Transobturator mesh for cystocele repair: a short- to medium-term follow-up using 3D/4D ultrasound

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KEYWORDS: 3D/4D ultrasound; anterior colpoprhaphy; cystocele; Perigee; transobturator mesh

ABSTRACT

Objective Anterior colpoprhaphy has been shown to have limited medium-term success rates in cystocele repair. Many clinicians use mesh implants, but their safety and efficacy are controversial. We therefore performed an external surgical audit using three- and four-dimensional pelvic floor ultrasound to study the short- to medium-term results of transobturator mesh placement.

Methods Forty-six women who had undergone transobturator mesh anterior repair using the Perigee™ system were invited back for a follow-up appointment conducted by two non-surgeons. The appointment consisted of a standardized interview, clinical examination using the International Continence Society Pelvic Organ Prolapse Quantification system (ICS POP-Q) and translabial ultrasound examination.

Results The mean follow-up time was 10 (range, 2–24) months. There had been no major intra- or postoperative complications. Thirty-six (78%) patients were subjectively satisfied with the outcome of the procedure. Cystocele recurrence (Stage 2 or 3) was observed in six (13%) patients. There were three (6.5%) cases of mesh erosion. On translabial ultrasound, we observed cystocele recurrence dorsal to the mesh in five women, associated with a marked change in mesh axis on Valsalva, implying dislodgment of the superior anchoring arms. The mesh was measured at a mean of 21 (range, 8.8–37.3; SD, 7.0) mm in length.

Conclusions At 10-month follow-up the Perigee procedure seems to be safe and effective for cystocele repair, with a satisfaction rate of 78%. In some women recurrence may occur due to dislodgment of the superior anchoring arms. Copyright © 2008 ISUOG. Published by John Wiley & Sons, Ltd.

INTRODUCTION

Large and recurrent cystoceles are a major challenge in pelvic reconstructive surgery. Cystocele occurs as a result of herniation of the bladder into the vagina due to generalized stretching or attenuation or specific defects of the pubocervical fascia, which stretches from one side of the pelvic side wall to the other. The procedure performed most commonly for cystocele repair is anterior colpoprhaphy, which involves plication of the pubocervical fascia in the midline from the bladder neck to the apex of the vagina. However, recurrence is common. Anterior vaginal prolapse may recur after standard anterior colpoprhaphy in up to 50% of patients. Proponents of the site-specific approach to cystocele repair claim that recurrence may ensue because the repair does not reach the site of the defect (particularly in the case of paravaginal or lateral defects). Concomitant connective tissue weakness or pelvic floor damage may also contribute to surgical failure. To improve the surgical outcome of cystocele repair, mesh has been used, but recurrence is still common after mesh interposition. The problem may lie partly in obtaining a strong attachment for mesh anchorage. In the early 2000s, the obturator foramen was described for the placement of suburethral slings in the surgical treatment of stress urinary incontinence, and by analogy, the transobturator approach for cystocele repair has been developed. In order to study the short- to medium-term safety and efficacy of transobturator mesh placement, we performed an external surgical audit using three- and four-dimensional (3D/4D) ultrasound.

METHODS

Seventy-nine women with a symptomatic large or recurrent cystocele underwent Perigee transobturator mesh repair (Perigee™ system, American Medical Systems, Minnetonka, MN, USA) by one of three surgeons between

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March 2004 and January 2006. All surgeons used the same surgical technique. One of the surgeons had been involved in the development of the manufacturer guidelines (A.R.), and those guidelines were followed in all cases. After routine dissection of the anterior vaginal wall as for traditional anterior colporrhaphy, tunnels were created towards the obturator foramen, at both the anteromedial and the posteromedial aspects of the foramen. The anchoring arms of the mesh were retrieved using the manufacturer’s helical needles, with the superior pass as close to the ischial spine as possible. After suturing of the mesh to the bladder base and trimming of the mesh tail as required, the vaginal skin was closed. Finally, the mesh arms were adjusted while the anterior vaginal wall was digitally supported.

In a retrospective surgical audit, patients were invited back for follow-up by two non-surgeons (K.L.S. and H.P.D.). Due to limited equipment and staff availability, we were able to see only 46 of the 79 (58%) patients; many patients lived several hours’ travel from the unit and were unwilling or unable to attend. We therefore analyzed the most important confounders such as age, vaginal parity and previous anti-incontinence or prolapse surgery in order to determine whether the patients seen during this audit can be regarded as representative.

The appointment consisted of a standardized interview that included questions regarding bladder symptoms (stress and urge incontinence, frequency, nocturia and symptoms of voiding dysfunction). We also asked the patient to define overall satisfaction with the outcome of the surgery (yes, no, not sure) and whether they considered themselves cured, improved, the same or worse with respect to their prolapse problem. Uroflowmetry, clinical examination using the International Continence Society Pelvic Organ Prolapse Quantification system (ICS POP-Q) and translabial 3D/4D ultrasound were also performed. Before sonography, the patient was asked to empty her bladder. Patients were placed in a supine position and examined using a GE Voluson 730 or 730 Expert system (GE Medical Systems, Zipf, Austria) equipped with 7–4-MHz and 8–4-MHz curved array volume transducers, respectively, with acquisition angles of 70° and 85°, respectively, as described previously. 3D/4D translabial ultrasound was performed with the patient at rest and on Valsalva maneuver. Volume datasets were later analyzed using the proprietary software GE Kretz 4D View v. 3.0 (GE Medical Systems) on a PC. Similar to suburethral slings made of polypropylene mesh, the Perigee mesh is evident on ultrasound as a hyperechogenic structure (Figure 1). Ethics approval was obtained from the local human research ethics committee (reference 84/04), t-test statistics were performed using Minitab V13 for PC (Minitab Inc., State College, PA, USA).

RESULTS

The 46 patients seen in the context of this external audit were found to be representative of the 79 women who underwent a Perigee procedure during the audit period. There were no significant differences between attending and non-attending patients as regards patient age, parity and previous surgery for prolapse (Table 1).

Of the 46 patients seen in this external audit, 19 had a past history of vaginal repair and 28 had a previous hysterectomy. Three patients had undergone a previous sling procedure for urinary incontinence. Fifteen patients had no history of any of the above procedures. The mean

Figure 1 Translabial ultrasound image in midsagittal (a) and axial (b) planes, showing Perigee mesh in a patient with bilateral levator avulsion and excellent clinical result 3 months after repair of third-degree cystocele, with no significant postvoid residual. In both planes the mesh seems to be well spread out, with minimal folding, and both anchoring arms are visible on the patient’s right (●). Their apparent absence on the patient’s left (right side of the image) is due to asymmetry and the alignment of the rendered volume.
follow-up interval was 10 (range, 2–24) months, the mean age was 61.4 (range, 38–81) years and the mean parity was 3.6 (range, 1–9). No serious complications such as urinary tract injury or hemorrhage requiring transfusion were identified. No patients had significant voiding dysfunction that required catheterization for more than 4 days postoperatively and there was no defective wound healing. In addition to Perigee mesh repair, concomitant hysterectomy was performed in five patients, an Apogee posterior vaginal wall mesh was inserted in 11 patients, posterior vaginal repair was performed in 16 patients, a Monarc transobturador sling was inserted in 14 patients, and sacrospinous fixation, enterocoele repair and posterior IVS (intravaginal slingsplasty) were each performed in one patient. Thirteen patients underwent an isolated Perigee mesh repair, in 18 cases there was one additional procedure and 15 women (33%) had more than one concomitant procedure performed.

We identified four cases of mesh erosion, three (6.5%) over the anterior vaginal wall and one posteriorly after Apogee repair. None of them had had a concomitant hysterectomy. One of the three patients with anterior mesh erosion had undergone a concomitant Monarc suburethral sling. All cases of anterior mesh erosion were identified near the midline. No vaginal erosions occurred laterally near the arms of the mesh.

Forty-two (91%) patients considered themselves cured or improved (37%, 17/46 cured; 54%, 25/46 improved). Thirty-six (78%) were satisfied with the outcome of the procedure. Twelve (26%) patients complained of symptoms of recurrent prolapse in the form of a vaginal lump; six (13%) were confirmed as Stage 2 (5/6) or Stage 3 (1/6) cystocele on clinical examination. The mean Ba coordinate in the entire cohort was −1.5 (range, −3 to +3).

In all cases, the mesh was visible on translabial ultrasound, although its appearance varied markedly (compare Figures 1 and 2). It was often clearly apparent whether the mesh was spread out or had folded (Figure 2), and frequently this was especially obvious in a rendered volume in an oblique axial plane. The latter also demonstrated clearly how far the mesh may extend laterally, covering the entire hiatus.

On Valsalva the ventral mesh margin was located on average 17.4 (range, 6–34) mm posterior to the pubic symphysis and was on average 21 (range, 8.8–37.3; SD, 7.04) mm in length. The mean bladder neck descent on Valsalva was 25.6 (range, 4.8–47.1) mm. On average, the most inferior aspect of the bladder reached to 2.6 mm below (range, 19.2 mm above to 37.9 mm below) the symphysis pubis. Twelve (26%) patients showed significant bladder descent on ultrasound examination, with the bladder descending to over 10 mm below the symphysis pubis, and in four cases to more than 20 mm below it. Among these 12 patients, in five (11%) cases there was cystocele recurrence dorsal to the mesh, in four (9%) cases cystocele recurred ventral to the mesh, and in three (6.5%) cases there was significant descent involving.

Figure 2 Translabial ultrasound image in midsagittal (a) and axial (b) planes, showing very narrow, folded Perigee mesh shown in a patient with excellent clinical result after repair of a third-degree cystocele.
the entire vaginal wall and mesh. In the five women with cystocele recurrence dorsal to the mesh, the mesh axis changed markedly on Valsalva, with over 90° of rotation of the cranial margin in a ventrocaudal direction, implying dislodgment of the superior anchoring arms (Figure 3). In one woman this was accompanied by the development of an anterior enterocele. Recurrence of clinically significant cystocele (Stage 2 or 3) was observed in four patients; all of them were symptomatic.

DISCUSSION

3D/4D translabial ultrasound can reliably identify polypropylene mesh implants in the anterior vaginal wall. The mesh is usually situated posterior to the bladder neck, caudal to the trigone and the posterior bladder wall, and is apparent as a highly echogenic linear structure (Figures 1–3)\textsuperscript{11}. It is usually more clearly visible on Valsalva and behaves like an oversized trigonal sling, rotating around the fulcrum of the symphysis pubis.

Transobturator anchoring of mesh appears to be a safe and effective technique in the medium to long term for the surgical treatment of large and/or recurrent cystocele, with 78% of patients in this study expressing satisfaction with the outcome at a mean follow-up time of 10 months. We demonstrated recurrence of a Stage 2 or 3 cystocele in 13% of cases, and significant cystocele recurrence on ultrasound (descent of the bladder to over 10 mm below the symphysis pubis) was seen in 26% of patients. While ultrasound data on cystocele recurrence is not currently available in the literature, our clinical findings are somewhat less impressive than those obtained by other authors after Perigee mesh insertion. Moore \textit{et al.}\textsuperscript{12} found only 6% of clinical recurrence (ICS POP-Q Stage 2 or 3) in 53 patients at 6-month follow-up, and Nguyen and Burchette\textsuperscript{13} claimed only one clinical recurrence in 32 women seen 6 months after Perigee insertion. This may be related to the longer follow-up time in our study (mean, 10 months).

Cystocele recurrence may occur anterior/ventral or posterior/dorsal to the mesh, or may involve the whole anterior vaginal wall in cases of very loose mesh placement, a distinction that is impossible to make without ultrasound imaging. Marked rotation of the mesh axis, indicative of dislodgment of the superior transobturator anchoring arms, seems to be one potential cause of recurrent anterior vaginal wall prolapse (Figure 3). Another potential cause of recurrence may be the presence of a large gap between symphysis pubis and ventral mesh margin, possibly due to insufficient anchoring of the mesh to the bladder neck, or perhaps simply as a result of individual anatomical variation. Further work is needed to determine mechanisms of failure and to suggest remedial measures or modification of system design.

As regards the only significant complication observed in this series, i.e. mesh erosion, our finding of three (6.5%) cases of erosion is compatible with the literature\textsuperscript{12–14}. Vaginal erosion is a minor complication that often can be managed conservatively with local estrogen. However, if mesh erosion persists, excision may be required to relieve symptoms. Erosion does not seem to be associated with particular ultrasound findings.

The mean length of Perigee mesh on ultrasound imaging in our study was 21 (SD, 7.04) mm. Though we have no

\begin{figure}[h]
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\caption{Translabial ultrasound image in midsagittal (a) and axial (b) planes in a woman with recurrent cystocele (\textcolor{red}{\#}) following Perigee mesh insertion. There is more than 90° rotation of the cranial mesh margin in a ventrocaudal direction, implying dislodgement of the superior transobturator arms. The postvoid residual was over 150 mL. The patient’s voiding dysfunction is being managed conservatively.}
\end{figure}
data with regard to mesh length before implantation due to individual trimming of the mesh tail, ultrasound findings seem to suggest a varying degree of intra- or postoperative folding of the mesh, and often 2D as well as 3D ultrasound findings are suggestive of folding (Figure 2). Tunn et al. found that the postoperative mesh length (mean, 29 mm; SD, 6 mm in their data) was only 45% of the mesh initial length in 13 patients who had undergone anterior repair with Perigee 6 weeks prior to assessment; this is in agreement with our data. Postoperatively, the Perigee mesh seems to cover a smaller area than anticipated. It remains to be seen whether this effect can be alleviated by modifications in technique, such as more permanent anchoring of the mesh to the bladder neck and vault.

In conclusion, the Perigee transobturator mesh appears to be safe and effective for cystocele repair in the short to medium term. The satisfaction rate was 78% at a mean follow-up of 10 months. Dislodgment of the superior transobturator anchoring arms seems to be one potential cause of recurrence. Insufficient anchoring of the mesh to the bladder neck, or individual anatomical variation may be other potential causes. Future research should focus on causes and mechanisms of suspension failure in order to optimize the design of mesh implants.

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REFERENCES


