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MESH CONTRACTION: MYTH OR REALITY?

Hypothesis / aims of study

Mesh implants are widely used in surgery for female pelvic organ prolapse. Complications such as erosion and pain syndromes are not uncommon, and so is recurrence of prolapse. It has recently been claimed that mesh contraction is a common cause of mesh-related pain, erosion and recurrence, which is held by some authors to be due to immunological processes rather than surgical methods or technique(1). Some authors have claimed that mesh may contract 10% per year, reaching a 85% reduction in volume by year 8 (1). In this longitudinal study we attempted to determine whether mesh contraction occurs after Perigee transobturator mesh placement.

Study design, materials and methods

As part of an ongoing audit of prolapse surgery we analysed ultrasound volume datasets obtained from women attending followup appointments 3 months- 5 years after Perigee mesh placement at our hospital. Perigee mesh augmentation of anterior colporrhaphy had been performed in standard fashion, with the tail of the mesh removed entirely before implantation. This leaves a piece of mesh of approx. 5.0 x 3.7 cm between the anchoring arms. In all cases the mesh was anchored to underlying tissues cranially and caudally. Patients were examined by translabial ultrasound as previously described, at rest, on maximal Valsalva and on pelvic floor muscle contraction, supine and after bladder emptying(2). The datasets of the first (minimum 3 months) and last postoperative appointments (maximum 4.6 years) were selected and analysed using the post-processing software 4D View (GE Medical, Kretz Ultrasound, Zipf, Austria), with the operator blinded against all clinical data and against the order in which the volumes had been obtained. For volumes obtained during the first and last 12 months of the observation period he was also blinded against all dates contained in the volume dataset. Assuming a reduction of 10% in linear measurements per year based on (3) we calculated that 50 woman-years would be required to give 80% power to detect a reduction of 10% in mesh diameter as statistically significant.

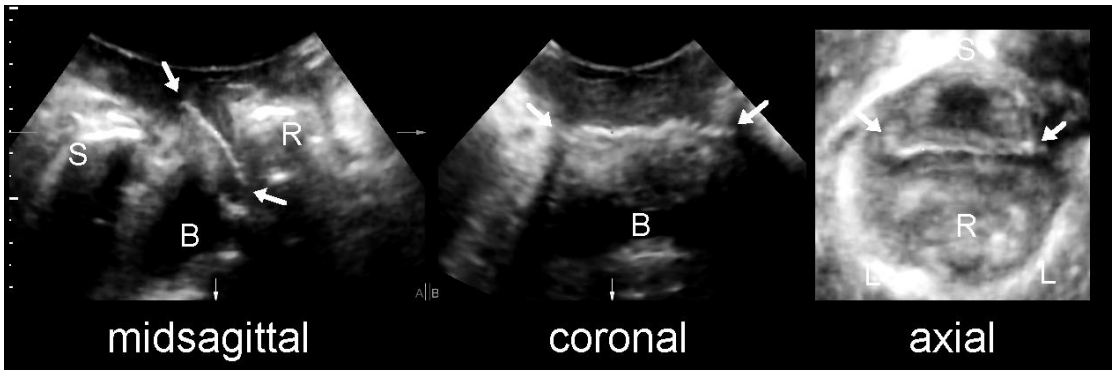

Figure 1: Identification of Perigee mesh on Valsalva (midsagittal plane on the left, coronal plane in the center, axial plane on the right). Arrows show mesh length in the midsagittal (left) and the coronal plane (center, right). S= symphysis, B= bladder, R= rectum, L= levator ani.

Results

Repeatability data (n=20) was obtained for the lower mesh margin at rest (ICC 0.65, CI 0.29-0.85) and on valsalva (ICC 0.89, CI 0.72-0.96), for length at rest (ICC 0.63, CI 0.27-0.84) and on Valsalva (ICC 0.48, CI 0.08- 0.76), for coronal mesh diameter (ICC 0.49, CI 0.07- 0.76) and for mesh thickness in the axial plane (0.24, CI –0.2- 0.6). Of a total of 63 women who were recipients of a Perigee mesh between May 05 and March 09, 40 women were identified whom we had assessed at least twice. In total, our data comprises 59.6 woman-years, exceeding the result of the power calculation by almost 20%. Mean age at last follow-up was 63.7 (range, 34-83) years. All but one were vaginally parous. A large proportion had had concomitant procedures: 17 sacrospinous colpopexies, 14 Monarcs, 9 posterior repairs, 7 vaginal hysterectomies and 6 Apogee mesh repairs. 37/40 women (93%) were satisfied with the outcome of their procedure at their last appointment. 18/40 considered themselves cured, and 18/40 felt improved. Two were not satisfied. Seven had required further surgery in the interim (repeat Perigee after the last followup included in this series, n=2, prolapse procedure in other compartments, n=2, excision of erosion, n=x1, suburethral sling n=2). Objective prolapse recurrence (cystocele ICS POP-Q stage 2+) was observed in 16/40 patients, but only 11/40 noticed a recurrent lump. Table 1 shows a comparison of measurements obtained at the first and last appointments.

Parameter	**First postoperative appointment**	**Last postoperative appointment**	**P=**
Mesh position at rest	+18.5 (7.4) mm	+14.6 (8.5) mm	0.005
Mesh position on Valsalva	- 2.7 (10.9) mm	- 5.1 (11.5) mm	0.240
Mesh length (midsagittal) at rest	32.7 (4.9) mm	35.1 (5.7) mm	0.021

Mesh length on Valsalva	32.7 (4.5) mm	35.8 (6.1) mm	0.006
Coronal mesh diameter on Valsalva	36.6 (4.2) mm	37.4 (4.3) mm	0.444
Maximal thickness at caudal margin	2.0 (0.6) mm	2.0 (0.6) mm	0.902

Table 1: Comparison of mesh position and size at first and last postoperative appointment (n= 40). Paired t-test. Mean interval 18 months.

Interpretation of results

The increasing use of mesh in pelvic reconstructive surgery since the development of the Perigee transobturator mesh by Rane and Fraser in 2002 has caused major ongoing controversies in urogynecology. Mesh-related chronic pain and mesh erosion are significant complications that have attracted considerable attention lately (1). Ultrasound is the method of choice for assessing intravaginal mesh since polypropylene meshes are highly echogenic and impossible to image with plain Xray, CT or MR. Translabial, introital and vaginal ultrasound have been used for this purpose. In some cases mesh appears folded and/ or contracted after implantation, and in general mesh surfaces seem smaller than prior to surgery. Animal data supports the contention that mesh implants shrink in vivo, but to date all claims of mesh shrinkage, retraction or contraction have been based on studies employing single time points, i.e., not on the longitudinal observation of individual patients. One small longitudinal study suggested that most of the difference between in vitro and in vivo mesh dimensions was due to surgical technique, i.e., folding and warping of the mesh during or immediately after implantation (3). In this longitudinal study after Perigee transobturator mesh we have found no evidence of mesh shrinkage. Over an observation span of almost 60 woman-years there was no evidence of a reduction in coronal mesh diameter. On the contrary, midsagittal mesh length at rest and on Valsalva seems to have increased by almost 10% over a period of 18 months on average. However, in order to exclude mesh shrinkage/ retraction or contraction as a pathophysiologically relevant process, longer observation periods in a larger number of patients will be required.

Concluding message

We have not observed any evidence of mesh shrinkage in 40 women after Perigee mesh implantation, followed up for an interval of 18 months on average. On the contrary there may be a mild degree of downwards displacement and stretching of the mesh over time.

References

1. Obstet Gynecol 2010; 115: 325-330
2. Ultrasound Obstet Gynecol 2004; 23: 615-625
3. Int Urogynecol J 2009; 20 (S1): S166

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Is this a clinical trial?	**No**
What were the subjects in the study?	**HUMAN**
Was this study approved by an ethics committee?	**Yes**
Specify Name of Ethics Committee	**SWAHS HREC**
Was the Declaration of Helsinki followed?	**Yes**
Was informed consent obtained from the patients?	**No**