the remainder of the dissection and suturing. For the posterior dissection and suturing we use a wide and long Breisky retractor to allow for better visualization.

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