Sacrospinous Ligaments Anterior Apical Anchoring for Needle-guided Mesh is a Safe Option: A Cadaveric Study

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OBJECTIVE To evaluate the feasibility and safety of using the sacro-spinous ligament (SSL) as a fixation point for anterior-apical pelvic floor compartment mesh implants. The apical support achieved with the sacro-spinous ligament mesh fixation is considered adequate, as it provides a high and stronger anchoring point. Even though, meshes for anterior pelvic floor reconstruction are traditionally anchored to the arcus tendineous fascia pelvis (ATFP). The authors presumed that fixing the anterior mesh to the sacro-spinous ligament instead of the ATFP is both feasible and safe. The present study evaluated the anatomical aspects and relations of a modified tissue passage with sacro-spinous fixation of the anterior apical mesh arms.

METHODS In 5 embalmed female cadavers and 1 fresh female cadaver, the apical arms of the anterior needle-guided mesh were placed through the SSLs rather than through the ATFP, using a transgluteal approach. The distances between the mesh arms and the ureters and uterine arteries were measured.

RESULTS The minimal final distance between the mesh arms and the ureters or uterine arteries was 1.5 cm in the embalmed cadavers, but only 5 mm in the fresh cadaver. However, when analyzing the procedure carefully, it was noted that during dissection the ureters and arteries were pushed medially by the surgeon's finger, thus the operative procedure did not entail any real risk of injury to these structures. The introduced surgical needle caused no trauma to any adjacent cadaveric organs.

CONCLUSIONS Anterior pelvic floor meshes may be safely anchored to the SSL, thus potentially improving the apical support. UROLOGY 79: 1020–1022, 2012. © 2012 Elsevier Inc.

Pelvic floor relaxation and pelvic organ prolapse are regarded by many as a herniation process resulting from obstetric trauma to the pelvic floor where a fascial defect existed. Hence, mesh pelvic floor fascial reinforcement is advocated to achieve satisfactory reconstruction.[1,2] Nevertheless, the use of mesh may result in postoperative complications, such as long-term pelvic and vaginal pain and dyspareunia.[1,2] Posterior pelvic floor needle-guided meshes are usually fixated to the sacrospinous ligaments (SSLs), whereas the anterior pelvic floor needle-guided mesh is attached to the arcus tendineus fascia pelvis (ATFP). The latter is regarded as inferior, both in terms of level of support[3] and because of postoperative thigh pain.[4] It is a weaker support, prone to breakdown and recurrence of the prolapse. Thus recently anterior mesh kits have been designed to be fixated to the SSL rather than to the ATFP, to improve the level of support; however, the efficacy and safety of these techniques have not yet been proven.[5-7] The exact anatomic relations and distances between the apical anterior mesh arms to the ureter and to the uterine blood vessels have not been precisely documented, even when the fixation point is the ATFP. The insertion needle-to-ureter distance might be smaller when the apical arms of the anterior mesh are fixated to the SSL.

This study examined the operative safety features in female cadavers, in whom the needle-guided mesh arms were fixated to the sacrospinous ligaments rather than to the ATFP (Fig. 1).

CADAVERS AND METHODS

Cadaveric dissections were performed in the anatomy laboratory. Female cadavers were positioned in the lithotomy position, with legs at 30° flexion with 30° abduction at the hip joint. The mesh used was Prolift (Gynecare, Somerville, NJ). The operation was carried out in accordance with the previously reported surgical method for anterior pelvic compartment needle-guided mesh implantation; the posterior arms were introduced in accordance with the instructions for posterior pel-

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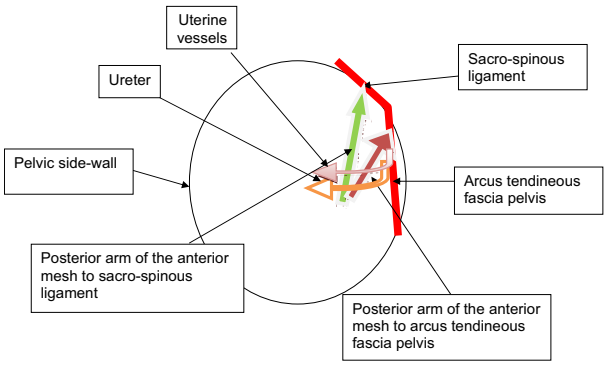

Figure 1. Diagram showing the anatomic relations of the mesh arms and needles to the uterine vessels and ureters.

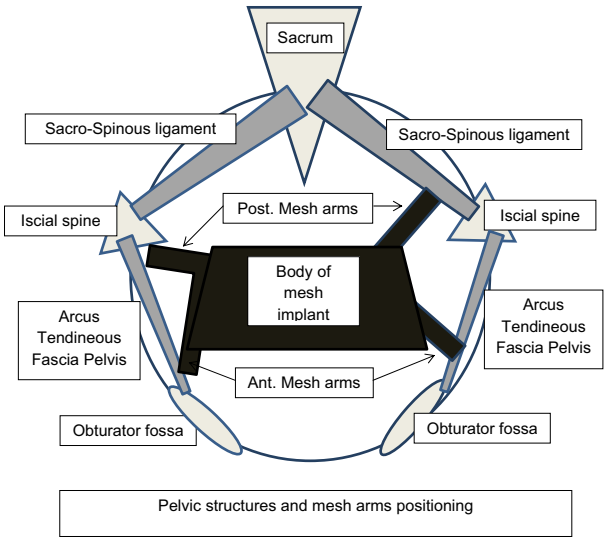

Figure 2. Diagram showing the anatomic relations of the mesh arms to the pelvic structures: The left hemi-pelvis demonstrates the regular arms placement whereas the right hemi-pelvis demonstrates the suggested new arms placement.

vic compartment mesh arms introduction. The only change in the surgical steps involved an additional 2- to 3-cm medial dissection, starting at the ischial spine, along the SSL, to prepare the space for the needle passage. The anterior mesh was then placed and spread in the usual manner, but the posterior arms were passed through the SSLs instead of being passed through the ATFP (Fig. 2).

The outcome measures were the shortest distance measured between the mesh arm needles and the ureters and uterine arteries. This was measured by further dissecting the cadavers until achieving full exposure of the mesh, the ureters, and the arteries (Fig. 3).

RESULTS

The shortest distance between the mesh arm needles and the ureters or uterine arteries was found to be 1.5 cm for the embalmed cadavers, but only 5 mm for the fresh cadaver (Table 1). However, when analyzing the procedure carefully, it was noted that during dissection, the ureters

Figure 3. Cadaveric dissection after anterior mesh placement, deep mesh arms to the SSLs. *Arrows*, Left uterine artery and ureter.

Table 1. Distances between mesh arm needlesand ureters/uterine arteries in 6 cadavers

Cadaver	Right	Left
1—embalmed	1.5 cm	1.5 cm
2—embalmed	2.0 cm	2.0 cm
3—embalmed	1.5 cm	1.5 cm
4—embalmed	2.0 cm	2.0 cm
5—embalmed	1.5 cm	1.5 cm
6—fresh frozen	0.5 cm	0.5 cm

and arteries were displaced medially by the surgeon's finger, thus the actual distance at operation in the fresh cadaver was also not <1.5 cm. The introduced surgical needle caused no trauma to any of the adjacent cadaveric organs.

COMMENT

This is the first study examining the safety of anchoring the anterior pelvic floor needle-guided mesh to the SSL, to create uterosacral-like artificial level 1 supportive ligaments. The dissection of the 6 cadavers demonstrated that needle-guided mesh augmentation for reinforcement of the anterior pelvic floor and apical support can be anchored safely to the SSLs. The risk involved in performing this anchoring is reasonable, because the distances measured to the ureters and uterine arteries are acceptable. The SSL is usually firmer, stronger, and located at a higher position than the ATFP, thus it might provide a superior fixation point for apical prolapse. Fur-

ther human studies should be designed and carried out to elucidate the issue of the optimal anchoring point for anterior apical support, for single incision, and for needle-guided mesh augmentation.

CONCLUSIONS

An anatomic cadaver study found that anterior pelvic floor meshes might be anchored safely to the SSL for apical support.

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