What transducers are used?

For transperineal/translabial scannings, the 8802 transducer (convex, freq. 3.5-6 MHz, field of view more than 70°) is the recommended choice.

For endovaginal scanning, a combination of transducers 2052 and 8848 is used.

- Transducer 2052 (mechanical, 360° rotating, multifrequency 6-16 MHz) is used to get the highest resolution possible and to have a 360° field of view of the pelvic floor.
- Transducer 8848 (electronic, biplane with 2 perpendicular arrays, multifrequency 6-12 MHz) is used to complete the examination, providing dynamic and vascular information.
- Both transducers are used for 3D imaging. The 2052 provides an automatic 3D acquisition. For 3D scanning with 8848, an external 3D mover must be added.

For high-resolution 3D endoanal scanning, the 2052 transducer is used.

As an optional extra, a traditional endovaginal transducer like 8819 can be added for introital scanning and general endovaginal scanning.
The position of the patient during scanning

The patient should be placed in the supine or lithotomy position.

The Multicompartment Examination

Transperineal/translabial scanning

The scanning will usually start with the transperineal examination. It is an easy method for a structural and functional assessment of pelvic organs. The exam will usually start with the transducer placed to obtain a midsagittal image (Fig.2).

The following structures can be seen from anterior to posterior: symphysis pubis, urethra, bladder, vagina, uterus, anorectum, puborectalis.

During this scanning the patient is asked to perform maximal pelvic floor contraction and Valsalva maneuvers in order to obtain functional information.

- Urethral hypermobility, bladder neck descent, cystoceles, enteroceles or rectoceles, intussusception and pelvic floor dyssynergy (dyskinesia) can be evaluated.
- The position of tapes or meshes can also be seen, to assess results after surgery and identify the reasons for complications.
- Different measurements of distances (bladder-symphysis distance, anterior-posterior dimension of the levator hiatus) and angles (retrovesicle angle, anorectal angle, levator plate angle) are also used to assess the functional anatomy.
- By turning the transducer to the transverse position, we can evaluate the anal canal, the bladder and urethra in the axial plane to assess any sphincter abnormality or rotation of the urethra.

Figure 2. Sagittal transperineal scanning with 8802.

Midsagittal view.
ARA: Anorectal Angle
A: Anal Canal
R: Rectum
V: Vagina
U: Urethra
B: Bladder
SP: Symphysis Pubis

Figure 3. Positioning of the convex probe for midsagittal and axial images of the pelvic floor.
Endovaginal scanning with 2052

As the 8802 transducer is working at low frequencies, the next step is to use the 2052 transducer endovaginally, to obtain higher resolution 2D, and especially 3D, images of the pelvic floor anatomy.

During this scanning it is important to keep the transducer in a neutral position – without pressure on the surrounding structures.

Endovaginal scanning with the 2052 is useful for:

- Assessing asymmetry of the pelvic floor.
- Measuring the levator hiatus dimensions (anterior-posterior, lateral-lateral, and area).
- Assessing the perineal muscles.
- Visualizing the levator ani muscle and attachment to the inferior pubic rami.

3D scanning is particularly useful because for some structures, it may be necessary to tilt the image planes in order to get the correct anatomical information. As the frequency used can be very high (up to 16 MHz) and the distance between image planes can be extremely low (down to 0.2 mm), the resulting resolution is the highest possible. Most scanings will be performed using the 13 MHz or 12 MHz frequency.

Figure 4. 3D endovaginal scanning with 2052.

Midsagittal view.
AC: Anal Canal
LA: Levator Ani
T: Transducer
U: Urethra
SP: Symphysis Pubis
OF: Obturator Foramen
IPR: Inferior Pubic Ramus
Endovaginal scanning of the anterior compartment with 8848

The next step in the multicompartment scanning is using the 8848 transducer endovaginally to assess the anterior and posterior compartments and also to obtain a dynamic assessment (by asking the patient to perform maximal pelvic floor contraction and Valsalva maneuvers) and to evaluate the vascularity of the urethra.

The transducer has two perpendicular arrays that can be used for either a midsagittal view (linear array) or an axial view (transverse array with a field of view up to 180°) of the pelvic floor. When the external 3D mover is used, the 8848 can also produce high resolution 3D imaging.

The transducer is first oriented anteriorly (ventrally) to get an assessment of the anterior compartment.

The midsagittal view lets you:

- Study the urethra.
- Measure the BSD (bladder-symphysis distance).
- Measure the urethral length.
- Evaluate and measure the rhabdosphincter, the striated urethral muscle.

Using the 3D functionality, the integrity of the urethra and the surrounding anatomy can be assessed using the sagittal, transverse and coronal views.
**Endovaginal scanning of the posterior compartment with 8848**

After visualizing the anterior compartment, the transducer can be rotated 180° to have an axial and midsagittal view of the posterior compartment.

Using the 8848 transducer for the posterior compartment makes it possible to:

- Evaluate RVS (rectovaginal septum) integrity.
- Measure the anorectal angle.
- Visualize the perineal body.
- Assess rectoceles, enteroceles and intussusception.
- Observe movement of the puborectalis during maximal pelvic floor contraction and Valsalva maneuvers in order to detect pelvic floor dyssynergy.

![Figure 7. Endovaginal scanning of the posterior compartment with 8848.](image)

**Figure 8. Axial and sagittal views of anal canal with 8848.**
Endoanal scanning with 2052

The last step in the multicompartment scanning is using the 2052 transducer endoanally.

The crystal can be moved manually inside the transducer to cover the complete length of the anal canal to get an overview of the anatomy in order to find the level to begin the 3D scan. The exam will then be completed by a high resolution 3D automatic acquisition starting above the puborectalis and going down all the way to the external anal opening.

This examination can be used to:

- Evaluate abscesses and fistulas.
- Evaluate sphincter tears in patients with fecal incontinence.
- Detect anal tumors.
- Detect mucosal rectal prolapse.

Conclusion

Using the multicompartment approach to pelvic floor scanning, with a combination of three transducers, we have the potential for gaining a complete understanding of functionality of the pelvic floor as well as detailed anatomical information.

This allows us to evaluate the patients with pelvic floor dysfunctions (such as urinary incontinence, symptoms of voiding dysfunction, recurrent urinary tract infections, fecal incontinence, pelvic organ prolapse, obstructed defecation, pelvic floor dyssynergy, and pelvic, vaginal, or anal pain) in order to decide the most appropriate management and also to assess the results after surgery.
References


