249

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ULTRASOUND ASSESSMENT OF THE VAGINAL MESH SHRINKING IN PATIENT WITH ANTERIOR VAGINAL WALL REPAIR

Hypothesis / aims of study

Polypropylene meshes are frequently used in vaginal reconstructive surgery. Its usage is limited by lack of good quality studies together with general awareness of mesh associated complication like protrusion and shrinking. We know from experimental studies that the large mesh area caused strong inflammatory reaction which results in integration of the mesh to the tissue and is associated with retraction- shrinking of the mesh. This effect is observed during postoperative clinical examination as a stiffness of the vaginal wall. This effect is a part of ongoing discussion about the appropriate size of the mesh – are the meshes too small or to large? The shrinking of the polypropylene mesh is described from 30% up to 50% in some animal studies. There are lacking clinical data. But there are at least two mechanisms causing shortening of mesh. Firstly – folding - caused by insufficient spread of the mesh and secondly - shrinking – caused by tissue retraction. There are enough studies describing ultrasound assessment of the tapes, the mesh is visualized in the same manner. Can we clinically visualize and objectively assess the mesh and its shortening after implantation?

Study design, materials and methods

We assessed the effect of implanted mesh after anterior vaginal repair.
The assessment consisted of 3D/4D ultrasound (vaginal probe) of the anterior vaginal wall using GE Voluson 730 Expert or GE E8 system in patient with symptomatic anterior vaginal wall prolapse POPQ grade ≥ II included in randomized interventional study, comparing traditional anterior repair (group – AR; n=12), anterior repair with free insertion of self-cut mesh (Gynemesh) (Group – Mesh; n=17) or with a large – Prolift mesh,(Group – Prolift; n=18). Before the surgery we measured the bladder wall thickness, and the entire vaginal wall including the bladder wall. The measurements were taken in region between 15 to 20 mm from urethro-vesical junction in mid-sagittal plane.Subtraction of the bladder wall thickness from entire anterior vaginal wall we calculate the thickness of vaginal mucosa with underlying fascia (vaginal wall). During the surgery we measured the length of the mesh (Original length). Fourth day after surgery we performed early ultrasound examination end measured the mesh length (Early US length) in mid-sagittal plane. The late ultrasound examination was performed 3 – 5 month after surgery to measure the anterior vaginal wall thickness and again the mesh length. (Late US length) All measurements were taken 3 times and we used the mean value. We calculated typical measurement error and ICC for each value – table 3. Mesh shortening in percent was calculated as a proportion of the different length measurements see table 2.

Results

We analyzed first 47 patients randomized in three groups, mean age 59,4 SD 9,6; mean BMI 27,3 SD 3,6; parity 2,2, with no differences between groups.
In group AR there is no change in vaginal wall thickness before and after surgery (+0,7mm p-value 0,335 – NS).
In groups with meshes there is increase in vaginal wall thickness by 1.3 mm (p-value 0.0001). Results for mesh shortening are included in table 1 and 2.

Table 1	Group Prolift					Group Mesh				
(mm)	N	mean	SD	median	QR	N	mean	SD	Median	QR
Original length	17	85,5	16,1	90	0,0	18	44,8	5,3	44,0	2,5
Early US length	17	53,4	11,3	56	17,8	18	40,4	1,9	40,8	2,0
Late US length	17	49,8	9,0	49	10,3	18	31,8	4,7	32,4	5,1

Table 2		**Mesh Shortening in %**				
		Group Prolift	Group Mesh	**Group Prolift**	**Group Mesh**	
		N	N	**median**	**median**	K p-value
Late US length /Original length		17	18	**45%**	**25%**	0,001
Late US length /Early US length	Shrinking	17	18	**16%**	**20%**	0,4180
Early US length/Original length	Folding	17	18	**36%**	**7%**	0,0009

Table 3		
measurements	**typical error %**	**ICC**
bladder wall thickness	7,48	0,89
entire vaginal wall thickness	4,08	0,95
mesh Late US length	5,65	0,95
mesh Early US length	8,48	0,86

Interpretation of results

We quantified with ultrasound imaging shrinking of the mesh and we were able to differentiate shrinking from folding of the mesh caused by the surgery. The Gynemesh shrinks one fifths of its length. The folding has a major impact on the final length of the large meshes (36%) and it seems to be irreversible as we see in table 2. The significant increase in vaginal wall thickness after vaginal surgery is apparently caused by the mesh and not by the surgery.

Concluding message

Folding has a major impact on the final size of the large meshes (anterior Prolift) and it raise the question about the appropriate size of the mesh or never the less its insertion technique.

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Was this study approved by an ethics committee?	**Yes**
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Was the Declaration of Helsinki followed?	**Yes**
Was informed consent obtained from the patients?	**Yes**