Laparoscopic Pelvic Floor Repair

Part II – Support

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LEVEL I SUPPORT—LAPAROSCOPIC APPROACH TO ENTEROCELE REPAIR AND VAGINAL VAULT SUSPENSION

Site-specific Enterocele Repair & Vaginal Vault Suspension

As previously mentioned, level 1 support involves the long paracolpial fibers which suspend the proximal vagina and cervicovaginal junction. The cardinal and uterosacral ligaments previously described merge with these fibers and attach to the pericervical ring. This network of connective tissue fibers and smooth muscle serves to prevent vaginal eversion. A disruption of the integrity of these fibers, as opposed to stretching, results in apical vaginal vault eversion. (Figure 3) The most common cause of this condition is hysterectomy with failure to adequately reattach the cardinal-uterosacral complex to the pubocervical fascia and rectovaginal fascia at the vaginal cuff.
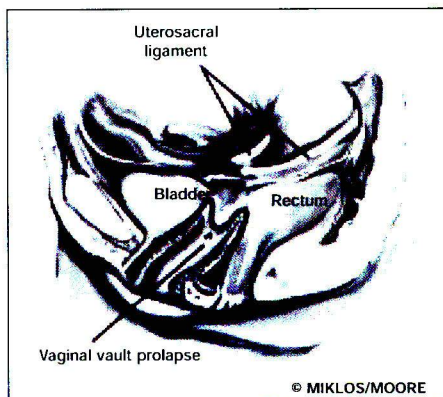

Figure 3. Vaginal vault prolapse – the apex of the vagina is prolapsed due to the lack of uterosacral ligaments attachment.

Enterocele repair begins first by anatomically defining the fascia defect present that results in the herniation of peritoneum and bowel through the apex of the vagina. An enterocele is defined as a pelvic hernia where the parietal peritoneum comes into direct contact with vaginal epithelium with no intervening fascia. (Figure 4) The development of
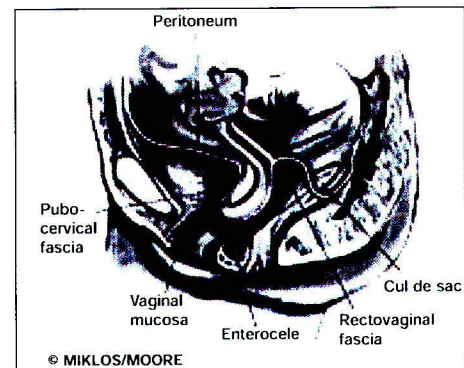

Figure 4. Enterocele – is defined as peritoneum in direct contact with vaginal epithelium with no intervening fascia. Note the difference between vault prolapse in figure 3 and enterocele here.

an enterocele is likely to be directly related to a disruption of the fusion of the proximal margins of the anterior pubocervical fascia and posterior rectovaginal fascia or failure to surgically reattach these two fascial margins at the time of vaginal cuff closure. It is possible that the surgeon may not incorporate the apex of the pubocervical and or the rectovaginal fascia at the time of closure of the vaginal cuff. Instead the surgeon may be only incorporating vaginal mucosa and unintentionally neglecting the reattachment of the supportive fascial layers. Poor surgical closure or disruption
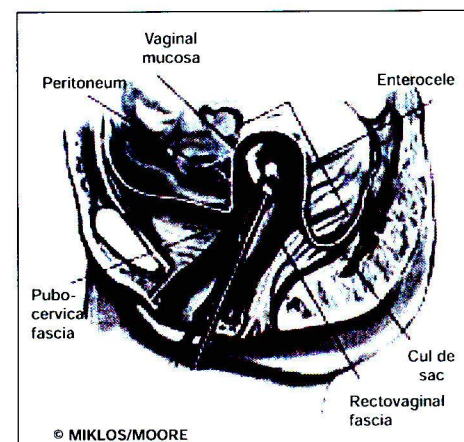

Figure 8. Reducing the enterocele. Identifying pubocervical and rectovaginal fascia utilising a vaginal probe.

at the apex of the pubocervical and rectovaginal fascia results in parietal peritoneum in direct contact with vaginal epithelium. Chronic rises of intraabdominal pressure will ultimately exploit this vaginal weakness with stretching of the peritoneum and vaginal mucosa and clinically evident symptomatic enterocele.

Laparoscopic uterosacral-ligament vault suspension and enterocele repair

The technique of laparoscopic uterosacral-ligament vaginal vault suspension and enterocele repair begins with identification of the vaginal vault apex, the proximal uterosacral ligaments and the course of the pelvic ureter. The identification of the vaginal vault and the delineation of the rectovaginal and pubocervical fascia are facilitated by the use of a vaginal probe. (Figure 8) Using the vaginal probe, traction is placed cephalad and ventrally,
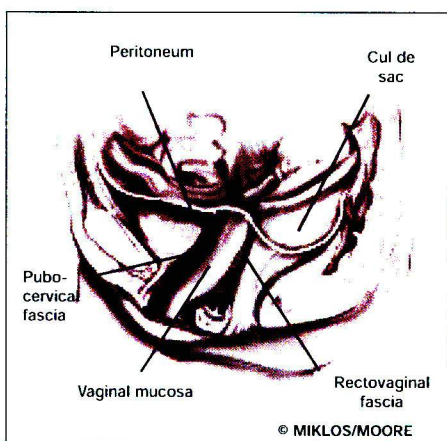

Figure 9. Excision of enterocele sac – please note it is te apex of the vagina which has been excised.

causing the uterosacral ligaments to stretch so they can be identified and traced backward their most proximal point of origin, lateral to the sacrum. At this level, the uterosacral ligament is usually about 4 cm below the pelvic ureter. The peritoneum overlying the vaginal apex is incised to expose the pubocervical fascia anteriorly and the rectovaginal fascia posteriorly. If the enterocele sac is large, it may be excised and the apical edges of the pubocervical and rectovaginal fascia should be exposed. (Figure 9)

A full-thickness purchase of the uterosacral ligament at its proximal portion is secured with nonabsorbable suture. These sutures are then placed full thickness, excluding the vaginal mucosa, through the ipsilateral rectovaginal fascia and then corresponding pubocervical fascia in the region of the lateral vaginal fornix. Extracorporeal knot tying secures the uterosacral ligament to the apex of the newly formed vaginal cuff, which consists of pubocervical and rectovaginal fascia. Suture tying not only elevates and secures the apex of the vagina to the uterosacral ligament (vault suspension), but it also allows for coaptation of the rectovaginal and
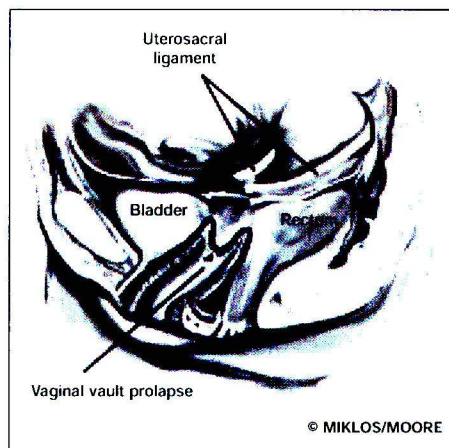

Figure 10. Enterocele repair: is accomplished by the reapproximation of the anterior pubocervical and psoterior rectovaginal fascia. Failure to suspend the apex of the vagna will result in a persistent apical vault prolapse as seen here
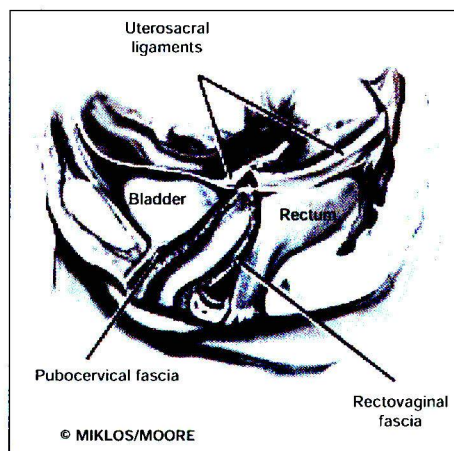

Figure 11. Vault suspension: is achieved by incorporating the uterosacral - cardinal complex to the newly constructed apex of the vagina, and vault suspension.

pubocervical fascia at the apex (enterocele repair). (Figure 10, 11)

Laparoscopic sacral colpopexy

Abdominal sacral colpopexy remains one of the most successful operations for the treatment of vaginal vault prolapse with excellent results on long-term follow-up. If the surgeon utilizes laparoscopy as a means of surgical access and performs the sacral colpopexy in the same manner as in the open abdominal approach, operative cure rate should theoretically be equivalent.

Port placement is based on the surgeon's preference, skill and acquired technique. Once the operative ports have been placed the vagina is elevated with a probe and the peritoneum overlying the vaginal apex is dissected posteriorly exposing the apex of the rectovaginal fascia. Next, anterior dissection is performed to delineate the apex of the pubocervical fascia. A separation between the rectovaginal and pubocervical fascia

confirms an enterocele. If a small enterocele is present it should be repaired in a site-specific fashion by imbricating the stretched vaginal epithelium between the apical edges of the pubocervical and rectovaginal fascia. Permanent suture can be utilized in a continuous purse-string fashion or in interrupted fashion. A large enterocele should be resected so the excessive vaginal epithelium is not utilized as a point of mesh attachment. Theoretically, suturing the mesh to the enterocele sac, instead of the more supportive pubocervical and rectovaginal fascia, may predispose the patient to an increased the risk of mesh erosion, suture pull-out and/or surgical failure.
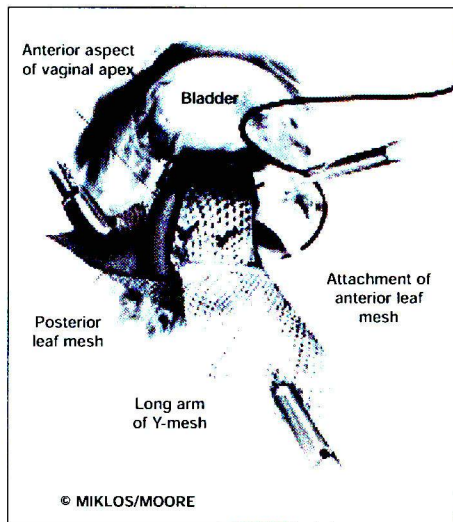

Figure 13. Sacral colpopexy: attaching the anterior leaf of the Y-shaped polypropolene mesh to the pubocervical fascia.

Attention is then directed to the sacral promontory and the presacral space. The peritoneum overlying the sacral promontory is incised
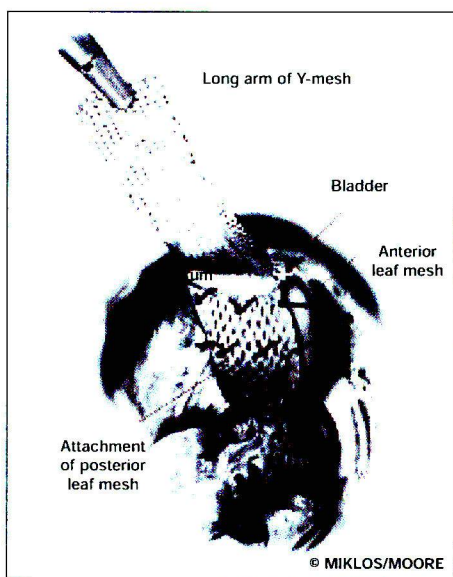

Figure 14. Sacral colpopexy: attaching the posterior leaf of the Y-shaped polypropolene mesh to the rectovaginal fascia.

longitudinally and this peritoneal incision is extended to the cul-de-sac. (Figure 12) A laparoscopic dissector is used to expose the anterior ligament of the sacral promontory through blunt dissection. Hemostasis is achieved using either coagulation or surgical clips. A 12 cm X 2.5 cm polypropylene mesh graft which has been fashioned in a Y shape, so there is an anaterior and posterior division of the mesh. The mesh is then introduced into the abdominal cavity through a 10 or 12 cm port. The vaginal apex is now directed anterior and cephalad exposing the pubocervical fascia for application of the surgical graft. The anterior leaf of the mesh is then sutured to the pubocervical fascia with three pairs of no. 0 nonabsorbable sutures beginning distally and working towards the rectovaginal fascia apex. (Figure 13) The posterior leaf of mesh approximately is then sutured in a similar fashion
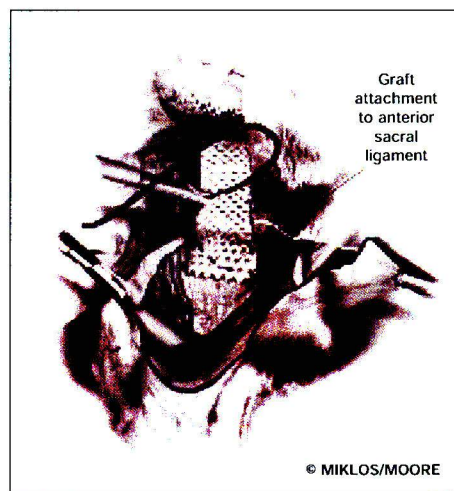

Figure 15. Sacral colpopexy: attaching the long arm of the Y-shaped mesh graft to the anterior ligament of the sacrum.

to the rectovaginal fascia. (Figure 14). The surgeon should attempt to take stitches through the entire thickness of the vaginal wall, excluding the vaginal epithelium. The surgeon sutures the free end of the Y-shaped mesh to the anterior longitudinal ligament of the sacrum using two pairs of No. 0 nonabsorbable suture. (Figure 15) The mesh should be attached with minimal tension on the vagina. In an attempt to decrease surgical time some surgeons have utilized Titanium bone tacks and hernia staplers for the mesh attachment to the anterior longitudinal ligament of the sacrum. After reducing intraabdominal pressure and inspecting the presacral space for hemostasis, the peritoneum is reapproximated with 2-0 polyglactin suture. (Figure 16).

Level 1 Support Procedures - Clinical Results

Richardson first described this anatomic defect for enterocele in 1995 in his landmark paper "The anatomic defects in rectocele and enterocele." Since that time, others have described laparoscopic surgical techniques which employ Richardson's

Figure 16. Sacral colpopexy: retroperitonealising the mesh via closure of the peritoneum.
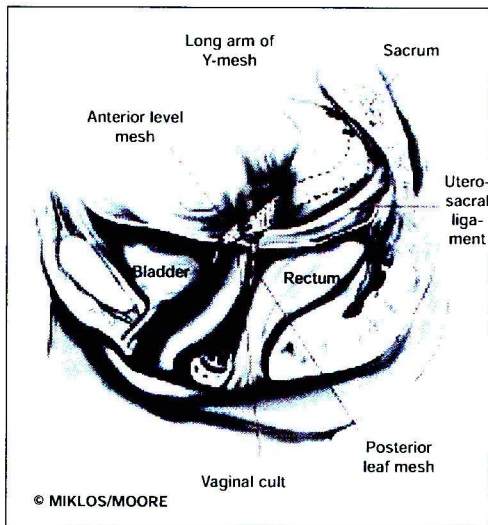
anatomic theories in the treatment of enterocele and vaginal apex prolapse.[7-9] Recently Carter et al reported on 8 patients who underwent the Richardson-Saye laparoscopic vaginal vault suspension and enterocele repair technique with excellent results.[10]

There are no other reports in the literature that evaluate clinical results of the laparoscopic uterosacral ligaments suspensions and/ or traditional types of enterocele repairs such as the Halban and Moskowitz procedures. However, some have described their surgical technique and/ or complications. Lyons & Winer reviewed the technique and complications in 276 patients who had either a Moskowitz or Halban procedure.[11] The worst complications encountered in this series were port site infections. Koninckx et al emphasized using the carbon dioxide laser for vaporization of the enterocele sac, followed by uterosacral ligament shortening and suspension of the posterior vaginal wall.[12] A modified Moschowitz procedure with approximation of the posterior vaginal fascia to the anterior wall of the rectum has also been described laparoscopically. Despite the

paucity of data regarding long-term cure rates, the uterosacral ligament suspension and site specific enterocele repair remains a mainstay in many surgeons armamentarium.

In 1994 Nezhat et al were the first to report a series of 15 patients who underwent laparoscopic sacral colpopexy.[13] They reported an apical vault cure rate of 100% on follow-up ranging from 3 to 40 months. In 1995, Lyons reported 4 laparoscopic sacrospinous fixation and 10 laparoscopic sacral colpopexies.[14] Ross subsequently reported on 19 patients who underwent laparoscopic sacral colpopexy, Burch colposuspension and modified culdeplasty in 1997. The author reported 7 complications including: 3 cystotomies, 2 urinary tract infections, one seroma, and one inferior epigastric laceration. Despite 2 patients being lost to follow-up, he reported a cure rate of (13/13) 100% for vaginal apex prolapse at 1 year.[8]

Cosson et al reported on their experience of feasibility and short-term complications in 77 patients who had undergone laparoscopic sacral colpopexies. Laparoscopy was actually performed on 83 patients with symptomatic prolaspe of the uterus. Six cases required conversion to laparotomy because of technical difficulties. All of the remaining 77 patients underwent laparoscopic sacrocolpopexy. Subtotal hysterectomy was performed in 60 cases. Three patients required reoperations for hematoma or hemorrhage. Mean operative follow up was 343 days. Three other patients required reoperation, 1 for a third-degree cystocele and 2 for recurrent stress incontinence. The surgeons concluded the sacrocolpopexy is feasible and the operative time, post operative complications are related to the surgeons experience but remains comparable to those noted in laparotomy.[15]

Use of synthetic mesh for the treatment of vaginal vault prolapse has been performed since 1991 at The University of Auvergne, Clermont-Ferrand. At the University of Auvergne, more than 250 cases have been performed with an apical vault cure rate of approximately 92%.[16] Complications are rare with the most common being mesh extrusion (2%) and only in patients who underwent concomitant hysterectomy. Patients who had uterine suspensions or who have not had a concomitant hysterectomy have not experienced this complication. (Wattiez A, personal communication – International Society of Gynaecologic Endoscopy – Berlin 2002). We have completed more than 400 laparoscopic sacralcolpopexies at our center in Atlanta and have a cure rate of over 95% with a mesh exposure rate of approximately 1.5% and a very low complication rate. Our average operative time for the procedure is less than 60 minutes and hospital stay averages less than 24 hours.

• To be concluded in next issue