Although the best approach to treatment of the obliterated cul-de-sac and excision of rectovaginal endometriosis is surgical, this laparoscopic procedure can be a daunting task for even the most experienced minimally invasive gynecologic surgeon. The potential risk to the rectum and ureter must be immediately recognized. It is for this reason that Dr. Harry Reich, one of the legendary pioneers in minimally invasive gynecologic surgery, stated over 20 years ago that dissection of the obliterated cul-de-sac and excision of deep rectovaginal endometriosis was the most difficult procedure in the gynecologist’s armamentarium.

Obviously, the anatomy has remained unchanged, but safety has been enhanced through the creation of a strategic approach for dealing with this unique surgical dilemma. For this current issue of the Master Class in Gynecologic Surgery, I have called upon Dr. Resad Pasic, who was my vice president during my tenure as president of the AAGL and who is now the immediate past president of that organization. Dr. Pasic is professor of obstetrics and gynecology, the director of the section of operative gynecologic endoscopy, and a codirector of the fellowship in laparoscopy and minimally invasive surgery at the department of ob/gyn and women’s health at the University of Louisville (UofL).

As the director of the postgraduate course on advanced laparoscopic anatomy, dissection, and operative pelvic surgery on unembalmed female cadavers, Dr. Pasic’s expertise in anatomy and minimally invasive gynecologic surgery makes him an excellent candidate to lead the discussion of the systematic approach to the obliterated cul-de-sac and excision of rectovaginal endometriosis. Joining Dr. Pasic as coauthors for this Master Class are Dr. Jessica A. Shepherd and Dr. Joseph L. Hudgens, the current clinical fellows in the division of gynecologic endoscopy at the University of Louisville.

Dr. Shepherd obtained her medical degree from Ross University in Roseau, Dominica, in 2005 and then completed her internship and residency at Drexel University in Philadelphia. In addition to her current involvement as a fellow in gynecologic endoscopy, Dr. Shepherd is also completing her MBA at the University of Louisville. She is currently a member of the AAGL and serves on the ad hoc review committee for the Journal of Minimally Invasive Gynecology.

Dr. Hudgens obtained his medical degree from the University of Arkansas, Little Rock, in 2005. He completed his residency training in ob/gyn at the University of Louisville in 2009. Dr. Hudgens recently completed a fellowship in minimally invasive gynecology in 2010 and has joined the Center for Women’s Health at Owensboro Medical Health System in Owensboro, Ky. Dr. Hudgens also is currently an active member of the AAGL and serves as a member of the ad hoc review committee for the Journal of Minimally Invasive Gynecology.

**Obliterated Cul-de-Sac Dissection**

**Pathophysiology**

The presence of deep endometriotic lesions in the posterior cul-de-sac is, again, likely a consequence of metastasis of Müllerian rests, and the nodules are composed of smooth muscle proliferation and fibrosis, which is a result of infiltration. The endometriotic foci migrate to the rectovaginal area, where hyperplasia of smooth muscle incites an inflammatory response; this evolves into retraction, which then leads to pelvic fibrosis and a subsequent reduction in uterine mobility and distortion of the pelvic anatomy. DIE lesions have been classified through studies by Dr. Philippe Koninckx and his colleagues into three types based on their depth of invasion and location. Type I lesions are conically shaped rectovaginal septum nodules and are located between the posterior and anterior walls of the vaginal mucosa and rectal muscle layers, respectively. Lesions categorized as type II are deeply located and form from the posterior fornix to the rectovaginal region. They are typically covered by extensive adhesions causing retraction. The most severe lesions—type III—are composed of spherical nodules. The largest dimensions of these lesions is located under the peritoneal fold of the rectouterine pouch of Douglas. The cranial movement of these posterior fornix lesions eventually causes the nodules to join the anterior rectal wall and creates an “hourglass”-like appearance.

**Anatomy**

It is important to appreciate the relationships of the avascular spaces and their relevance to the dissection of the obliterated cul-de-sac and excision of rectovaginal endometriosis. Also remember that the ureter enters the pelvis over the bifurcation of the common iliac and medial to the infundibulopelvic ligament (see photo below).

The pararectal space is bordered laterally by the pelvic sidewall, anterolaterally by the cardinal ligament, and medially by the rectal pillars. The ureter courses beneath the peritoneum and through the rectal pillar.

The rectovaginal space is bordered laterally by the uterosacral ligaments, anteriorly by the vaginal fascia, and posteriorly by the rectal fascia.

The potential surgical space between the ureter and uterosacral ligament is utilized to transect the uterosacral ligament, which provides a means of access from the pararectal space into the rectovaginal space.

**Instrumentation and Process**

Surgical management of DIE is essential for restoring pelvic anatomy, relieving pain, and improving quality of life. It is important to visualize the extent of disease and select the optimal surgical technique. This can be achieved through the use of laparoscopy and laparotomy. Laparoscopy is preferred for DIE because it allows for a thorough examination of the pelvic anatomy and a more precise identification of the involved structures. It also allows for the placement of adhesions or instruments, which can be useful for identification of the involved structures.

The pararectal space is bordered by the pelvic sidewall, the cardinal ligament, and the rectal pillars. The rectovaginal space is bordered by the uterosacral ligaments, the vaginal fascia, and the rectal fascia.
Continued from previous page
debrating pelvic pain, and eliminating endometriotic nodular foci. Laparo-
sopic surgery provides magnified views of the posterior cul-de-sac and its pathol-
y, and results in less postoperative pain and decreased recurrence of
adhesions.

Instruments typically utilized during these procedures include monopolar
scissors, bipolar coagulation, and the Harmonic scalpel.

Energy sources that provide the least amount of lateral spread are key in these
procedures as the relationships of the pelvic organs, ureters, and rectum are
exceptionally close.

The systematic approach of resecting these nodules entails restoring the nor-
aman anatomy relationships of the ad-
nexa and sigmoid, then dissecting the obliterated cul-de-sac and performing a
thorough excision of the rectovaginal endometriotic lesions.

We have divided the procedure into four parts: ureterolysis, dissection of the
rectovaginal septum, excision of the rec-
tovaginal nodule, and reconstruction.

When the ureters and bowel are in-
volved, and during the disease process, the sur-
gical approach should take into account
the importance of restoring normal anatomy. The use of uterine manipula-
tors with a colpotomy cup can help de-
lineate the posterior vaginal fornix and

the rectum. The introduction of rectal and vaginal probes during the surgery
will improve the exposition and excision of the lesions (see figure above).

After pneumoperitoneum is estab-
lished and maintained at 15 mm Hg, we
have used a standard technique of plac-
ing a 10-mm trocar in the umbilicus for the laparoscope and three 5-mm an-
cillary trocars. One 5-mm trocar is placed
at the right at 10 cm lateral to the um-
bilicus, and two 5-mm trocars are placed
to the left (10 cm lateral to the um-
bilicus and in the left lower quadrant).

A thorough examination of the ab-
domen and pelvis should be performed
to assess the disease and degree of dis-
section needed to successfully access the
rectovaginal space. To excise the lesions, we have used the bipolar Rolli forcps
(Karl Storz), monopolar scissors, and the Harmonic scalpel.

Ureterolysis

In all of our cases thus far, ureterolysis
was performed before resection of any
DIE nodules. The ureter crosses the
pelvic brim close to the bifurcation of the
common iliac artery, at which point it be-
comes the pelvic ureter. It continues on
the pelvic sidewall medial to the in-
fundibulopelvic ligament as it crosses the
external iliac artery. Branches of the
internal iliac artery supply the descend-
ing portion of the ureter and move along
the course of the ureter from the lateral
aspect.

The dissection of the ureter begins at
the pelvic brim where the anatomy is
normal. The peritoneum superior to the
ureter is grasped and entered, and the in-
cision is extended. Medial traction is
placed on the inferior edge of the peri-
toneal incision, and dissection is contin-
ued in the fat/nonfat interface until the
ureter is identified.

The ureter is surrounded by a layer of
loose areolar tissue; this layer is entered
by using a blunt dissector to dissect par-
allel to the ureter. Small vessels should
be coagulated in the process to ensure
visibility. The ureterolysis is directed to-
ward the uterosacral ligaments and con-
tinued until the ureter enters the card-
inal ligament (see photo above).

When complete obliteration of the cul-
de-sac is present and the uterosacral
ligaments are obscured bilaterally,
ureterolysis is carried out on the oppo-
site side to improve pelvic anatomic
restoration. The dissection is sufficient
when both ureters are mobilized com-
pletely and when each can be traced from
the pelvic brim to its insertion into the
bladder (see photo above).

Dissection of Rectovaginal Septum

The next step is to enter and dissect the
rectovaginal septum. Prior to excision of
the nodule, the pouch of Douglas is first
accessed by freeing the area from any ad-
hesions or ovarian endometriomas.

After the successful bilateral ureterol-
ysis, the ureters can be identified and the
posterior fornix can be delineated with
the rectal probe and colpotomizer.

The posterior fornix is then pushed
upward, and a transverse incision is
made over the posterior cervix superior
to the rectum—an area also known as

To transect the rectovaginal septum,
place the uterus on stretch in the
anteverted position. The rectal probe
is placed in the rectum and the
uterosacral ligament is identified and
transected with the harmonic scalpel.

Continuing along the original shape
(triangular) of the pouch of Douglas
(see photo at bottom of column).

One might find that the nodule
extends into the pararectal fascia, the
muscular layer of the rectum, the pos-
terior vagina, or the rectal wall. The rec-
tal probe is used to help delineate the
rectum from the remaining lesion. Such
lesions can often be dissected with sharp
scissors or may require excision with a
Harmonic scalpel.

Reconstruction

The last step is the reconstruction of any
structures that were compromised dur-
ning the dissection. The patient is given IV
indigo carmine to ensure the ureters are
not compromised, and a cystoscopy is
performed at the conclusion of the case
to confirm function. The rectal wall in-
tegrity is confirmed with the injection of
dilute indigo carmine through an 18
french Foley catheter placed in the rec-
tum or via an air leak test performed
with the aid of a proctoscope.

Because the fibers of rectovaginal sep-
tum run vertically and blend with the
muscular wall of the vagina, some deep-
infiltrating lesions are part of the vaginal
wall, and in these cases excision of the af-
fected area of the vagina is necessary.

Once these lesions are fully resected,
the vagina is reattached to the cervix by
means of an interrupted figure of eight
suture, and the anterior rectal wall is also
reinforced with sutures. The pneu-
monoperitoneum can be maintained by us-
ning a blue suction bulb in the vagina.

Once the reconstruction is completed,
the restoration of the pelvic anatomy
should be apparent and additional
attention should be paid to defects to
ensure proper closure.

The surgical management of recto-
vaginal endometriosis nodules can be
technically demanding as it can include
the repair of the vagina, bowel, bladder,
and ureters. A systematic approach and
adequate endoscopic experience, howev-
er, can significantly decrease the risk of in-
jury. Taking the time to perform the
ureterolysis before the beginning of the
case, moreover, is beneficial in providing
landmarks and protecting the integrity of
the ureters. Although long-term experi-
ence is forthcoming, the surgical inter-
vention of DIE has proven to be bene-
ficial in the short term by decreasing
patients’ pain and improving their
quality of lifestyle.

DR. PASIC is a consultant for Ethicon
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Corporation, and CooperSurgical Inc. He
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The rectal nodule is grasped and placed
on tension. The rectal probe is used to
help delineate the rectal borders.