Commentary on "MRI and CT of Sacrocolpopexy"

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OBJECTIVE. The purpose of this commentary is to highlight several aspects of two main perspectives on sacrocolpopexy: surgical—which includes selection of a route for reconstructive surgery, types of surgical meshes available, advantages and disadvantages of each type of mesh, and the associated postoperative complication—and radiologic, that is, the role of imaging in improving outcome.

CONCLUSION. As new modalities and techniques related to sacrocolpopexy are developed, concepts of form and function change. With advances in imaging modalities, especially MRI and CT, and the postprocessing options available, the radiologist's role should extend beyond reporting imaging findings to sharing in the choice of the initial treatment plan.

Each year, pelvic floor dysfunction affects between 300,000 and 400,000 American women so severely that they need surgery [1]. It is estimated that 11.1% of women will undergo a single operation for pelvic floor dysfunction in their lifetime; nearly 30% of these patients will need a second operation [2]. Because of the large number of women undergoing this operation and reoperation, it is desirable to provide radiologists who have a special interest in the pelvic floor with the surgical perspective on pelvic floor dysfunction. In their pictorial essay in this issue, Rousset et al. [3] help us acquire this perspective about sacrocolpopexy in the treatment of pelvic organ prolapse. Radiologists need to become acquainted with the spectrum of postoperative complications whether anatomic, functional, or due to recurrent prolapse. Another form of complication occurs de novo. The preoperative problem has resolved, but a new abnormality develops and affects the genitourinary tract after surgery [4].

This commentary highlights several aspects of two main perspectives. The surgical perspective includes selection of a route for reconstructive surgery, types of surgical meshes available, advantages and disadvantages of each type of mesh, and postoperative complications. The other perspective is the role of imaging in improving outcome. As new modalities and techniques appear, our concepts of form and function change. With advances in imaging modalities, especially MRI and CT, and postprocessing options [5–7], the radiologist's role should extend beyond reporting imaging findings (after successful or complicated operations) to sharing in the choice of the initial treatment plan [8, 9].

Surgical Perspectives

Different surgical approaches can be used to resolve vaginal vault prolapse. These include vaginal, abdominal, laparoscopic, or a combination of these routes. Details of each procedure are beyond the scope of this commentary, but those who are interested in the field of pelvic floor dysfunction should have a basic understanding of the different surgical procedures available for prolapse. A wide range of success rates with different techniques has been reported. One prospective study [10] showed that the vaginal route has twice the failure rate of abdominal surgery. A second series, though retrospective, had similar recurrence rates for abdominal sacrocolpopexy (19%) and sacrospinous fixation (33%) [11]. Naturally, such success rates may not be universally applicable. A laparoscopic approach may be useful for some patients. Long-term efficacy studies of such approaches have been few, reflecting difficulties in evaluating long-term follow-up. As mentioned in the pictorial essay [3], if the laparoscopic approach is chosen, procedures should be performed as in open cases.

Many factors should be considered before selection of a route for reconstructive

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surgery. These include vaginal sexual function, the concept of body image, a patient's comorbidities, and possible fertility desires [12]. With further research, the answers to these questions about surgical planning and approach will become clearer.

In abdominal sacrocolpopexy an allograft, xenograft, or synthetic mesh can be used to buttress the anterior and posterior vaginal walls. The disadvantages of synthetic mesh include erosion in as many as 9–11% of cases and an unnatural feel to the vaginal wall. The disadvantages are balanced by the strength and longevity of the material and sometimes its propensity to stimulate scar tissue formation, which may aid pelvic support [13]. In contrast to synthetic mesh, allografts have the advantage of pliability and a natural feel without the apparent risk of erosion [12]. In a series of 10 patients, the reported success rate of autologous fascia was 90%. Use of this material is often impractical, however, because a large piece has to be harvested for a large endopelvic fascial defect [14]. Paravaginal defects are usually bilateral, perhaps asymmetric, and sometimes accompanied by a central defect [8]. Xenografts have been used, but results of long-term studies are insufficient [12].

The techniques of abdominal sacrocolpopexy involve placement of a graft along the anterior and posterior vaginal wall. It is important to mention two technical points that might add to the technique mentioned in the pictorial essay. First, placement of a methyl methacrylate polymer (Lucite, DuPont) stent within the vagina aids graft placement and dissection. Second, symmetric placement of the graft over the vaginal wall is important to allow equal distribution of forces [12]. Among the postoperative complications, presacral hemorrhage and osteomyelitis at the sacral site of graft attachment are unique to abdominal sacrocolpopexy [15, 16].

Role of Imaging

Although individual surgeons may have different reasons for requesting imaging studies, the basic question remains the same. Preoperatively, the surgeon wants to make sure to identify the extent of the surgically treatable prolapse, and postoperatively, causes of recurrence must be identified, especially if the operation was initially successful. Regarding the postoperative role, the merits of diffusion-weighted MRI sequences must be emphasized [17]. These images facilitate differentiation between the desired postoperatively induced fibrosis that will add to the mesh thickness and mesh thickening due to inflammatory infiltration. In the latter situation, inflamed structures can be detected as high signal intensity on high-b-value diffusion-weighted images.

In their article, Rousset et al. [3] explain each step of the surgical procedure in detail and show the corresponding images. By mentally visualizing the surgical steps, the radiologist facilitates and enforces his or her ability to trace the sites and the landmarks mentioned in the technique while looking for the mesh.

The article also describes the normal appearance of a successfully placed mesh and shows both CT and MR images. These aids are of special importance in complicated cases. Only by becoming acquainted with the normal and healthy appearance of the mesh after a successful operation can the radiologist appreciate subtle changes. For example, finding that the posterior mesh is too short can be challenging. Apart from other short-, mid-, and long-term complications are those related to failure of operative technique and to sepsis. Supported by many example images, including CT and MR images of almost every type of complication and photographs of the materials used during the operation, this article is especially useful to readers.

MRI has promise for guiding surgeons in choosing the initial treatment [4, 18, 19]. If surgery is indicated, the role of the radiologist is to assist the clinician in planning reconstruction. This is made possible by identifying the specific anatomic defect causing pelvic floor dysfunction in each patient so that optimal defect-specific corrective treatment—not simply a procedure based on a symptom complex—can be planned [9, 20]. At our institution my colleagues and I have used this approach for many years [8, 9]. The collaboration with our surgeons has resulted in a reproducible success rate for current treatment and the invention of new treatments. In an attempt to provide a common language that we hope can be used worldwide, we created a practical MRI reporting form on which all data are presented in a schematic, which is continually revised and updated for the benefit of patients [8, 9]. This reporting in a schematic provides a channel through which the radiologist can effectively communicate imaging findings and bridges the gap between the radiologist and the surgeon.

The article by Rousset et al. [3] facilitates thorough understanding of the preoperative and postoperative roles of pelvic floor imaging for sacrocolpopexy through presentation of a full spectrum of high-quality images.

References

1. DeLancey JO. The hidden epidemic of pelvic floor dysfunction: achievable goals for improved prevention and treatment. *Am J Obstet Gynecol* 2005; 192:1488–1495
2. Olsen AL, Smith VJ, Bergstrom JO, et al. Epidemiology of surgically managed pelvic organ prolapse and urinary incontinence. *Obstet Gynecol* 1997; 89:501–506
3. Rousset P, Deval B, Chaillot PF, Amara N, Buy JN, Hoeffel C. MRI and CT of sacrocolpopexy. *AJR* 2013; 200:3; [web]W383–W394
4. El Sayed RF, Fielding JR, El Mashed S, et al. Preoperative and postoperative magnetic resonance imaging of female pelvic floor dysfunction: correlation with clinical findings. *J Womens Imaging* 2005; 7:163–180
5. Hoyte L, Schierlitz L, Zou K, Flesh G, Fielding JR. Two- and three-dimensional MRI comparison of levator ani structure, volume, and integrity in women with stress incontinence and prolapse. *Am J Obstet Gynecol* 2001; 185:11–19
6. Singh K, Jakab M, Reid WM, Berger LA, Hoyte L. Three-dimensional magnetic resonance imaging assessment of levator ani morphologic features in different grades of prolapse. *Am J Obstet Gynecol* 2003; 188:910–915
7. Natal JR, Mascarenhas T, Parente M, et al. On the use of numerical simulation techniques to study the deformation field of the pelvic floor muscles. *Int Urogynecol J Pelvic Floor Dysfunct* 2007; 18:S112–S112
8. El Sayed RF, Mashed SE, Farag A, et al. Pelvic floor dysfunction: assessment with combined analysis of static and dynamic MR imaging findings. *Radiology* 2008; 248:518–530
9. Farouk El Sayed RF. The urogynecological side of pelvic floor MRI: the clinician's needs and the radiologist's role. *Abdom Imaging* 2012 Jun 1 [Epub ahead of print]
10. Benson JT, Lucente V, McClellan E. Vaginal versus abdominal reconstructive surgery for the treatment of pelvic support defects: a prospective randomized study with long-term outcome evaluation. *Am J Obstet Gynecol* 1996; 175:1418–1421, discussion 1421–1422
11. Sze EH, Kohli N, Miklos JR, Roat T, Karram MM. A retrospective comparison of abdominal sacrocolpopexy with Burch colposuspension versus sacrospinous fixation with transvaginal needle suspension for the management of vaginal vault prolapse and coexisting stress incontinence. *Int Urogynecol J Pelvic Floor Dysfunct* 1999; 10:390–393
12. Hale DS, Kelvin FM, Strohbehn K. Urogenital

dysfunction. In: Bartram CI, DeLancey JO, Halligan S, et al, eds. *Imaging pelvic floor dysfunction*. New York, NY: Springer-Verlag, 2003:106

13. Iglesia CB, Fenner DE, Brubaker L. The use of mesh in gynecologic surgery. *Int Urogynecol J Pelvic Floor Dysfunct* 1997; 8:105–115
14. Maloney JC, Dunton CJ, Smith K. Repair of vaginal vault prolapse with abdominal sacropexy. *J Reprod Med* 1990; 35:6–10
15. Sutton GP, Addison WA, Livengood CH 3rd, Hammond CB. Life-threatening hemorrhage complicating sacral colpopexy. *Am J Obstet Gynecol* 1981; 140:836–837
16. Weidner AC, Cundiff GW, Harris RL, Addison WA. Sacral osteomyelitis: an unusual complication of abdominal sacral colpopexy. *Obstet Gynecol* 1997; 90:689–691
17. Patel V, Shi Y, Thompson P, Toga A. Mesh-based spherical deconvolution for physically valid fiber orientation reconstruction from diffusion-weighted MRI. In: *Biomedical imaging: from nano to macro, 2009*. Piscataway, NJ: IEEE, 2010: 614–617
18. Kaufman HS, Buller JL, Thompson JR, et al. Dynamic pelvic magnetic resonance imaging and cystocolpoproctography alter surgical management of pelvic floor disorders. *Dis Colon Rectum* 2001; 44:1583–1584
19. Altringer WE, Saclarides TJ, Dominguez JM, et al. Four contrast defecography: pelvic ''floor-oscopy''. *Dis Colon Rectum* 1995; 38:695–699
20. El-Sayed RF, Morsy MM, el-Mashed SM, Abdul-Azim MS. Anatomy of the urethral supporting ligaments defined by dissection, histology, and MRI of female cadavers and MRI of healthy nulliparous women. *AJR* 2007; 189:1145–1157

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