

HOW TO ASSESS THE MESH BY ULTRASOUND?

Hypothesis / aims of study

Ultrasound is the method of choice for imaging implants such as macroporous polypropylene meshes, which are highly echogenic and cannot be imaged with X-ray, CT or MRI. Thus we can clinically monitor such implants and follow them up to observe any changes in position or dimension. For mesh position, the introital approach is used most frequently. This method is also used for mesh dimension monitoring. Another approach is a vaginal ultrasound examination. The advantage of introital assessment is that it does not affect the anatomy, but sometimes it is difficult to see the distal section due to the penetration and shadow of the perpendicular beam. The vaginal approach is not suitable to assess the position of the mesh during dynamic maneuvers, but the probe is placed close to the mesh and makes it possible to trace the course of the entire vaginal length.

In this prospective longitudinal study we compare vaginal and introital ultrasound examinations for mesh dimension assessment in different time points after the surgery. We should expect the two methods to be comparable, because both visualize the same structure.

Study design, materials and methods

All patients included in our study underwent operations with anterior mesh (Nuvia anterior – n=20 and Prolift anterior - n=54) . The first follow up was on the third day after surgery, the second after 3 months and the third after one year. Ultrasound examination was performed with GE Voluson 730 Expert system (GE Medical Systems, Zipf, Austria) equipped with 8–4 MHz curved array volume transducer and 9-5 MHz vaginal volume transducer with acquisition angle 146° x 120°. The introital examination was performed during maximal Valsalva, and the volume was stored. After the introital examination we introduced the vaginal probe into the vagina and recorded and stored the volume as we traced the mesh moving the probe to the vaginal apex. From the saved 4D volumes we performed offline analysis using the proprietary software GE Kretz 4D View v. 10.5 (GE Medical Systems). We always measured the mesh in the mid-sagittal plane – the sagittal length of the mesh. We provide reliability measurement in 10 cases by means of a second operator. We compare the methods and analyze their ability to monitor mesh dimension changes.

Results

All together we analyzed 74 women, but we did not have all sets of ultrasound data available in all cases (see Table 1). The mean age was 60.4 years (min 33; max 81, SD 10.1), mean BMI 27.9 (min 19.9; max 38.6 SD 3.9) and mean parity 2.1. The comparison of mesh dimension analyzed by introital and vaginal approach is summarized in Table 1. When we compared relative dimension changes from implantation to one year follow-up there was a difference between the two methods. (Picture 1) The introital approach showed shortening in the one year frame by 6.6%. The vaginal ultrasound examination showed shortening by 19.8%; (p=0.16).

When we correlated both method the correlation coefficient was weak (Pearsons correlation- $r = 0.29$)

The reliability of measurement was tested in a test-retest series on 10 cases. Intra-class correlation was 0.84 for the vaginal approach and 0.37 for the introital method.

Interpretation of results

This study compares two different approaches for sagittal mesh dimension assessment, and it becomes apparent that they produce different results. The introital approach underestimates the dimension in comparison to the vaginal approach. But for monitoring mesh dimension changes the difference was not significant. The reliability of the introital approach was lower compared to the vaginal method.

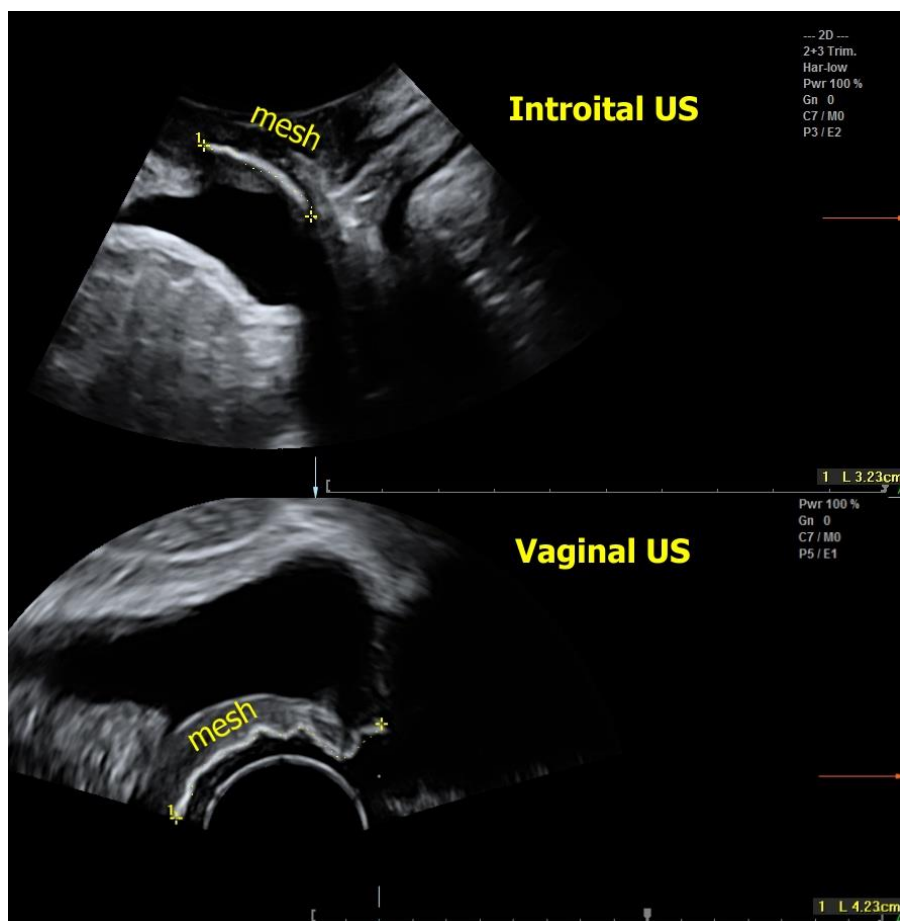
Concluding message

The imaging of the implants is an important tool for postoperative assessment. Before we base our conclusions on it, however, we should be aware of its limitations.

Table 1 – Comparison of mid-sagittal anterior mesh dimensions with vaginal and introital ultrasound examination

| Table 1 | N | Vaginal (mm) | Introital (mm) | Difference (mm) | t-test (p) | Confidence Interval (CI) |
|-------------------|-----|--------------|----------------|-----------------|------------|--------------------------|
| Day 3 follow up | 40 | 62.2 | 39.9 | 22.2 | < 0.001 | 18.4 - 25.9 |
| 3 month follow-up | 20 | 51.6 | 39.0 | 12.6 | < 0.001 | 8.0 -17.1 |
| 1 year follow-up | 40 | 50.7 | 33.9 | 16.7 | < 0.001 | 13.6 -19.8 |
| All | 100 | 55.4 | 37.7 | 18.1 | < 0.001 | 15.9 - 20.3 |

Picture 1 : Mesh dimensions measurement by introital and vaginal ultrasound examination



Disclosures

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